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UNITED STATES
NUCLEAR REGULATORY COMMISSION
REGION II
245 PEACHTREE CENTER AVENUE NE, SUITE 1200
ATLANTA, GEORGIA 30303-1257

March 13, 2012

EA-12-034

Mr. David A. Heacock
President and Chief Nuclear Officer
Virginia Electric and Power Company
Innsbrook Technical Center
5000 Dominion Boulevard
Glen Allen, Virginia 23060-6711

SUBJECT: SURRY POWER STATION – NRC INSPECTION REPORT 05000280/2012007
AND 05000281/2012007; PRELIMINARY WHITE FINDING

Dear Mr. Heacock:

On February 15, 2012, the U.S. Nuclear Regulatory Commission (NRC) completed review of the Surry Unit 2 reactor coolant system (RCS) standpipe level indication issue identified as FIN 05000281/2011005-02, Failure to Conduct Reviews of the Vendor Technical Manual for the RCS Standpipe, in NRC Inspection Report Nos. 050000280 and 281/2011005. In addition, the inspectors performed a Phase 3 significance determination process (SDP) evaluation to determine the safety significance of this issue. The enclosed report documents the inspection findings, which were discussed on March 8, 2012, with Mr. L. Lane and other members of your staff.

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

The enclosed inspection report discusses one Apparent Violation (AV) of Surry Units 1 and 2 Technical Specification 6.4.A.7 for the failure to provide detailed written procedures with appropriate check-off lists and instructions for preventive or corrective maintenance operations which would have an effect on the safety of the reactor. Degradation of the RCS standpipe could impact on the safety of the reactor. This finding has preliminarily been determined to be of low to moderate safety significance (Preliminary White) for Unit 2, which may require

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additional NRC inspections, and of low safety significance (Green) for Unit 1. As described in the enclosed report, a performance deficiency was identified in that the licensee failed to review the Vendor Technical Manual (VTM) as required by Dominion Procedure VPAP-0602, Vendor Technical Manual Control and did not evaluate the need for a periodic maintenance activity associated with the standpipe or if current maintenance practices were adequate in both scope and frequency. As a result, degradation of the standpipe internals occurred which contributed to both decreased standpipe reliability during a high risk reduced inventory configuration and the performance of multiple subsequent entries into that configuration in February 2011. These activities related to the safety of the reactor. The finding did not present an immediate safety concern because no shutdown cooling events occurred and safety-related mitigating systems were available at the time. This issue was assessed based on the best available information, using the applicable SDP. The analysis estimates the increase in risk from the additional drain-down evolutions and extra time in mid-loop; i.e., the risk above what the RCS repair activity would have required without the performance deficiency. For Unit 2, the analysis determined the risk increase to be on the order of $4E-06$, which is low to moderate safety significance, "White." Influential assumptions, dominant cut-set contributors, exposure time, uncertainty and sensitivity analysis, and SDP Phase 3 evaluation results are discussed in Enclosure 2 of this report. The final resolution of this finding will be conveyed in separate correspondence.

The AV associated with this finding is also being considered for escalated enforcement action in accordance with the NRC Enforcement Policy. The current Enforcement Policy can be found on the NRC's Web site at <http://www.nrc.gov/about-nrc/regulatory/enforcement/enforce-pol.html>. Additional details for this AV are provided in the enclosed inspection report.

In accordance with NRC Inspection Manual Chapter 0609, Significance Determination Process, we intend to complete our risk evaluations using the best available information and issue our final significance determination within 90 days from the issue date of the NRC Inspection Report No. 05000280, 281/2011005. The Significance Determination Process encourages an open dialogue between the NRC staff and the licensee; however, the dialogue should not impact the timeliness of the staff's final determination.

Before the NRC makes its final decision on this matter, we are providing you an opportunity to either: (1) present your perspectives on the facts and assumptions used by the NRC to arrive at these findings and their significance at a Regulatory Conference, or (2) submit your position on these findings to the NRC in writing. If you request a Regulatory Conference, it should be held within 30 days of the receipt of this letter and we encourage you to submit supporting documentation at least one week prior to the conference to make the conference more efficient and effective. If a Regulatory Conference is held, it will be open for public observation. The NRC will also issue a press release to announce the conference. If you decide to submit only a written response, such a submittal should be sent to the NRC within 30 days of the receipt of this letter. If you decline to either request a Regulatory Conference or to submit a written response, you relinquish your right to appeal the final significance determination; in that, by not doing either you fail to meet the appeal requirements stated in the Prerequisites and Limitations sections of Attachment 2 of IMC 0609.

