VIRGINIA ELECTRIC AND POWER COMPANY
RICHMOND, VIRGINIA 23261

September 27, 2011

10 CFR 100, Appendix A

U.S. Nuclear Regulatory Commission
Attention: Document Control Desk
Washington, DC 20555

Serial No.: 11-520A
NL&OS/GDM R2
Docket Nos.: 50-338/339
License Nos.: NPF-4/7

VIRGINIA ELECTRIC AND POWER COMPANY
NORTH ANNA POWER STATION UNITS 1 AND 2
POST-EARTHQUAKE RESTART READINESS DETERMINATION PLAN
STATUS UPDATE

By letter dated September 17, 2011 (Serial No. 11-520), Virginia Electric and Power Company (Dominion) submitted a summary report of the response of North Anna Power Station to the August 23, 2011 Mineral, Virginia earthquake whose epicenter was located approximately eleven miles West-Southwest of the station. In that report, Dominion confirmed the earthquake exceeded the peak ground and spectral accelerations for the Operating Basis and Design Basis Earthquakes (OBE and DBE, respectively) for North Anna Power Station. Chapter 10 of the Code of Federal Regulations, Part 100, Appendix A, states that "if vibratory ground motion exceeding that of the Operating Basis Earthquake occurs... Prior to resuming operations, the licensee will be required to demonstrate to the Commission that no functional damage has occurred to those features necessary for continued operation without undue risk to the health and safety of the public." Consistent with this regulatory requirement, Dominion also provided a Restart Readiness Determination Plan in the letter noted above to demonstrate that station structures, systems and components (SSCs) will continue to perform their required design functions such that restart of North Anna Units 1 and 2 may commence. The purpose of this letter is to provide a status update of the plant activities associated with unit restart that have been completed to date.

Detailed Inspection

In the letter noted above, we informed the NRC that a detailed inspection was being performed for a small number of structures and components that were determined to have high-confidence-of-low-probability-of-failure (HCLPF) capacities below 0.3g. The structures and components were identified during implementation of the station response to Generic Letter (GL) 88-20, Supplement 4, *Individual Plant Examination of External Events* (IPEEE) and GL 87-02, *Verification of Seismic Adequacy of Mechanical and Electrical Equipment In Operating Reactors (USI A-46).* The detailed inspection has been completed and no significant physical or functional seismic related damage was identified. It should be noted that the list of IPEEE equipment with HCLPF capacities below 0.3g included in Table 1 of Enclosure 1 of the September 17, 2011 submittal erroneously included the Unit 2 "C" 120 V vital bus (2-EP-CB-04C). This component has a HCLPF capacity greater than 0.3g and should not have been

A001
NRR

included. In addition, the Unit 2 steam generator blowdown valves were incorrectly specified. The correct mark numbers for these components are 2-BD-TV-200A, 200C and 200E.

Near-Term Actions to be Completed Prior to Unit Restart

Enclosure 8 of the September 17, 2011 submittal identified several near-term actions to be completed prior to unit restart. These actions include seismic monitoring improvements, completion of ongoing nuclear fuel inspections and testing, issuance of two root cause evaluations, completion of engineering program inspections and completion of surveillance and functional testing to confirm the functionality of plant SSCs. Attachment 1 to this letter provides a status update for these actions to facilitate NRC review efforts. Additional updates will be provided as action items are completed. Attachment 2 updates Enclosure 8 with the current completion status of near-term actions.

If you have any questions or require additional information, please contact Mr. Gary D. Miller at (804) 273-2771.

Sincerely,

E. S. Grecheck
Vice President – Nuclear Development

Attachments:
1. Status Update of Near-Term Restart Actions
2. Updated Enclosure 8 from Dominion Letter Serial No. 11-520, September 17, 2011

Commitments made in this correspondence: None

COMMONWEALTH OF VIRGINIA)

COUNTY OF HENRICO)

The foregoing document was acknowledged before me, in and for the County and Commonwealth aforesaid, today by E. S. Grecheck who is Vice President – Nuclear Development, of Virginia Electric and Power Company. He has affirmed before me that he is duly authorized to execute and file the foregoing document in behalf of that Company, and that the statements in the document are true to the best of his knowledge and belief.

Acknowledged before me this 27th day of September, 2011.

My Commission Expires: 4/30/2015.

Ginger Lynn Rutherford
NOTARY PUBLIC
Commonwealth of Virginia
Reg. # 310847
My Commission Expires 4/30/2015

Ginger L Rutherford
Notary Public

cc: Regional Administrator
U.S. Nuclear Regulatory Commission - Region II
Marquis One Tower
245 Peachtree Center Ave.
NE Suite 1200
Atlanta, Georgia 30303-1257

NRC Senior Resident Inspector
North Anna Power Station

M. Khanna
Branch Chief - Mechanical and Civil Engineering Branch
U. S. Nuclear Regulatory Commission
One White Flint North
Mail Stop 09 E-3
11555 Rockville Pike
Rockville, MD 20852-2738

R. E. Martin
NRC Project Manager
U. S. Nuclear Regulatory Commission
One White Flint North
Mail Stop 08 G-9A
11555 Rockville Pike
Rockville, MD 20852-2738

P. G. Boyle
NRC Project Manager
U. S. Nuclear Regulatory Commission
One White Flint North
Mail Stop 08 G-9A
11555 Rockville Pike
Rockville, MD 20852-2738

Mr. J. E. Reasor, Jr.
Old Dominion Electric Cooperative
Innsbrook Corporate Center
4201 Dominion Blvd.
Glen Allen, Virginia 23060

Attachment 1

Status Update of Near-Term Restart Actions

Virginia Electric and Power Company
(Dominion)
North Anna Power Station Units 1 and 2

Status Update of Near-Term Restart Actions
North Anna Power Station Units 1 and 2

Background

By letter dated September 17, 2011 (Serial No. 11-520), Dominion submitted a Summary Report of the August 23, 2011 Earthquake Response and Restart Readiness Determination Plan to inform the NRC of the response of station structures, systems and components (SSCs) to the earthquake and to obtain concurrence with Dominion's plan for restart of North Anna Units 1 and 2. Enclosure 8 of that letter provides a list of near-term actions that will be completed prior to unit restart. These actions include seismic monitoring improvements, completion of ongoing nuclear fuel inspection and testing activities, issuance of two root cause evaluations, completion of engineering program inspections, and completion of surveillance and functional testing to confirm the functionality of plant SSCs. The status of these actions is provided in detail below. The associated Enclosure 8 item number is identified where applicable.

I. Seismic Monitoring

A. Temporary Free Field Seismic Monitoring Instrumentation (Encl. 8, Item A.2)

A temporary free field seismic monitoring system has been installed at North Anna Power Station. The system consists of a triaxial sensor (i.e., an accelerometer) and a strong motion recorder. Both components are mounted on a small concrete pad east of the Training Building. The sensor picks up vibration and transforms it into an electrical signal which is proportional to acceleration. The strong motion recorder is mounted adjacent to the sensor, and the data collected by the sensor is transmitted to the recorder via a sensor cable where the data is digitized and stored in memory. If the vibration exceeds the set threshold level, the contents of the memory are written to an internal static random-access memory (SRAM) as a compressed binary file. The data files can be retrieved by a laptop computer equipped with the proper software, and the data files can be decompressed and analyzed. The seismic monitoring system is powered by 120V AC, and the strong motion recorder has an internal rechargeable battery that provides operation for over 30 hours during power interruptions.

Site-specific parameters such as trigger value, Operating Basis and Design Basis Earthquake[1] (OBE and DBE, respectively) peak ground acceleration levels, Cumulative Absolute Velocity (CAV) values, and OBE/DBE response can be inputted into the software. Time domain analysis includes time history acceleration and CAV. In the frequency domain, the software can generate a response spectrum and velocity spectrum. Time history displays acceleration vs. time for three orthogonal directions (X, Y, and Z) along with the site specific trigger, OBE, and DBE

[1] Vendor literature and other references use the term Safe Shutdown Earthquake (SSE). North Anna Power Station uses the term Design Basis Earthquake (DBE). These terms are equivalent.

alarm levels. The graphical interface displays maximum acceleration values in each direction and allows the user to enlarge various portions of the curve. The software also computes the CAV value and graphically displays the result compared to OBE/DBE limits.

