

# North Anna 1

## 1Q/2011 Plant Inspection Findings

---

### Initiating Events

**Significance:**  Dec 31, 2010

Identified By: NRC

Item Type: FIN Finding

#### **Failure to Maintain PM Procedures for Circuit Breakers Current with Industry Information and OE**

A Green, self-revealing finding was identified for the failure to maintain a preventative maintenance (PM) procedure for circuit breakers current with industry information and operating experience (OE), as required by procedure, DNAP-2001, "Equipment Reliability Process," Revision 0. The licensee entered this problem into their corrective action program as condition report 331819.

The failure to maintain an adequate preventive maintenance (PM) procedure led to an age related failure of a motor starter (main contactor) causing a fire in safetyrelated breaker cubicle J1 of motor control center (MCC) 1J1-2S which supplied power to the D control rod drive mechanism cooling fan, 01-HV-F-37D. The failure to establish an adequate PM task for testing the main contactor of a circuit breaker to ensure that it is in good operating condition and will operate reliably until the next scheduled maintenance was determined to be a performance deficiency. Significance Determination Process (SDP) phase 1 screening of the finding was performed and the finding was determined to increase the likelihood of a fire external event and required a phase 3 SDP evaluation. A phase 3 SDP analysis was performed by a regional SRA in accordance with Inspection Manual Chapter 0609 Appendix F, NUREG /CR -6850 as amended by NUREG/CR -6850 supplement 1, with the NRC North Anna SPAR risk model used to determine the conditional core damage probability (CCDP) for the fire scenarios. The dominant sequence was a fire in MCC1J1-2S damaging MSIV cables resulting in a reactor trip transient with failure of high pressure recirculation and residual heat removal due to fire effects leading to core damage. The evaluation concluded that the core damage frequency (CDF) increase of the potential fire scenarios was characterized as of very low safety significance (Green). This finding involved the cross-cutting area of problem identification and resolution, the component of OE, and the aspect of implementation and institutionalization of OE through changes to station processes and procedures (P.2(b)), because the licensee failed to incorporate existing industry OE to ensure procedural guidance was adequate for testing of the main contactor.

Inspection Report# : [2010005](#) (*pdf*)

**Significance:**  Sep 30, 2010

Identified By: Self-Revealing

Item Type: FIN Finding

#### **Inadequate set point for balbance-of-plant bus undervoltage relay**

A self-revealing finding was identified for the failure to establish an adequate set point for a balance-of-plant 4160 V bus undervoltage protection relay. The inadequate set point caused a reactor trip upon automatic start of a steam generator feedwater pump. The event was reported to the NRC in Licensee Event Report (LER) 0500339/2010-002-00. Corrective action has been taken to reduce the probability of recurrence of the problem. The licensee has placed this issue in their corrective action program as Root Cause Evaluation (RCE) 001012.

The fact that the motor starting voltage dip of the twin 4500 horsepower motor feedwater pump was below the set point of the bus undervoltage protection relays was a performance deficiency. The typical industry standard practice for bus undervoltage is that the set point be below the motor starting voltage dip to preclude spurious actuation of the undervoltage relays for expected voltage transients such as motor starting. This industry standard practice is documented in Institute of Electrical and Electronics Engineers Standard 666-1991, "IEEE Design Guide for Electric Power Service Systems for Generating Stations." Table 7.2, "Motor Protection Devices," states that the suggested setting for undervoltage relay is that it be set to override voltage drop due to motor starting. The potential for spurious tripping of the undervoltage relays has nuclear safety ramifications, in that it can contribute to a reactor trip, as it did

on May 28, 2010. The performance deficiency is more than minor because it was associated with the attribute of design control and adversely affected the objective of the initiating event cornerstone. The inappropriate undervoltage relay set point contributed to a reactor trip which is an event that upset plant stability and challenged critical safety functions. The finding was evaluated for significance using Inspection Manual Chapter 0609, Appendix E. The finding was determined to be very low safety significance, Green, because it did not contribute to both the likelihood of a reactor trip and the likelihood that mitigation functions will not be available. The cause of the finding was evaluated in the licensee's corrective action program as RCE001012. According to the LER and RCE001012, the cause of the finding was determined to be lack of a design basis for the undervoltage protection relay. Since the set point was established well outside the two-year window of current performance and there was no prior event that provided an opportunity to identify this problem, this issue did not represent current licensee performance. Therefore, no associated cross-cutting aspect was identified. (Section 40A3.3)

Inspection Report# : [2010004](#) (*pdf*)

---

## Mitigating Systems

**Significance:**  Mar 31, 2011

Identified By: NRC

Item Type: NCV NonCited Violation

### **Inadequate Post Maintenance Test Program Instructions for Safety-Related Instrument and Control Preventative Maintenance**

A Green, non-cited violation of 10 CFR 50, Appendix B, Criterion V, "Instructions, Procedures, and Drawings," was identified by the NRC for failure to adequately prescribe the correct program instructions to ensure safety-related instrument and control (I&C) preventative maintenance (PMs) received the appropriate post maintenance testing (PMT). The licensee entered this problem into their corrective action program as condition report 417730.