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If you choose to provide a written response, it should be clearly marked "Response to Apparent Violation in Inspection Report Nos. 05000280/2012007 and 05000281/2012007; EA-12-034," and should include: (1) the reasons for the apparent violation, or, if contested, the basis for disputing the apparent violation, (2) the corrective steps that have been taken and the results achieved, (3) the corrective steps that will be taken to avoid further violations, and (4) the date when full compliance will be achieved. Your response may reference or include previously docketed correspondence, if the correspondence adequately addresses the required response.

If an adequate response is not received within the time specified or an extension of time has not been granted, NRC will proceed with its enforcement decision.

Please contact Gerald McCoy at (404) 997-4551 within 10 days of the date of this letter to notify the NRC of your intended response. If we have not heard from you within 10 days, we will continue with our significance determination decision. The final resolution of this matter will be conveyed in separate correspondence.

Because the NRC has not made a final determination as to the significance of the issue, no Notice of Violation is being issued at this time. Please be advised that the number and characterization of the AV described in the Enclosure 1 may change as a result of further NRC review.

In accordance with 10 CFR 2.390 of the NRC's "Rules of Practice," a copy of this letter, its Enclosure 1, and your response (if any) will be available electronically for public inspection in the NRC Public Document Room or from the Publicly Available Records (PARS) component of NRC's Agencywide Document Access and Management System (ADAMS). ADAMS is accessible from the NRC Web site at <http://www.nrc.gov/reading-rm/adams.html> (the Public Electronic Reading Room).

Sincerely,

/RA/

Richard P. Croteau, Director
Division of Reactor Projects

Docket Nos.: 50-280, 50-281
License Nos.: DPR-32, DPR-37

Enclosures:

1. Inspection Report 05000280/2012007,
05000281/2012007w/Attachment:
Supplementary Information
2. Phase 3 Significance Determination

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Supplementary Information
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STANDPIPE CHOICE LETTER-FINAL VERSIONWENC.DOCX

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Letter to David A. Heacock from Richard P. Croteau dated March 13, 2012

SUBJECT: SURRY POWER STATION – NRC INSPECTION REPORT 05000280/2012007
AND 05000281/2012007; PRELIMINARY WHITE FINDING

Distribution w/encl:

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U.S. NUCLEAR REGULATORY COMMISSION

REGION II

Docket Nos. 50-280, 50-281

License Nos. DPR-32, DPR-37

Report No. 05000280/2012007, 05000281/2012007

Licensee: Virginia Electric and Power Company (VEPCO)

Facility: Surry Power Station, Units 1 and 2

Location: 5850 Hog Island Road
Surry, VA 23883

Dates: January 26, 2012 through February 15, 2012

Inspectors: S. Sanchez, Senior Resident Inspector
J. Nadel, Resident Inspector
R. Clagg, Resident Inspector
S. Ninh, Senior Project Engineer
G. MacDonald, Senior Reactor Analyst

Approved by: Gerald J. McCoy, Chief
Reactor Projects Branch 5
Division of Reactor Projects

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Enclosure 1

SUMMARY OF FINDINGS

IR 05000280/2012007, 05000281/2012007; 01/26/2012–02/15/2012; Surry Power Station, Units 1 and 2; Other Activities.

The report covered a two week period of inspection by resident inspectors, a senior project engineer, and a senior reactor analyst. One Apparent Violation (AV) of Surry Units 1 and 2 Technical Specification 6.4.A.7 was identified. This AV has been determined to be of very low safety significance (Green) for Unit 1 and of low to moderate safety significance (Preliminary White) for Unit 2. The significance of most findings is indicated by their color (Green, White, Yellow, Red) using Inspection Manual Chapter (IMC) 0609, "Significance Determination Process" (SDP). Findings for which the SDP does not apply may be Green or be assigned a severity level after NRC management review. The NRC's program for overseeing the safe operation of commercial nuclear power reactors is described in NUREG-1649, "Reactor Oversight Process" Revision 4, dated December 2006.