The data/output generated by the temporary seismic monitoring system is considered supplemental information. The supplemental information is not to supplant the annunciator indication from the existing Kinemetrics and Engdahl systems regarding determination whether a seismic event occurred with vibratory ground motion equal to or exceeding an OBE. The temporary seismic monitoring system will be used primarily to corroborate data obtained from the other two plant systems.

B. Revision of Abnormal Procedure AP-36, "Seismic Event" (Encl. 8, Item A.3)

While the initial station response to the earthquake using North Anna Abnormal Procedure 0-AP-36 was adequate, subsequent to the earthquake it was determined that procedural improvements could be incorporated to provide plant staff with more comprehensive direction for responding to an earthquake. Improvements include, but are not limited to, the following:

- Addition of an initial CAUTION statement to perform walkdown inspections and evaluations for damage within eight hours of a seismic event,
- Identification of actions to be taken if the Earthquake Instrument Panel Trouble Annunciator is lit to determine if OBE has been exceeded,
- Verification of Fire Main loop integrity,
- Performance of a Seismic Event Assessment within four hours of a seismic event,
- Addition of procedural guidance for:
  - Restoring the Seismic Monitor to Standby,
  - Retrieving Seismic Data,
  - Assessing Seismic Data,
  - Understanding a Typical Seismic Strip Chart Trace,
  - Performing Plant Walkdowns and Evaluations for Damage,
  - Performing Operations Watch Station Walkdowns,
  - Evaluating Safe Shutdown Systems,
  - Evaluating Control Room Systems, and
  - Obtaining/evaluating data from the temporary free-field seismic monitoring instrumentation.

These procedural improvements will significantly enhance station response to seismic events.

II. Nuclear Fuel (Encl. 8, Items B.1.a and B.2.a – f)

Enclosure 4 of Dominion's September 17, 2011 submittal discussed the inspection and testing activities that had been completed, were in process, or were planned to assess the impact of the August 23, 2011 earthquake on North Anna fuel assemblies and non-fuel core components. In addition, Enclosure 8 of that submittal listed the remaining nuclear fuel inspection and testing activities to be completed prior to unit startup. A significant portion of the inspection and testing activities have since been completed. Consequently, the information previously provided in Enclosure 4 has been revised in its entirety to provide an update of the actions that have been completed and the results obtained. The updated information is provided below.

As a result of the potential impact on station equipment due to the August 23, 2011 earthquake, verification of the continued acceptability of fuel assemblies and non-fuel core components in the new fuel storage area, the spent fuel pool, and the Unit 1 and Unit 2 cores was necessary. The purpose of this review is to provide an update on the inspections that have been or will be performed to confirm that the recent seismic event at North Anna did not result in significant physical or functional damage to the fuel assemblies and the fuel insert components. These inspections allow for confirmation of the condition of both new and spent fuel, as well as non-fuel core components such as rod core cluster control assemblies (RCCAs) and burnable poison rod assemblies (BPRAs).

Discussion

EPRI NP-6695, "Guidelines for Nuclear Plant Response to an Earthquake," only mentions fuel and control rods briefly. Results of physical inspections of the plant indicate the seismic event damage is consistent with Intensity 0 on the EPRI seismic damage scale. NP-6695 describes how prescribed inspections and tests are keyed to the severity of the earthquake. No specific inspections of fuel or associated components are specified in NP-6695 for Intensity 0 earthquakes. Since the earthquake did not produce any significant physical or functional damage to safety-related plant SSCs and only limited damage to non-safety related, non-seismically designed SSCs that were examined following the event, there is reasonable assurance that there was no significant physical or functional damage to the fuel, and that the fuel remains functional and capable of performing its design functions. The inspections described herein provide additional confirmation that the earthquake resulted in no significant physical or functional damage to the fuel or fuel insert components, and that they remain fully functional and capable of performing their design basis functions.

Dominion, with input from AREVA, compiled a list of inspections to be conducted for fuel and fuel insert components in the new fuel storage racks and spent fuel pool, and during offload of the Unit 2 core, to verify the acceptability of the Unit 2 fuel for use or reuse. The Unit 2 fuel has been examined, and these inspections were used to assess the condition of the Unit 1 fuel. No inspections of Unit 1 fuel are planned subject to the Unit 2 fuel meeting the inspection criteria.

Miscellaneous Inspections to Support Fuel Inspections

Before any fuel inspections were performed by station personnel in the spent fuel pool area the following inspections were performed:

- Prior to any movement of fuel assemblies for inspection, the handling equipment - including handling tools, new fuel elevator and bridge crane - was verified as operational using functional checkouts required in the fuel handling procedures.
- Slight movement of the racks had been postulated during a DBE. The spent fuel storage rack arrays were inspected to confirm that the racks had not shifted significantly and that structural changes had not occurred during the earthquake. The indexing coordinates used on the bridge crane were verified to remain accurate by inserting and removing the dummy fuel assembly in two empty spent fuel cells in each rack. Videos of the rack cells taken after the earthquake were also compared with previously existing videos of the racks. There were no structural changes of the storage racks.
- The dummy fuel assembly was lifted and visually inspected prior to its use for any other system checkouts or verification.

New Fuel Storage

Prior to moving any assemblies, an inspection of the underneath portion of the New Fuel Storage area was conducted to ensure there was no damage or distortion that would lead to interferences between the assemblies and the storage cells when raising the fuel assemblies. There were no Condition Reports initiated from that inspection that indicated conditions exist that would result in any adverse impact on the fuel.

At the time of the earthquake, there were eighteen new fuel assemblies in the new fuel storage area, eleven of which contained BPRAs. In addition, there was one new BPRA hanging from a support plate in a new fuel storage cell. The eighteen fuel assemblies were free standing in their storage cells and thus able to move and contact the cell walls during a seismic event. These eighteen assemblies were visually inspected for any evidence of impact between the storage cell and the grids or any other parts of the assembly. This inspection was more involved than the normal new fuel receipt inspections. AREVA provided recommendations on the scope and criteria to be used during these inspections. Inspections included verification that all visible quick disconnect locking lugs remained in the locked position, visual examination of the outer row of fuel rods for anomalies that might indicate deformation of the grids, visual inspection of rod to rod and rod to guide tube gaps to the extent possible, and visual inspection of inner grid strip straightness to the extent possible. RCCA insertion force was measured for the seven new fuel assemblies that did not contain BPRAs at the time of the earthquake to ensure that there is no distortion of the guide tubes. (A spare, unirradiated RCCA was used for this purpose.) The eighteen assemblies were found to meet the inspection criteria.

The eleven BPRAs that were in new fuel assemblies were each lifted a short distance by hand and lowered back into the assembly to ensure that they would self-seat. Additional inspections were performed on these eleven BPRAs in accordance with the AREVA recommendations, including inspections of the nuts and welds connecting the poison rodlets to the BPRA baseplates and, while the BPRAs were slightly raised, inspecting the BPRA rodlets for dents or abrasions to the extent possible. The BPRA that was hanging from the support plate was inspected when it was removed from the support plate and placed in a fuel assembly. AREVA provided separate inspection recommendations for this BPRA, which again included inspection of the connections of the rodlets to the baseplate, visual inspection of the rods for straightness (qualitative inspection while BPRA was hanging), and inspection of the full length of the rods for dents, abrasions, or yielding. The inspected BPRAs were determined to meet the inspection criteria.

Spent Fuel Pool

The spent fuel pool rack cells are 8.875 inches square on the inside. There is slightly less clearance between the fuel and the cell walls in the spent fuel racks compared to the new fuel storage cells, and the potential for fuel damage in the spent fuel pool is further reduced by hydraulic damping effects. Nevertheless, the following inspections were performed:

- Five new fuel assemblies scheduled for use in Unit 2 Cycle 22 that were placed into the spent fuel pool prior to the earthquake were video inspected for any signs of damage. These assemblies were inspected in accordance with the recommendations provided by AREVA, and the inspections included verification that the visible quick disconnect locking lugs remained in the locked position, visual examination of the outer row of fuel rods for anomalies that might indicate deformation of the grids, visual inspection of rod to rod and rod to guide tube gaps to the extent possible, and visual inspection of inner grid strap straightness to the extent possible.