A performance deficiency was identified by the NRC for the failure to adequately prescribe programmatic PMT instructions to ensure safety-related I&C PMs had proper PMT. The inspectors reviewed Inspection Manual Chapter (IMC) 0612, Appendix B, and determined the finding was more than minor because if left uncorrected it would have the potential to result in a more significant safety event. In accordance with IMC 0609, "Significant Determination Process," the inspectors performed a Phase 1 analysis and determined that the finding was of very low significance because the finding was not a design deficiency, did not represent a loss of safety function and did not screen as potentially risk significant due to a seismic, flooding or severe weather initiating event. This finding involved the cross-cutting area of human performance, the component of the resources, and the aspect of complete documentation, H.2(c), because the licensee failed to adequately prescribe programmatic PMT instructions to ensure safety-related I&C PMs had proper PMT.

Inspection Report# : [2011002](#) (*pdf*)

**Significance:**  Dec 31, 2010

Identified By: NRC

Item Type: NCV NonCited Violation

### **Inadequate Corrective Action for Fatigued Fuse Clips in Safety-Related Breakers**

A Green, non-cited violation of 10 CFR 50, Appendix B, Criterion XVI, "Corrective Action," was identified by the NRC for failure to promptly identify and correct a condition adverse to quality regarding fatigued fuse clips associated with safety-related breakers. The licensee entered this problem into their corrective action program as condition report 400128.

The inspectors determined that the failure to promptly initiate corrective actions for fatigued fuse clips was a performance deficiency (PD) which resulted in two safetyrelated breaker failures. The inspectors reviewed IMC 0612, Appendix B, and determined the PD 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 design control for the initial structure, system, component design. In accordance with NRC Inspection Manual Chapter (IMC) 0609, "Significance Determination Process," the inspectors performed a Phase 1 analysis and determined that the finding was of very low

significance because the finding was not a design deficiency, did not represent a loss of safety function and did not screen as potentially risk significant due to a seismic, flooding or severe weather initiating event. This finding involved the cross-cutting area of problem identification and resolution, the component of the corrective action program, and the aspect of thorough evaluation of problems such that resolutions address extent of condition, P.1(c), because the licensee failed to initiate adequate corrective actions to address extent of condition for fatigued fuse clips.

Inspection Report# : [2010005](#) (*pdf*)

**Significance:** G Dec 31, 2010

Identified By: NRC

Item Type: NCV NonCited Violation

**Inadequate Design Control Measures for Field Changes Affecting Station Battery Cables**

The inspectors identified a non-cited violation of 10 CFR 50, Appendix B, Criterion III, "Design Control," for the failure to ensure that design control measures for field changes impacting the support of station battery cables were commensurate with those applied to the original design requirements. The licensee entered this problem into their corrective action program as condition report 358461.

The inspectors determined that the failure to adhere to the requirements of Criterion III for field changes involving the support of station battery cables was a performance deficiency (PD). This PD had a credible impact on safety due to an increase in battery post loading not analyzed by the vendor for a seismic event impacting the unsupported cables. The PD 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 design controls due to changes made to battery cable supports which created a condition adverse to quality. In accordance with NRC Inspection Manual Chapter (IMC) 0609, "Significant Determination Process," the inspectors performed a Phase 1 analysis and determined that the finding was of very low significance (Green) because the design deficiency did not result in the loss of functionality. The finding had no cross-cutting aspects because it is not indicative of current licensee performance.

Inspection Report# : [2010005](#) (*pdf*)

**Significance:** G Sep 30, 2010

Identified By: NRC

Item Type: NCV NonCited Violation

**Inadequate procedurally controlled temporary modification for the emergency diesel generator starting air system**

A non-cited violation of 10 CFR 50, Appendix B, Criterion III, "Design Control," was identified by the inspectors for the failure to ensure that design control measures for a field change performed on the Unit 1, '1J' emergency diesel generator (EDG) starting air receivers were commensurate with those of the original design. The field change consisted of a procedurally controlled temporary modification (TM) that installed a non-safety related hose between the safety related EDG starting air receivers. The licensee entered this problem into their corrective action program as condition report 389521.

The inspectors determined that the failure to adhere to the requirements of Criterion III for a field change involving a procedurally controlled TM was a performance deficiency (PD). This PD had a credible impact on safety due to the implementation of a TM which introduced a common mode failure mechanism for both EDG starting air receivers which would render the respective EDG unavailable and inoperable. The PD 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 design controls due to the removal of independence between the EDG starting air receivers and consequent impact on the redundancy of the EDGs. In accordance with NRC Inspection Manual Chapter (IMC) 0609, "Significance Determination Process," the inspectors performed a Phase 1 analysis and determined that the finding was of very low significance (Green) because the design deficiency did not result in the loss of functionality. The finding had no cross-cutting aspects because it is

## Barrier Integrity

**Significance:**  Dec 31, 2010

Identified By: NRC

Item Type: NCV NonCited Violation

### **Failure to Promptly Correct Conditions Adverse to Quality for Valve Actuator Diaphragms**

A non-cited violation of 10 CFR 50, Appendix B, Criterion XVI, "Corrective Action," was identified by the inspectors for two examples of the failure to promptly identify and correct a condition adverse to quality present in the actuator diaphragms of 1-CH-HCV-1200C, letdown orifice isolation, and 1-RC-PCV-1456, reactor coolant system (RCS) pressurizer power operated relief valve (PORV). The licensee entered these problems into their corrective action program as condition reports 355000 and 387916.