A. NRC Identified and Self-Revealing Findings

Cornerstone: Initiating Events

- TBD. The inspectors identified one Apparent Violation (AV) of Surry Units 1 and 2 Technical Specification 6.4.A.7 for the failure to provide detailed written procedures with appropriate check-off lists and instructions for preventive or corrective maintenance operations which would have an effect on the safety of the reactor. Degradation of the reactor coolant system (RCS) standpipe could impact the safety of the reactor. This AV has been determined to be of very low safety significance (Green) for Unit 1 and of low to moderate safety significance (Preliminary White) for Unit 2. Specifically, a performance deficiency was identified in that the licensee failed to review the Vendor Technical Manual (VTM) for the RCS standpipe to determine conformance with established maintenance practices as required by Dominion Procedure VPAP 0602, "Vendor Technical Manual Control." As a result, the licensee did not evaluate the need for a periodic maintenance activity associated with the standpipe or if current maintenance practices were adequate in both scope and frequency. The licensee entered this issue into their corrective action program as condition report 460261.

The inspectors determined that the failure to review the VTM as required by VPAP-0602 was a performance deficiency that was within the licensee's ability to foresee and correct and which should have been prevented. The inspectors reviewed NRC Inspection Manual Chapter (IMC) 0612, Appendix B, issued on 12/24/2009, and determined that the finding was more than minor because it could adversely impact the equipment performance attribute of the initiating events cornerstone objective to limit the likelihood of those events that upset plant stability and challenge critical safety functions during shutdown operations. Specifically, the performance deficiency led to the degradation of the standpipe internals, which contributed to both decreased standpipe reliability during

a high risk reduced inventory configuration and the performance of multiple subsequent entries into that configuration. These activities related to the safety of reactor.

Because the finding affected the safety of a reactor during shutdown or refueling outages, the inspectors evaluated this finding in accordance with IMC 0609 Appendix G, "Shutdown Operations Significance Determination Process," Attachment 1, Checklist 3 "PWR Cold Shutdown and Refueling Operation - RCS Open and Refueling Cavity Level < 23' or RCS Closed and No Inventory in Pressurizer – Time to Boiling < 2 hours." The inspectors determined that the Unit 1 finding was low safety significance (Green) because no actual RCS standpipe level indication problems were observed during its reduced inventory periods. The Unit 2 finding required a Phase 3 analysis because the licensee did not maintain two sources of continuous level instrumentation with the pressurizer empty in accordance with checklist item II.A.(2) at the times, where the standpipe main control room (MCR) indication became erratic and had to be declared nonfunctional. As a result, additional drain-down evolutions were required to perform the valve repairs. Thus, the Unit 2 finding resulted in an increase in the likelihood of a loss of RCS inventory and required a significance determination process (SDP) Phase 2/3 evaluation.

The NRC performed a SDP Phase 3 evaluation based on the best available information and preliminarily determined this finding to be of low to moderate safety significance (Preliminary White) for Unit 2, which may require additional NRC inspections. The analysis estimates the increase in risk from the additional drain-down evolutions and extra time in mid-loop; i.e., the risk above what the repair action would have represented without the performance deficiency. The analysis determined that risk increase to be on the order of 4E-06, which is low to moderate safety significance, "White." Influential assumptions, dominant cut-set contributors, exposure time, uncertainty and sensitivity analysis, and SDP Phase 3 evaluation results are discussed in the Enclosure 2 of this report. The cause of this finding did not involve a cross-cutting aspect because it is not indicative of current licensee performance because of the time period associated with the receipt of the VTM and its revisions (2002-2003). (Section 4OA5)

REPORT DETAILS

4OA5 Other Activities

(Closed) FIN 05000281/2011005-02, Failure to Conduct Reviews of the Vendor Technical Manual for the RCS Standpipe

a. Inspection Scope

The inspectors performed additional in-office review of the FIN 05000281/2011005-02, Failure to Conduct Reviews of the Vendor Technical Manual for the RCS Standpipe, which was documented in the NRC Inspection Report Nos. 050000280 and 281/2011-005, to determine if there were any violations of NRC requirements. The inspectors also performed a Phase 3 significance determination process (SDP) evaluation of this issue in accordance with NRC Inspection Manual Chapter (IMC) 0609, Appendix G, Shutdown Operations Significance Determination Process.