- During preparation of the spent fuel pool prior to the Unit 2 offloads, a pre-core offload fuel shuffle was performed. During this shuffle, a sample consisting of ten of these assemblies was also video inspected for any signs of damage. When inspecting these irradiated assemblies, Dominion's normal criteria for irradiated fuel inspections were used to assess the condition of the fuel.

The population of new fuel assemblies and fuel assemblies moved during the pre-core offload fuel shuffle that was inspected provides a representative sample of the fuel and storage locations across the spent fuel pool. The fuel assemblies examined during these inspections met the inspection criteria.

Unit 1 and Unit 2 Cores

At the time of the seismic event on August 23, 2011, Reactor Coolant System (RCS) coolant activity indicated zero fuel failures in the Unit 2 core and an estimated two failed rods in the Unit 1 core. The Unit 1 and Unit 2 RCS coolant activity following shutdown was consistent with the known fuel condition at the time of the earthquake, and indicated that no fuel failures occurred in either unit as a result of the earthquake. Because there were no indications of fuel failures in the Unit 2 core, no fuel sipping inspections, which are used to identify fuel assemblies containing leaking fuel rods, were necessary.

Prior to the Unit 2 core offload, the tops of two fuel assemblies that did not contain inserts (either RCCAs or discrete BPRAs) were examined to ensure the quick disconnect mechanisms remained properly locked. The locking lug position was checked for one fuel assembly in the interior of the core and for one fuel assembly in a baffle core location in accordance with AREVA recommendations. The locking lugs were determined to be properly positioned.

Binocular visual inspections were performed on the 157 fuel assemblies in the Unit 2 core during the core offload. Such visual inspections are performed as part of the normal refueling outage work scope, to look for any damage or other fuel anomalies. The appearance of the fuel assemblies during the North Anna 2 Cycle 21 core offload was consistent with fuel assemblies inspected during previous core offloads, with no observations of grid or fuel rod damage that would indicate any unusual interaction between adjacent fuel assemblies or between fuel assemblies and the core baffle.

The only fuel anomalies that were identified during the North Anna 2 core offload visual inspections were indications of excessive fuel rod bow in some second- and third-cycle assemblies. Twenty fuel assemblies (five assemblies scheduled for reuse in Cycle 22 and fifteen assemblies scheduled for discharge at the end of the current cycle) were identified as potentially having sufficient fuel rod bow to result in channel closure (rod-to-rod contact) or envelope violations (rods extending beyond the plane identified by the fuel assembly nozzles and grids). Consistent with Dominion's normal inspection practice, detailed video inspections were performed of each fuel assembly in which a possible anomalous condition was identified during the core offload. These detailed video inspections confirmed the presence of channel closure or envelope violations in ten of the twenty fuel assemblies that had been identified. The ten fuel assemblies with confirmed anomalies were scheduled for discharge at the end of Cycle 21. The existence of significant fuel rod bow, the number of potentially affected fuel assemblies identified by the binocular inspections, and the number of confirmed instances of channel closure or envelope violation are consistent with previous experience with fuel rod bow in the AREVA Advanced Mark-BW fuel design at both North Anna units. There is no indication that the seismic activity that resulted in the Unit 2 shutdown affected the presence of this phenomenon in some fuel assemblies, the frequency of occurrence, or the magnitude of fuel rod bow.

Dominion fuel inspection procedures also require that a sampling of fuel assemblies be video inspected in detail after the offload. The fuel assemblies selected for this inspection were selected to provide an overview of the core, and included fuel assemblies from each reload batch in the core. The selected fuel assemblies also represented different types of power histories within each batch and different core locations (interior and baffle locations, and locations in each quadrant of the core). Prior to the earthquake, thirteen fuel assemblies had been selected for inspection during the North Anna 2 refueling outage. AREVA also recommended that video inspections be performed on twenty fuel assemblies that resided in or near baffle locations that are predicted to be most susceptible to seismic damage. During these video inspections, recommendations provided by AREVA (e.g., half-face video inspections, inspection of rod to rod gap, inspection of grids from above and below for inner grid strip straightness) were used to supplement Dominion's normal criteria for irradiated fuel inspections. Any reuse fuel assembly with an anomalous condition (i.e., identified during the offload visuals as potentially having significant fuel rod bow) was inspected in the same manner. The appearance of the North Anna 2 fuel assemblies was consistent with observations made during previous refueling outages. There were no indications of grid, fuel rod or fuel assembly deformation or damage. If the vertical acceleration had been sufficient to lift the core and compress the top nozzle hold down springs, some indications might have appeared on the springs or on the corner pads if the springs bottomed out. Inspections of the side of the nozzle when the video inspections were performed did not identify any such damage to the nozzles.

When the units tripped during the recent seismic event, the RCCAs fully inserted. When RCCAs are removed from fuel assemblies, the design of the RCCA handling tool prevents inspection of the RCCA rodlets. To confirm that there is no distortion of the RCCA rodlets or the fuel assembly guide tubes, and that the RCCAs can still freely travel within the fuel assembly guide tubes, RCCA drag loads were measured in the spent fuel pool. Measurements have been performed in the 48 fuel assemblies in which the RCCAs resided during Cycle 21. Following the movement of the RCCAs into their host fuel assemblies for Cycle 22, additional measurements of drag loads were performed. The fuel assemblies in which the control rods were placed for Cycle 22 were also in the North Anna 2 core at the time of the earthquake. The data from these measurements are currently being analyzed.

The RCCAs used at North Anna are a Westinghouse design in which the radial vanes are tack welded, and then brazed, to the central hubs. Over the years, there have been isolated incidents in the industry where an RCCA vane has separated from the central hub in this design. To provide additional confirmation that the seismic event did not compromise the RCCA integrity, prior to the handling of individual RCCAs (drag measurements, movement to other fuel assemblies), a video inspection of the RCCA hubs was performed, with emphasis on the joints where the radial vanes are brazed to the RCCA central hubs. No indications of any cracks or other flaws were observed.

Post-latch drag testing and hot rod drops of the RCCAs are already required as part of the normal start-up activities, and will be performed on Unit 2 prior to the unit entering Mode 2. In addition, hot rod drops of the RCCAs will be performed on Unit 1 prior to the unit prior to entering Mode 2. These tests ensure the proper alignment of the RCCAs and fuel assemblies, ensure that the RCCAs move freely, ensure that the control rod drive mechanisms (CRDMs) are functional, and verify that the Technical Specifications requirements for RCCA insertion are satisfied.

Conclusions

Inspections performed on the North Anna 2 fuel included:

- Detailed visual inspections of the new fuel assemblies and BPRAs that were in the new fuel storage area, including RCCA insertion force for fuel assemblies that did not contain BPRAs at the time of the seismic event,
- Detailed visual inspections of a sample of the new fuel assemblies and BPRAs that had already been placed in the spent fuel pool,
- Visual inspections of a sample of fuel assemblies stored in the pool at the time of the seismic event,
- Binocular inspections of the North Anna Unit 2 fuel in the core at the time of the seismic event, and detailed visual inspection of any anomalies identified during the core offload,
- Detailed visual inspections of a representative sample of fuel assemblies from the Cycle 21 core,
- Detailed visual inspections of fuel assemblies from the Cycle 21 core locations predicted to be most susceptible to damage during a seismic event,
- Visual inspection of the RCCA hubs, and
- Control rod drag measurements of the fuel assemblies that contained RCCAs in Cycle 21 and the fuel assemblies that will contain RCCAs in Cycle 22 to confirm the operability of the fuel assembly guide tubes and RCCAs.

Reduction of the data from the RCCA drag testing is currently in progress. The fuel assemblies met the inspection criteria of the additional visual inspections. The appearance of the fuel and fuel insert components was consistent with fuel inspected during previous refueling outages. There were no indications of deformation of or other damage to the fuel assemblies, fuel assembly grids or fuel rods, or to the BPRAs or RCCAs as a result of the August 23, 2011 seismic event that would adversely impact their ability to safely perform their design functions.