The inspectors determined that the failure to promptly correct conditions adverse to quality for 1-CH-HCV-1200C and 1-RC-PCV-1456 was a performance deficiency (PD). The NRC Enforcement Manual allows for the grouping of multiple examples of the same violation during an inspection period and the assignment of an issue to that example which is most significant. The inspectors determined that the second example, involving 1-RC-PCV-1456, was the more significant issue. The inspectors reviewed IMC 0612, Appendix B and determined the finding was more than minor because it affected the Barrier Integrity cornerstone objective of providing reasonable assurance that physical design barriers (e.g. RCS) protect the public from radionuclide releases caused by accidents or events. Specifically, the pressurizer PORVs provide protection to the RCS by preventing brittle fracture at low temperature conditions and protect RCS integrity at high temperature conditions. The inspectors reviewed IMC 0609, Attachment 4 and determined that since the finding involved a degradation of the Barriers Cornerstone, specifically the RCS barrier, a phase 3 analysis was required. The NRC's SPAR model was utilized to assess the risk significance of the finding modeling the impact of an increased likelihood of failing-to-open. The analyst calculated new failure probabilities for the Unit 1 PORVs (1-RC-PCV-1455C/1456) based on actual/observed failures of the valves. The analyst confirmed that the other valves affected by the performance deficiency (e.g., loop drain valves) were of negligible risk significance and were not included in the North Anna SPAR model. The dominant sequences were transients where a loss of the Condensate Storage Tank occurs and one/both of the PORVs fail to open when called upon, in order to initiate feed and bleed, subsequently leading to core damage. The analyst determined that the risk increase in core damage frequency was  $<1E-6$  per year, a finding of very low safety significance, Green. The cause of this finding involved the cross-cutting area of problem identification and resolution, the component of corrective action program, and the aspect of implementation of corrective action (P.1(d)), because the licensee failed to correct the safety issue that existed with 1-RC-PCV-1456 in a timely manner, commensurate with its safety significance and complexity.

Inspection Report# : [2010005](#) (pdf)

**Significance:**  Jun 30, 2010

Identified By: NRC

Item Type: NCV NonCited Violation

### **Failure to Demonstrate Effective Control of a Pressurizer PORV 1-RC-PCV-1455C Performance in**

## **Accordance with the Maintenance Rule**

Green: A non-cited violation of 10 CFR 50.65, “Requirements for Monitoring the Effectiveness of Maintenance at Nuclear Plants,” was identified by the inspectors for the failure to demonstrate that the performance of a Unit 1 pressurizer power operated relief valve (PORV), 1-RC-PCV-1455C, was being effectively controlled through preventative maintenance in accordance with 10 CFR 50.65 (a)(2) and establish performance goals and monitor against those goals in accordance with 10 CFR 50.65 (a)(1). The licensee entered this into their corrective action program as condition report 374734.

The inspectors determined that the failure to demonstrate that the performance of 1-RC-PCV-1455C, was being effectively controlled through preventative maintenance in accordance with 10 CFR 50.65 (a)(2) was a performance deficiency. The inspectors reviewed Inspection Manual Chapter 0612, Appendix B and determined the finding was more than minor because it affected the Barrier Integrity cornerstone objective of providing reasonable assurance that physical design barriers (e.g. reactor coolant system (RCS) protect the public from radionuclide releases caused by accidents or events. Specifically, RCS equipment and barrier performance, in that the PORVs provide protection to the RCS by preventing brittle fracture at low temperature conditions and protect RCS integrity at high temperature conditions.

The inspectors determined that this performance deficiency was a separate consequence of the degraded performance associated with 1-RC-PCV-1455C. Therefore, in accordance with the guidance provided in NRC Inspection Procedure 71111.12, Appendix D, this issue was determined to be a maintenance rule Category II finding and was of very low safety significance (Green). The cause of this finding involved the cross-cutting area of human performance, the component of work practices, and the aspect of human error prevention (H.4(a)), because the licensee failed to verify that the correct maintenance rule function performance criteria was being used to conduct maintenance rule evaluations.

Inspection Report# : [2010003](#) (*pdf*)

---

## **Emergency Preparedness**

---

## **Occupational Radiation Safety**

---

## **Public Radiation Safety**

---

## **Physical Protection**

Although the NRC is actively overseeing the Security cornerstone, the Commission has decided that certain findings pertaining to security cornerstone will not be publicly available to ensure that potentially useful information is not provided to a possible adversary. Therefore, the [cover letters](#) to security inspection reports may be viewed.

---

## **Miscellaneous**

Last modified : June 07, 2011