b. Findings

Introduction: The inspectors identified one Apparent Violation (AV) of Surry Technical Specification 6.4.A.7 for the failure to provide detailed written procedures with appropriate check-off lists and instructions for preventive or corrective maintenance operations which would have an effect on the safety of the reactor. Degradation of the reactor coolant system (RCS) standpipe could impact the safety of the reactor. This AV has been determined to be of very low safety significance (Green) for Unit 1 and of low to moderate safety significance (Preliminary White) for Unit 2. Specifically, a performance deficiency was identified in that the licensee failed to review the Vendor Technical Manual (VTM) for the RCS standpipe to determine conformance with established maintenance practices as required by Dominion Procedure VPAP 0602, "Vendor Technical Manual Control." As a result, the licensee did not evaluate the need for a periodic maintenance activity associated with the standpipe or if current maintenance practices were adequate in both scope and frequency. The licensee entered this issue into their corrective action program as condition report 460261.

Description: On February 2, 2011, Surry Unit 2 tripped due to a C reactor coolant loop isolation valve (RCLIV) failure which partially blocked RCS flow. Subsequently, the licensee drained the RCS to reduced inventory conditions, defined as less than 15.7 feet above the top of active fuel, and into the coolant loop itself (mid-loop) in order to repair the valve.

The standpipe instrument consists of a stainless steel pipe with an internal magnetic float. The bottom of the standpipe is connected to the RCS cold leg and the top is vented to containment atmosphere through the pressurizer. The standpipe has a column of magnetic flag indicators (2-RC-LI-200B) that react with the float to provide a local indication of level. A remote indication transmitter (2-RC-LT-200) is installed on the

standpipe exterior oriented 125 degrees circumferentially from the magnetic flags. The transmitter is a voltage divider with reed switches. As the magnetic float rises in the column, reed switches are closed changing the voltage drop across the voltage divider linearly from the minimum indicated level (10.5 feet or 0 VDC) to the maximum indicated level (24 feet or 12 VDC). The transmitter feeds both a digital level recorder (2-RC-LR-200) and a LED bar graph level indicator (2-RC-LI-200A) with digital display, both of which are located on the main control room (MCR) vertical board. After flushing the standpipe with clean water and placing it in service in accordance with procedure 2-OP-RC-013, "Reactor Head Vent and Standpipe Operation," the licensee commenced draining to reduced inventory and began experiencing erratic indications on level indicators 2-RC-LR-200 and 2-RC-LI-200A. After the erratic indications failed to subside and resulted in sustained channel disagreement, the operators commenced a re-fill to greater than 5% RCS level in the pressurizer as required by procedure.

Initial troubleshooting on the MCR level indicator and associated circuitry identified a loose connection which was believed to be responsible for the erratic indication. After correcting the loose connection, calibrating the standpipe, and placing it back in service per procedure, but without further troubleshooting, the licensee began draining to reduced inventory for a second time. Similar erratic indications recurred and the licensee was again required by procedure to leave the reduced inventory configuration and return to greater than 5% RCS level in the pressurizer. This time, after verifying all the electrical instrumentation was operating satisfactorily, the decision was made to disassemble the standpipe and inspect the condition of the magnetic float and pipe interior. The float was found to be rusted and bent, with wear spots present on some surfaces. The standpipe interior was found to have a layer of boric acid covering 20% of the inside circumference along the entire vertical length of the standpipe.

The licensee replaced the float with a new one and pressure washed the boric acid off the standpipe interior. The pressure washing was not fully successful at removing all the boric acid. The standpipe was then reassembled and a third draining evolution to reduced inventory was commenced. The licensee successfully reached mid-loop condition without issue and began the valve repairs. However, while relying on the MCR standpipe level indicator at mid-loop inventory with the RCS open and vented, the licensee experienced two separate erratic indication events.