The fuel and insert components in North Anna Unit 1 are of the same design as the Unit 2 fuel and insert components that were inspected, and were subjected to the same seismic loads during the August 23, 2011 earthquake. The impact of the seismic loads on the Unit 1 fuel and inserts would therefore be similar to the impacts on the Unit 2 fuel and inserts. No damage to the Unit 2 fuel or inserts was identified by the visual inspections that were performed, so it is concluded that the North Anna 1 fuel and inserts were similarly not subjected to any loads or vibrations that would adversely impact their ability to continue to safely perform their design functions. To the extent possible, the restart of Unit 1 will include performance of the tests and verifications that are normally applied during startup from a refueling outage. Because the Unit 1 reactor vessel was not disassembled following the August 23, 2011 seismic event, post-latch drag testing of the RCCAs normally performed as part of reactor reassembly to provide a first indication that the RCCAs are aligned and moving freely cannot be performed for Unit 1. However, hot rod drop testing of the Unit 1 RCCAs will be performed in accordance with station procedures as a final confirmation of the full functionality of the RCCAs.

Table 1
Fuel and Miscellaneous Inspections

Area	Task	Status
New Fuel Storage	Inspect BP1729 (hanging from support plate in new fuel storage cell) when transferring to new fuel assembly 13L. Use AREVA inspection criteria.	Complete
	Inspect 18 New Fuel Assemblies prior to transfer to spent fuel pool. Use AREVA inspection criteria.	Complete
	Inspect 11 BPRAs in Fuel Assemblies. Use AREVA inspection criteria.	Complete
	Drag test 7 New Fuel Assemblies.	Complete
Spent Fuel Pool	Inspect a sample (10) of assemblies during the pre-offload shuffle. Video inspect according to the normal benchmark video inspection requirements.	Complete
	Inspect a sample (5) of New Fuel Assemblies and BPRAs. Use AREVA inspection criteria.	Complete
Unit 1 Core	Hot Rod Drop Tests. Follow standard North Anna procedure used at BOC.	Prior to Unit 1 entering Mode 2
Unit 2 Core	Prior to core offload, inspect top nozzle locking lug position of two Fuel Assemblies. Ensure positive lock of the quick disconnect mechanisms.	Complete
	Verify RCCAs still freely travel within the Fuel Assembly guide tubes. Measure RCCA drag loads in the spent fuel pool.	In Progress
	Perform routine binocular visual inspection during core offload. Any anomalous conditions will be video inspected.	Complete
	Perform video inspections on 13 benchmark Fuel Assemblies and AREVA recommended Fuel Assemblies. The AREVA recommendations include Fuel Assemblies from specific core locations susceptible to grid damage during seismic events.	Complete
	Perform video inspection of RCCA central hubs.	Complete
	Perform video inspections on Fuel Assemblies with any anomalies observed during binocular inspections. Part of normal outage scope. Normal Dominion irradiated fuel inspection criteria apply. Fuel Assemblies planned for reuse will also be inspected to the AREVA inspection criteria.	Complete

Area	Task	Status
Unit 2 Core (cont.)	Post-latch drag testing and Hot Rod Drops. Both are part of normal refueling outage scope and will follow standard North Anna procedures.	Prior to Unit 2 entering Mode 2
Miscellaneous Inspections	Prior to picking up any fuel, verify that all handling equipment including handling tools, new fuel elevator, and bridge crane are operational prior to fuel inspections.	Complete
	Visually inspect dummy fuel assembly prior to picking up other fuel in spent fuel pool and prior to moving new fuel to pool.	Complete
	Visually inspect spent fuel storage racks for indications of significant rack movement and distortion prior to fuel movement. Functionally verify no significant change to indexing coordinates by inserting and removing dummy fuel assembly at a minimum of one per rack.	Complete

III. Root Cause Evaluations (Encl. 8, Items C.1 and C.2)

Two Root Cause Evaluations (RCEs) were identified in Enclosure 8 of Dominion's September 17, 2011 submittal as near-term actions that would be completed prior to unit restart. The first RCE addresses the cause of the dual unit reactor trip, and the second RCE addresses the Unit 2H Emergency Diesel Generator (EDG) coolant leak. While the second RCE is being performed for an event that occurred separately from and subsequent to the August 23, 2011 earthquake, it is nevertheless being completed prior to unit restart.

The RCE associated with the dual unit reactor trip has been completed and is summarized below. The RCE associated with the Unit 2H EDG coolant leak is ongoing.

Root Cause Evaluation of the Dual Unit Trip Following Magnitude 5.8 Earthquake

1. Root Cause Summary

   On August 23, 2011, at 1351 hours, with North Anna Power Station Units 1 and 2 operating at 100% power, a Magnitude 5.8 earthquake occurred approximately five miles from Mineral, Virginia. The epicenter was approximately eleven miles West-Southwest of North Anna Power Station. Ground motion was felt and recognized as an earthquake by the Main Control Room operators at the station. The earthquake caused a series of reactor trip signals to both the Unit 1 and Unit 2 reactors resulting in a dual unit reactor trip. Following the earthquake, North Anna staff initiated an RCE to determine the cause of the reactor trips. The Root Cause Team consisted of operations, engineering, and training personnel from Dominion, as well as Westinghouse personnel. Industry peers and members of the Purdue University Nuclear Engineering faculty also provided input to the evaluation.

   The RCE concluded the Direct Cause for both the Unit 1 and Unit 2 reactor trips was the initiation of the power range nuclear instrument high negative flux rate reactor trip. Both Unit 1 and Unit 2 met the required coincidence of 2 out of 4 Power Range Nuclear Instruments (PRNI) with greater than a 5% change in 2.25 seconds.

   The Root Cause of the negative flux rate event was a combination of seismically induced conditions, which include core barrel movement, detector movement, and fuel motion. The additive effects of the combined conditions resulted in momentary changes in indicated flux and under-moderated core conditions as evidenced by the oscillatory, but overall decreasing flux profiles from both Unit 1 and Unit 2.

2. Seismic Response

   The direct correlation of the reactor trips and the earthquake motion is illustrated in the figures below. Figure 1 provides a schematic showing the location and orientation of the PRNIs which made up the 2 out of 4 reactor trip logic. The figure is labeled with the sequence and location of PRNIs N41 and N42 which tripped the units. As shown below, the nuclear instruments (NIs) on each unit are identical and are located in identical locations. It is also noted that the initial seismic motion at the time of the trip was in the East-West direction.

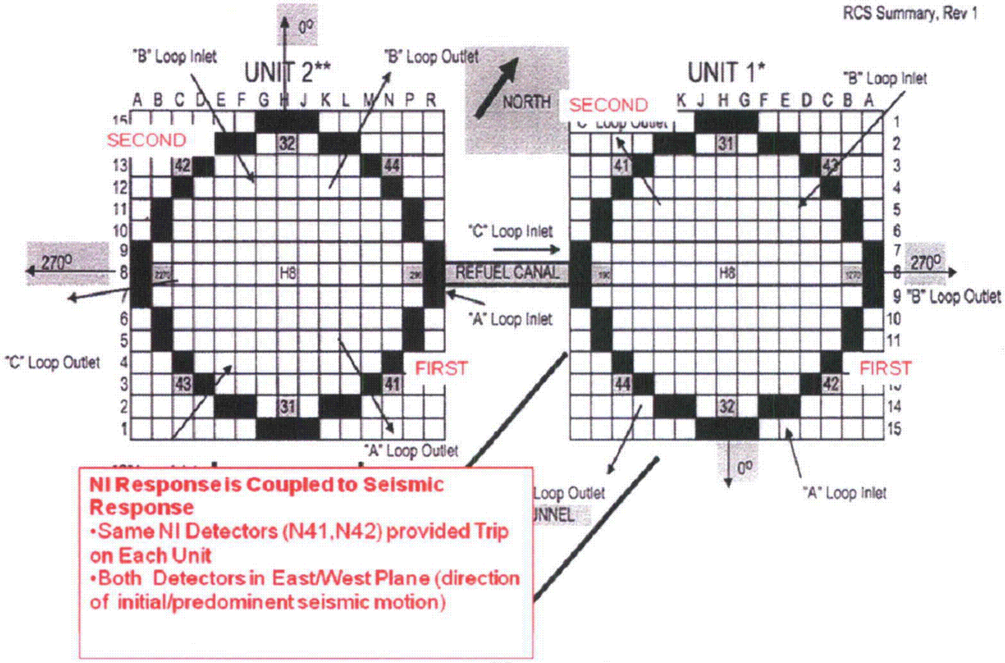

Figure 1

Figures 2 and 3 below demonstrate how the PRNIs closely correlate with the seismic response.

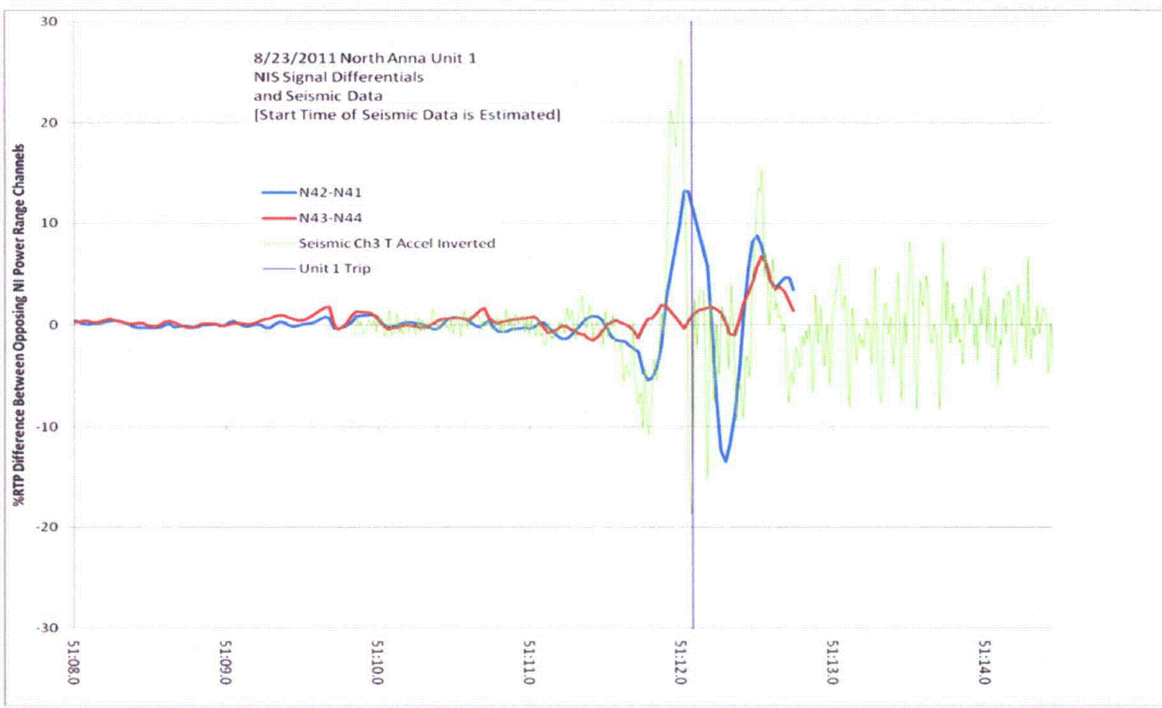

Figure 2

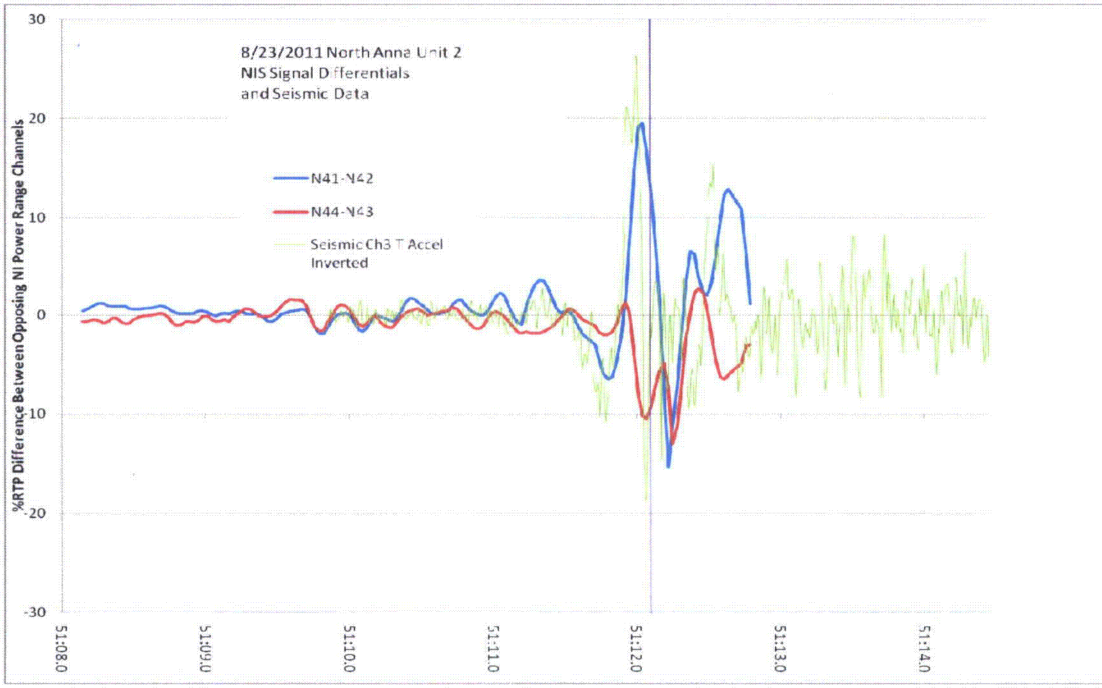

Figure 3

3. Core Barrel Movement

Normal core barrel motion is known to affect nuclear instrumentation neutron flux readings. The North Anna core barrels were estimated to have up to 100 mils of free radial movement as allowed by the core barrel support scheme. Radial movement of the core barrel results in changing the amount of moderation between the nuclear instruments and the core. Westinghouse estimated the 100 mils radial movement during the earthquake could cause a 3-6% change in nuclear instrument readings.

4. PRNI Movement in Well

The PRNI detectors are located in dry wells against the inner wall of the Primary Shield Tank. Similar to the core barrel condition discussed above, movement of the NIs within the detector wells can also result in changes in nuclear flux indication. As the detectors move within the wells, the amount of neutron moderation as seen by the PRNI is changed. Westinghouse analysis of a similar plant (Beaver Valley) determined nuclear instrument flux readings can be affected by detector movement within the instrument wells.

5. Core Motion

Operating experience and testing associated with Japanese nuclear reactors indicates core reactivity changes can occur as a result of small changes in overall fuel geometry caused by earthquakes. One theory is fuel rod motion results in thickening of the thermal boundary layer along the fuel rods allowing existing bubbles to grow and new bubbles to generate. The additional voids within the fuel thermal boundary results in the insertion of negative reactivity.

The North Anna units experienced a decreasing reactivity trend that, when combined with the seismically induced core barrel and nuclear indication effects, resulted in the negative flux rate trip.

6. Refuted Causes

The RCE performed extensive fault analysis and Failure Modes and Affects analysis. These techniques were used to refute other possible causes for the North Anna reactor trips. The analysis eliminated the following potential causes for the reactor trips:

- Core flow increases
- Core bypass flow impacts
- Hydrogen voiding
- Dropped control rods
- Core temperature excursion
- Detector voltage impacts
- Detector cable motion
- Electrical grounding impact
- Electromagnetic interference
- Motor-Generator (MG) set output breaker opening
- Reactor trip breaker failure

7. Safety Aspects

The North Anna units experienced a decreasing reactivity trend that, when combined with the seismically induced core barrel and nuclear indication effects, resulted in the negative flux rate trip. This was an expected and desired plant response considering the magnitude of the earthquake. At no time did reactor power increase above 100% power. Installed protection equipment responded as designed.

The RCS response was consistent with a normal reactor trip from full power followed by a reactor coolant pump (RCP) trip coastdown from the loss of power to the supply buses. Although there were some core power variations prior to full control rod insertion, power decreases from the initial value and at no time exceeded 100% power. RCS temperatures trended smoothly toward hot zero power values as expected with no perturbations.

Safety analysis events discussed in the North Anna Updated Final Safety Analysis Report (UFSAR) that are most applicable to this event include:

- Loss of External Electrical Load and/or Turbine Trip [UFSAR 15.2.7],
- Loss of Offsite Power to the Station Auxiliaries [USFAR 15.2.9], and
- Complete Loss of Reactor Coolant Flow [UFSAR 15.3.4].