Testing by the Instrumentation and Controls Department, which was discussed with the inspectors, determined that 2-RC-LT-200, which feeds a common signal to 2-RC-LR-200 and 2-RC-LI-200A, was very sensitive to the orientation of the magnetic float within the standpipe. Slight deviations in the preferred magnetic axis alignment of the float as it moved up and down in the standpipe were seen to cause magnetic flux coupling loss with 2-RC-LT-200, which produced similar erratic indications on the recorder and the indicator. Interference in the standpipe due to rust, boric acid, and deformations in the float can cause such deviations. The troubleshooting section of the VTM lists a "damaged float" as a possible cause of incorrect level indication.

The inspectors reviewed Surry Units 1 and 2 Technical Specification (TS) and determined that TS 6.4.A.7 requires that detailed written procedures with appropriate check-off lists and instructions shall be provided for preventive or corrective maintenance operations which would have an effect on the safety of the reactor.

The inspectors reviewed the vendor technical manual (VTM) for the RCS standpipe (VTM-000-38-G492-00004) and found that it stated the only maintenance typically required on the standpipe and magnetic float assembly was to “ensure the internal walls of the weldment and the float are free of foreign matter.” This may be accomplished by “removing the float assembly from the unit and wiping both the float and the inside wall of the float chamber.” At the time of the valve failure in 2011, the maintenance organization had no periodic maintenance (PM) activity to wipe down the float and float chamber of the standpipe and had never previously disassembled it for internal inspection to check for foreign matter. Additionally, the licensee concluded that the float damage was likely due to years of normal standpipe operation where the float would frequently impact the top of the standpipe whenever the RCS was filled above the level of the standpipe while it was in service. Since there was no PM to check the standpipe internals, the float was never previously inspected.

The inspectors reviewed Dominion Procedure VPAP-0602, “Vendor Technical Manual Control,” Revision 5, and identified that steps 6.1.8 and 6.1.9 required the VTM coordinator to route the VTM and all revisions for review in accordance with section 6.4, which required review of maintenance procedures to ensure consistency with the VTM and all VTM revisions. A search of licensee records showed that no documented review had been performed on the VTM or any of its revisions when they were officially received and entered into the licensee’s system in 2002-2003. The inspectors also noted that VPAP 0602 requires such documentation to be retained for the life of the plant.

The licensee also concluded, in their Apparent Cause Evaluation (ACE 18543), that the PM scope and frequency for the RCS standpipe was inadequate to ensure component reliability. As a result, a corrective action was created to “establish a PM to clean the standpipe on a periodic basis as stated in the vendor manual.”

Analysis: The inspectors determined that the failure to review the VTM as required by VPAP-0602 was a performance deficiency that was within the licensee’s ability to foresee and correct and which should have been prevented. As a result, a violation of Surry Units 1 and 2 TS 6.4.A.7 was identified for failure to provide detailed written procedures with appropriate check-off lists and instructions for preventive or corrective maintenance operations which would have an effect on the safety of the reactor. Degradation of the reactor coolant system (RCS) standpipe could impact the safety of the reactor. Degradation of the standpipe internals occurred which contributed to both decreased standpipe reliability during a high risk reduced inventory configuration and the

performance of multiple subsequent entries into that configuration in February 2011. These activities relate to the safety of the reactor. The inspectors reviewed IMC 0612, Appendix B, issued on 12/24/2009, and determined that the finding was more than minor because it could adversely impact the equipment performance attribute of the initiating events cornerstone objective to limit the likelihood of those events that upset plant stability and challenge critical safety functions during shutdown operations.

Because the finding affected the safety of a reactor during shutdown or refueling outages, the inspectors evaluated this finding in accordance with IMC 0609 Appendix G, "Shutdown Operations Significance Determination Process," Attachment 1, Checklist 3, "PWR Cold Shutdown and Refueling Operation - RCS Open and Refueling Cavity Level < 23' or RCS Closed and No Inventory in Pressurizer – Time to Boiling < 2 hours." The inspectors determined that the Unit 1 finding was low safety significance (Green) because no actual RCS standpipe level indication problems were observed during its reduced inventory periods. The Unit 2 finding required a Phase 3 analysis because the licensee did not maintain two sources of continuous level instrumentation with the pressurizer empty in accordance with checklist item II.A.(2) at the times where the standpipe MCR indication became erratic and had to be declared nonfunctional. As a result, additional drain-down evolutions were required to perform the valve repairs. Thus, the Unit 2 finding resulted in an increase in the likelihood of a loss of RCS inventory and required a significance determination process (SDP) Phase 2/3 evaluation.