Since the reactor trip, turbine trip and RCP trips occurred at essentially the same time during the plant event, the transient response was bounded by the safety analysis response for these events. In particular, the safety analysis requirements relative to core cooling/departure from nucleate boiling (DNB) criteria, RCS and Main Steam pressure, and pressurizer level were met.

In summary, the plant response to the seismic event is bounded by the North Anna UFSAR safety analyses. The integrity of the core is maintained by operation of the reactor protection system and natural circulation flow through the RCS loops and reactor core. In addition, pressure relief valves and/or sprays maintained primary and secondary pressures well below safety analysis allowable values.

IV. Inspections

The engineering program inspections that were identified in Enclosure 8, Item D, of Dominion's September 17, 2011 submittal have been completed for Unit 1. Steam generator and containment sump strainer inspections are ongoing for Unit 2. The inspection results are provided below.

A. Steam Generator Inspections (Encl. 8, Item D.1)

EPRI Steam Generator Management Program Pressurized Water Reactor Steam Generator Examination Guidelines, Revision 7, Section 3.10, states that forced outage examinations shall be performed during plant shutdown subsequent to seismic occurrence greater than the OBE. The guidelines require performance of a 20% sample inspection of Unit 1 and Unit 2 steam generator (S/G) tubes. The 20% sample criterion was met for Unit 1 by inspection of 100% of the "A" S/G. The 20% sample criterion is being met for Unit 2 by inspection of the "A" and "C" S/Gs, which was part of the normal refueling outage scope.

Unit 1 "A" S/G Scope of Work

The primary side work scope included:

i. Visual inspection for evidence of leakage of previously installed plugs in the hot and cold legs. There are no installed plugs.

ii. Bobbin coil inspection of the full length of all tubes, except for the U-bend region of Row 1 tubes.

iii. Rotating coil inspection of the U-bend region of the Row 1 tubes in service (approximately 98 tubes).

iv. Rotating coil inspection of the hot leg top of tubesheet region (TSH +3 to TSH -3) of 993 tubes. The tubes selected for inspection included a 50% sample of tubes in the defined special interest areas as shown in the Dominion Outage Plan documents.

v. Rotating coil inspection of the cold leg top of tubesheet region (TSC +3 to TSC -3) of 570 tubes.

vi. Rotating coil inspection of 100 additional locations of interest as defined by Dominion.

<u>The secondary side work scope included:</u>

i. Foreign Object Search and Retrieval (FOSAR).

ii. Visual inspection of the internal blowdown piping and wrapper supports at the top of the tubesheet.

iii. Steam drum visual inspection.

iv. 7th tube support plate visual inspection.

v. J-nozzle visual inspections.

On Unit 1, 100% of the “A” S/G tubes were inspected, and no adverse indications were identified as a result of the seismic event. Inspection of the Unit 1 “A” S/G secondary side components also revealed no seismic related damage. Details of the inspections performed, including secondary side inspections, are listed below. The Unit 2 "A" and "C" S/Gs are being inspected in a similar fashion during the current refueling outage.

Table 4

Rotating Pancake Coil (RPC) Exams:		U1 SG A Tubes
1	**TSH±3"** (50% of Sludge Region/Critical Area)	214
2	**TSH±3"** (Approximately 50% of 5 tube deep periphery)	570
3	**TSH±3"** (bundle interior outside the Sludge Region/Critical Area)	209
4	**Row 1 U-bends** (100% of the U-bends of row 1 tubes were RPC inspected)	98
5	**TSC±3" Periphery Exams** (Approximately 50% of 5 tube deep periphery)	570
6	**Special Interest Exams** (Hot Leg + Cold Leg tubes requiring additional diagnostic testing)	100

	Bobbin Exams:	U1 SG A Tubes
1	**Full Length from Hot Leg** (Rows >3, these tubes are inspected full length from one tube end to the other as one exam)	3298
2	**Hot Leg Candy Canes** (Rows 2 and 3, these tubes are inspected from the 7th tube support plate on the cold leg through the U-bend, continuing through the hot leg tube end)	196
3	**Hot Leg Straights** (Row 1, these tubes are inspected from the 7th tube support plate on the hot leg through to the hot leg tube end)	98
4	**Cold Leg Straights** (Rows 1 through 3, these tubes are inspected from the 7th tube support plate on the cold leg through to the cold leg tube end)	294

(100% of the tubes were inspected full length with bobbin coil with the exception of the Row 1 U-bends which were 100% RPC inspected.)

Inspection Results - Three S/G tubes were identified with tube degradation during this examination. The three indications were caused by shallow volumetric tube degradation at tube support plate (TSP) land contact points and are characteristic of TSP vibration and wear. The three indications were initially identified during the 2007 inspection of "A" S/G, and none of the indications have exhibited growth since the 2007 inspection. The largest wear flaw had a maximum through-wall depth of 13%. None of the affected tubes required plugging and no tubes were plugged.

Two foreign objects were identified within the hot leg channel head of "A" S/G. One object was found at the tubesheet at tube SGA R29C21 and was removed from the tube. Post-removal, full length bobbin probe examination, and +Point RPC examination of the full tubesheet depth confirmed that the foreign object caused no tube degradation. The second object was identified lying on the bottom of the hot leg channel head bowl and was successfully removed. Both objects appear to have originated from the same part. A visual examination of the tubesheet revealed no evidence of tube end or cladding damage. Investigation into the source of the material is ongoing. The objects were stainless steel and appear to be part of a unistrut tube clip. It was determined that the pieces did not come from the reactor vessel based on the relatively low radiation levels exhibited by the objects. The last time the RCS "A" loop hot leg was accessed was during the ten-year in-service inspection (ISI) activities conducted in spring 2009. No visible damage is attributed to the foreign objects.

On the secondary side of the S/G, the internal feedring / J-nozzle interfaces of the J-nozzles in "A" S/G" were visually examined. The inspection videos from "A" S/G were reviewed side by side with videos from the previous secondary inspection in 2007 to identify any locations where flow assisted corrosion (FAC) may have continued to advance. This review revealed no discernible evidence of change since the 2007 inspection.

Ultrasonic testing (UT) thickness measurements were taken in selected regions of the "A" S/G feedring during the outage for the purpose of monitoring flow assisted corrosion (FAC) related degradation. For each region examined, the minimum and average observed thickness is calculated, and a comparison with previous UT examination results is performed. The thickness measurements obtained exceeded the minimum design requirement of 0.350 inch with the exception of one measurement identified in a local area within the left side reducer extension between J-nozzles 2 and 3. This local area material thickness measurement was 0.350 inch. A re-analysis of the allowable minimum wall thickness was performed by Westinghouse (Original Equipment Manufacturer). This analysis concluded that the allowable minimum wall thickness for localized degradation is 0.240 inch.

Additional secondary side inspections were performed and included the steam drum internals and upper tube bundle regions. Visual examinations of the blowdown pipe, blowdown pipe supports, no-tube lane tie-rod, wrapper and wrapper supports, and tube bundle periphery were performed from the lower hand hole inspection ports above the secondary tubesheet face. These examinations revealed no evidence of structural damage or foreign objects.

Based on the examinations discussed above, there is no evidence that the August 23, 2011 earthquake caused any seismically induced damage in the Unit 1 "A" S/G. Inspection of the Unit 2 "A" and "C" S/Gs is ongoing as part of the previously planned Unit 2 refueling outage scope.

B. Containment Inspections (Encl. 8, Item D.2)

Containment inspections have been completed and earthquake generated debris (e.g., minor concrete spalling) has been identified and cleaned. A final containment cleanliness inspection (North Anna Operating Procedure 1/2-OP-1B, "Containment Checklist") is performed as normal station practice prior to Mode 4 entry.

C. Containment Sump Strainers (Encl. 8, Item D.3)

The Generic Safety Issue (GSI) -191 containment sump strainer inspection for Unit 1 has been completed for the Low Head Safety Injection (LHSI) and Recirculation Spray (RS) strainers. This inspection performs and documents the results of the detailed gap inspections performed for the containment sump strainers fin seal strip interfaces and other fin joint fit-up surfaces. As-left gaps greater than 1/16" must be documented (mapped) and evaluated for acceptability with design assumptions.

This is the third time the strainer inspections have been performed since installation. The total gap area is determined by adding the gap areas that have been identified over the three inspections. The actual increase in flow area for the RS and LHSI strainers due to the identified gaps is much less than the allowable increase in flow area and is therefore acceptable. The number of gaps found (and left) in the RS and LHSI strainers is therefore acceptable. Based on the inspection results, compared to previous inspections, there is no indication that the earthquake contributed to an increase in the number of gaps identified in the containment sump strainers.

D. <u>In-service Inspections – Owner-Selected Weld Inspections (Encl. 8, Item D.4)</u>

To provide further assurance that safety related piping systems had not sustained earthquake induced damage, a sample of system pipe welds that were considered to be susceptible to damage from a seismic event were inspected. To select the pipe welds for inspection, a review of industry earthquake experience was performed to identify piping vulnerabilities (Reference EPRI LR-2008-008, EPRI-1019199). Pipe welds were selected in areas that had potential for strong anchor movements, and, as a result, pipe welds were selected in RCS loop drain piping, containment penetration area piping, and Service Water (SW) tie-in vault piping. A number of safety related welds and supports in these areas were then selected for nondestructive examination (NDE). Examination results are provided below:

Unit 1 Pressurizer Spray line 4"-RC-15-1502-Q1

Weld No.	Examination Method	Examination Results	Station Drawing No.	ASME Code Category
Weld 57H	PT	No flaws identified - Completed SAT	11715-WMKS-0110B-1	BK / B10.20
SH-17	VT-3	Spring Hanger visual inspection - Completed SAT	11715-WMKS-0110B-1	F-A / F1.10C
R-16	VT-3	Lateral restraint visual inspection - Completed SAT	11715-WMKS-0110B-1	F-A / F1.10B

Unit 1 Safety Injection line 10"-SI-238-1502-Q1

Weld No.	Examination Method	Examination Results	Station Drawing No.	ASME Code Category
Weld 70H	PT	No flaws identified - Completed SAT	11715-WMKS-0104A-2	BK / B10.20
SH-37	VT-3	A loose bolt was identified on a spring hanger riser clamp resulting in a "rejectable" condition. The loose bolt did not impact the hanger support function. It was determined that it was unlikely that the loose bolt was caused by the seismic event. The condition has been entered into the corrective action system and will be repaired.	11715-WMKS-0104A-2	F-A / F1.10C

Unit 2 'A' Loop Drain line 2"-RC-455-1502-Q1

Weld No.	Examination Method	Examination Results	Station Drawing No.	ASME Code Category
Weld 10	PT	No flaws identified - Completed SAT	12050-WMKS-0103CB	R-A / R1.20
Weld 37	PT	No flaws identified - Completed SAT	12050-WMKS-0103CB	R-A / R1.11

Unit 2 Seal Injection Line 1-1/2"-CH-797-1502-Q1 at 2-RC-P-1B Thermal Barrier

Weld No.	Examination Method	Examination Results	Station Drawing No.	ASME Code Category
Weld 59A	PT	No flaws identified - Completed SAT	12050-WMKS-0103AR	R-A / R1.20

Unit 2 Seal Injection Line 2"-CH-492-1502-Q1 to 2-RC-P-1C on the Containment side of the Anchor at Pen 35

Weld No.	Examination Method	Examination Results	Station Drawing No.	ASME Code Category
Weld 1	PT	No flaws identified - Completed SAT	12050-WMKS-0103AQ	B-J / B9.40

Unit 2 Seal Injection Line 2"-CH-492-1502-Q1 to 2-RC-P-1C on the Auxiliary Building side of the Anchor at Pen 35 - Inspected both sides of the coupling (Coupling not shown on DWG)

Weld No.	Examination Method	Examination Results	Station Drawing No.	ASME Code Category
Weld 17	PT	No flaws identified - Completed SAT	12050-WMKS-0111E-1	B-J / B9.21

Unit 2 Safety Injection Line 6"-RC-420-1502-Q1 at the RCS Loop 'C' Cold Leg Welds

Weld No.	Examination Method	Examination Results	Station Drawing No.	ASME Code Category
Weld 1	PT	No flaws identified - Completed SAT	12050-WMKS-0103BN	R-A / R1.11
Weld 2B	PT	No flaws identified - Completed SAT	12050-WMKS-0103BN	R-A / R1.11

Unit 2 Pressurizer Vessel 2-RC-E-2 integral attachment

Weld No.	Examination Method	Examination Results	Station Drawing No.	ASME Code Category
Weld WS-1	PT	Completed SAT (acceptable rounded indication)	12050-WMKS-RC-E-2	B-K / B10.10

Common line 36"-WS-3-151-Q3

Weld No.	Examination Method	Examination Results	Station Drawing No.	ASME Code Category
Weld 71	MT	No flaws identified - Completed SAT	11715-WS-2D49A	Not in ISI Program
Weld 98	MT	No flaws identified - Completed SAT	11715-WS-2D49A	Not in ISI Program
1-WS-SPRH-3.1	VT-3	Completed SAT (CR 443359 submitted for spring setting out of tolerance)	11715-WMKS-0105AK	F-A / F1.30A
1-WS-SPRH-3.4	VT-3	Completed SAT	11715-WMKS-0105AK	F-A / F1.30C

Common line 36"-WS-4-151-Q3

Weld No.	Examination Method	Examination Results	Station Drawing No.	ASME Code Category
Weld 71	MT	No flaws identified - Completed SAT	11715-WS- 2D49B	Not in ISI Program
Weld 97	MT	No flaws identified - Completed SAT	11715-WS- 2D49B	Not in ISI Program
1-WS-SPRH-4.1	VT-3	Completed SAT	11715-WMKS-0105AK	F-A / F1.30A
1-WS-SPRH-4.4	VT-3	Completed SAT	11715-WMKS-0105AK	F-A / F1.30C

E. Buried Pipe (Encl. 8, Item D.5)

Buried pipe inspections have been completed. The piping segments were inspected in accordance with station procedure ER-AA-BPM-101, "Underground Piping and Tank Integrity Program," and were also inspected for any issues that may have occurred due to the August 23, 2011 earthquake. The inspected piping was determined to be in satisfactory condition with no indication of seismic related damage. Specific inspections performed included the following:

1. Direct inspection of the Fire Protection system piping going to the Warehouse 5 Fire Protection Pump House. (The line section was located at the southeast corner of Protected Area just outside security fence.)

   (Note: This line was previously inspected as part of the Buried Pipe Program on August 19, 2011, and those inspection results were used for comparison. No anomalies associated with the August 23, 2011 earthquake were identified by comparison of the inspection results.)

2. Indirect inspection for leakage by review of detailed pictures of the Fire Protection main loop near the West Security Gate within a few days following the seismic event. (Excavation area has since been backfilled due to outage activities.)

3. Direct inspection of Fire Protection piping to the North Anna Nuclear Information Center.
4. Direct inspection of the Unit 1 Refueling Water Storage Tank (RWST) piping located between the Auxiliary Feedwater tunnel and Quench Spray Pump House. Inspected piping sections included the following:
   a. Quench Spray piping to the Quench Spray pumps' suction,
   b. Quench Spray pump recirculation piping,
   c. Safety Injection system piping to the High Head and Low Head Safety Injection pumps' suction,
   d. RWST recirculation pumps' suction and discharge piping, and
   e. Refueling purification and blender make-up piping to the RWST.

V. **Surveillance Tests** (Encl. 8, Item E.1)

Section 5 of EPRI NP-6695 provides guidelines for post-shutdown inspections and tests of nuclear plant equipment and structures required for operation prior to restart of a nuclear plant which has been shut down due to an earthquake which exceeds the OBE. To further evaluate the effect of the earthquake on the functionality of nuclear plant equipment, it recommends that surveillance tests, required to verify that the limiting conditions for operation as defined in the plant Technical Specifications (TS) are met, also be performed.

A Unit 1 and a Unit 2 list of the surveillance tests to be performed have been developed using guidance from EPRI NP-6695, Appendix B, "Typical Surveillance Tests for PWRs." To ensure a comprehensive test program is completed prior to restart, additional testing has also been included. Surveillance tests (STs) are being performed to demonstrate the availability and operability of components and systems important to nuclear safety or required to mitigate the consequences of an accident as identified in the TS.