The NRC performed a SDP Phase 3 evaluation based on the best available information and preliminarily determined this finding to be of low safety significance (Preliminary Green) for Unit 1 and of low to moderate safety significance (Preliminary White) for Unit 2 that may require additional NRC inspections. The analysis estimates the increase in risk from the additional drain-down evolutions and extra time in mid-loop; i.e., the risk above what the repair action would have represented without the performance deficiency. The analysis determined that risk increase to be on the order of 4E-06, which is low to moderate safety significance, "White." Influential assumptions, dominant cut-set contributors, exposure time, uncertainty and sensitivity analysis, and SDP Phase 3 evaluation results are discussed in the Enclosure 2 of this report. The cause of this finding did not involve a cross-cutting aspect because it is not indicative of current licensee performance because of the time period associated with the receipt of the VTM and its revisions (2002-2003).

Enforcement: Surry Units 1 and 2 Technical Specification 6.4.A.7 requires that detailed written procedures with appropriate check-off lists and instructions shall be provided for preventive or corrective maintenance operations which would have an effect on the safety of the reactor. Dominion Procedure VPAP-0602, Vendor Technical Manual Control (VTM), Revision 5, Steps 6.1.8 and 6.1.9 requires the VTM coordinator to route the VTM and all revisions for review. Dominion Procedure VPAP-0602, Vendor Technical Manual Control, Revision 5, Section 6.4, requires review of maintenance procedures to ensure consistency with the VTM and all VTM revisions.

Contrary to the above, as of February 6, 2011, the licensee had failed to provide detailed written procedures with appropriate check-off lists and instructions for preventive or corrective maintenance operations for the RCS standpipe. Specifically, the licensee failed to provide detailed written procedures that incorporated appropriate instructions to ensure the RCS standpipe is free of foreign matter. Vendor Technical Manual VTM-000-38-G492-00004, for the RCS standpipe, states that "the only maintenance typically required is to ensure the internal walls of the weldment and the float are free of foreign matter." The licensee failed to implement procedures to implement these recommendations. Dominion Procedure VPAP-0602, required the VTM coordinator to route the VTM and all revisions for review in accordance with section 6.4, which required review of maintenance procedures to ensure consistency with the VTM and all VTM revisions. The licensee failed to evaluate the applicability of the vendor recommended maintenance to their specific installation. As a result, the RCS standpipe was demonstrated to be unreliable during a reduced inventory evolution in February 2011, and the RCS standpipe internals were found to contain rust, boric acid residue along its entire length, and a bent float mechanism. This condition contributed to multiple entries into a reduced inventory configuration. This condition could have an effect on the safety of the reactor because the RCS level indications support the residual heat removal system in providing reliable cooling to the core while the plant is in a reduced inventory condition. Pending final determination of safety significance, this finding is identified as AV 05000280, 281/2011005-02, Failure to Provide Preventive or Corrective Maintenance Operations for the RCS Standpipe Resulted in TS 6.4.A.7 Violation.

4OA6 Meetings, Including Exit

Exit Meeting Summary

On March 8, 2012, the inspection results were presented to Mr. L. Lane and other members of his staff, who 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.

ATTACHMENT: SUPPLEMENTAL INFORMATION

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SUPPLEMENTAL INFORMATION

KEY POINTS OF CONTACT

Licensee Personnel

L. Lane, Site Vice President
K. Sloane, Plant Manager (Nuclear)
B. Stanley, Director, Station Safety and Licensing

NRC Personnel

R. Croteau, Director of Division of Reactor Projects (DRP)
G. McCoy, Chief, Reactor Projects Branch 5, DRP

LIST OF ITEMS OPENED, CLOSED AND DISCUSSED

Opened

05000280, 281/2011005-02	AV	Failure to Provide Preventive or Corrective maintenance operations for the RCS Standpipe Resulted in TS 6.4.A.7 Violation (Section 4OA5)
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Closed

05000281/2011005-02	FIN	Failure to Conduct Reviews of the Vendor Technical Manual for the RCS Standpipe
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~~OFFICIAL USE ONLY—SECURITY RELATED INFORMATION~~

Attachment