Approximately 80% of the Unit 1 STs have been satisfactorily completed; however, several STs cannot be completed until after the unit is above Mode 4. These tests are provided in Table 5 below.

The completion status for the Unit 2 surveillance and functional testing will be provided in a subsequent update.

Table 5 – Periodic Tests to be Performed After Mode 4			
Test Proc. No.	**Work Description**	**Basis for Inclusion**	**Startup**
1-PT-56.1.1	31D PT: 1-SI-TK-1A BORON CONCENTRATION	Startup	Perform prior to Mode 3 - Normal Startup
1-PT-56.1.2	31D PT: 1-SI-TK-1B BORON CONCENTRATION	Startup	Perform prior to Mode 3 - Normal Startup
1-PT-56.1.3	31D PT: 1-SI-TK-1C BORON CONCENTRATION	Startup	Perform prior to Mode 3- Normal Startup
1-PT-58.2	7D PT: BORON INJECT TANK CHEMISTRY	Startup	Perform Prior to Mode 3 - Normal Startup
1-PT-121	18M PT: RTD ADJUSTMENT	Additional Testing	Perform at 547° F Steady State Prior to Mode 2 - Augmented - Startup
1-PT-17.2	18M PT: ROD DROP TIME	Additional Testing	Perform prior to Mode 2 in Mode 3 >500° F - Augmented - Startup
1-PT-21.1	SPECIAL PT: RX CORE FLUX MAPPING (31 EFPD)	Additional Testing	Perform prior to 30% - Augmented - Startup
1-PT-21.2	31D PT: HOT CHANNEL FACTORS (31 EFPD)	Additional Testing	Perform prior to 30% power - Augmented - Startup
1-PT-21.4	31D PT: INTERMED RNGE TRIP SETPOINT(31EFPD)	Additional Testing	Perform prior to 30% power - Augmented - Startup
1-PT-27	18M PT: RCS FLOW & LOOP TEMP	Additional Testing	Perform within 30 days of reaching 90% Power - Augmented - Startup
1-PT-46.3A	1 DAY PT: PRI TO SEC LEAK RATE DETERMIN.	Startup	Unit 1 ≥ 25% Power - Normal Startup
1-PT-46.3A.2	31D PT: PRI TO SEC LEAK RATE EVAL	Startup	Perform in Mode 1 - Normal Startup
1-PT-34.5.1	18M PT: CALC OF NORM TURB 1ST STG PRESS TRANSM	Additional Testing	Unit 1 > 95% Power - Augmented S/U
1-PT-46.3B	7D PT: PRIMARY TO SECONDARY LEAK RATE **PERFORMED ON THE 6TH,	Startup	Initiate in Mode 2 - Normal Startup
1-PT-32.4.10	18M PT: FEEDWATER ULTRASONIC FLOW METER VME-B CHANNEL CAL	Additional Testing	Complete at 100% Pwr - Augmented - Startup
1-PT-32.4.9	18M PT: FEEDWATER ULTRASONIC FLOW METER VME-A CHANNEL CAL	Additional Testing	Complete at 100% Pwr - Augmented - Startup
IPM-RCS-G-001B	ROD CONTROL SYSTEM MAINTENANCE WITH THE REACTOR TRIP BREAKERS CLOSED AND THE ROD CONTROL SYSTEM CAPABLE OF ROD WITHDRAWAL	Additional Testing	Perform prior to Mode 3 - Augmented - Startup
1-PT-17.1	92D PT: CONTROL ROD OPERABILITY	Additional Testing	Per 1-OP-1.5 - Normal Startup
1-PT-24.1	DAILY PT: COMPUTER CALORIMETRIC	Startup	Not required until 12 hrs after thermal power is ≥ 15% RTP per 1-OP-2.1 - Normal Startup
1-PT-34.3	184D PT: TURBINE VALVE FREEDOM TEST	Additional Testing	Normal Startup
1-PT-34.5	18M PT: TURB-GEN OVERSPEED TRIP TEST	Additional Testing	Perform prior to 30% - Augmented - Startup

Table 5 – Periodic Tests to be Performed After Mode 4			
Test Proc. No.	**Work Description**	**Basis for Inclusion**	**Startup**
1-PT-34.6	31D PT: T-G OIL PPS	Additional Testing	Perform within 31 days following Turbine S/U after 100% - Augmented - Startup
1-PT-44.11	31D PT: ICCM SYS CHANNEL CHECKS	Additional Testing	Perform prior to Mode 3 - Augmented - Startup
1-PT-44.7	92D PT: PORV BLOCK VALVES	Additional Testing	Perform prior to Mode 3 - Augmented - Startup
1-PT-52.1	31D PT: MEASURE. OF RCP SEAL INJ FLOW	Startup	Per 1-OP-1.4 - Normal Startup
1-PT-56.2	31D PT: ACCUM. ISO.VAL.BRK. POSTION VERF	Startup	Normal Startup
1-PT-71.1Q	92D PT: 1-FW-P-2 TURB DRIVEN AUX FEEDWATER PUMP	Additional Testing	Per 1-OP-1.4 - Perform Prior to Mode 2 - Augmented - Startup
1-PT-44.5.1	18M PT: S/G TUBE ISI REPORT	Additional Testing	Perform after 100% - Augmented - Startup
1-PT-44.5.5	18M PT: DOC OF S/G EDDY CURRENT TEST RESULTS	Additional Testing	Perform after 100% - Augmented - Startup

Attachment 2

Updated Enclosure 8 from Dominion Letter Serial No. 11-520
September 17, 2011

Virginia Electric and Power Company
(Dominion)
North Anna Power Station Units 1 and 2

Updated Enclosure 8 from Dominion Letter Serial No. 11-520 September 17, 2011		
NEAR-TERM ACTIONS TO BE COMPLETED PRIOR TO UNIT RESTART		
Restart Activity		**Comments**
A. Seismic Monitoring and Design Basis		
1	Provide temporary backup power to the Main Control Room Seismic Monitoring Panel.	Complete
2	Install temporary free field seismic monitoring instrumentation.	Complete
3	Revise Abnormal Procedure 0-AP-36 to improve procedural guidance for determining whether an onsite earthquake exceeds OBE and/or DBE peak acceleration criteria.	Complete
B. Nuclear Fuel		
1. Unit 1 Core		
a	Perform hot rod drop testing.	Prior to Unit 1 entering Mode 2
2. Unit 2 Core		
a	Perform RCCA drag testing.	Prior to Unit 2 onload
b	Perform hot rod drop testing.	Prior to Unit 2 entering Mode 2
c	Perform routine binocular visual inspection during core offload.	Complete
d	Perform video inspections on 13 benchmark assemblies and additional vendor-recommended assemblies.	Complete
e	Perform video inspection of RCCA hubs.	Complete
f	Perform video inspections on assemblies with anomalies observed during binocular inspections.	Complete
C. Root Cause Evaluations		
1	Reactor Trip	Complete
2	Unit 2H Emergency Diesel Generator Coolant Leak	Prior to Unit 1/2 Restart

Updated Enclosure 8 from Dominion Letter Serial No. 11-520 September 17, 2011		
NEAR-TERM ACTIONS TO BE COMPLETED PRIOR TO UNIT RESTART		
Restart Activity		**Comments**
D. Inspections		
1	Steam Generators - Perform a 20% sample inspection of Unit 1 and Unit 2 steam generators.	Complete (Unit 1)
2	Containment - Perform containment inspections to identify and remove debris that may have resulted from the earthquake, as required.	Complete
3	Containment Sump Strainers Perform a visual examination of the sump strainer gaps in accordance with the applicable periodic test.	Complete (Unit 1)
4	In-service Inspection Perform sample weld inspections.	Complete
5	Buried Pipe Monitoring/Ground Water Monitoring Program Perform buried pipe inspections of: • the two areas of buried fire protection pipe that are currently excavated, • the Unit 2 circulating water discharge tunnel and associated liquid waste line, and • the buried pipe between the Unit 1 auxiliary feedwater tunnel and the Unit 1 Quench Spray Pump House.	Complete
E. Testing		
1	Complete Unit 1/2 Surveillance Periodic Tests as determined by the Seismic Event Response Team.	Prior to and during Unit 1/2 Startup per Technical Specifications (Unit specific tests will be completed prior to and during that Unit's startup)