VIRGINIA ELECTRIC AND POWER COMPANY
RICHMOND, VIRGINIA 23261

10 CFR 100, Appendix A

October 20, 2011

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

Serial No.: 11-566C
NL&OS/ETS R1
Docket Nos.: 50-338
50-339
License Nos.: NPF-4
NPF-7

VIRGINIA ELECTRIC AND POWER COMPANY (DOMINION)
NORTH ANNA POWER STATION UNITS 1 AND 2
RESPONSE TO REQUEST FOR ADDITIONAL INFORMATION (RAI)
STATUS OF NEAR-TERM ACTION ITEMS
RESTART READINESS DETERMINATION PLAN

Short Term RAI Response

By letters dated September 26, 28, and 30 and October 6, and 13, 2011, the NRC requested additional information regarding Dominion's Restart Readiness Determination Plan for North Anna Power Station following the August 23, 2011 Central Virginia earthquake. By letters dated September 27, 2011 (11-544), October 3, 2011 (Serial Nos. 11-544A and 11-566), October 10, 2011 (Serial Nos. 11-566A and 11-577), October 17, 2011 (Serial No. 11-544B), and October 18, 2011 (Serial Nos. 11-566B and 577A), Dominion responded to a number of the RAI questions provided by the NRC technical review branches. In Enclosure 1 to this letter, Dominion is providing responses to the remaining short term questions, as well as clarifications requested by the NRC staff on previously submitted responses. The specific technical review areas and the associated questions being answered are provided below for reference:

Electrical	Clarifications for Questions 1 and 3 Additional Questions 1 and 2 Correction for Question 4
Instrument and Control	Clarification for Question 2
Fire Protection	Clarifications for Questions 1, 2, 3, 4, 5, and 6
Snubbers	Clarifications for Questions 2 and 4
EMCB	Supplemental Questions 1 and 2 Clarification for EMCB Question 1
Inservice Testing	Questions 1, 2 and 3

Status Update of Near-Term Actions to be Completed Prior to Unit Restart

Enclosure 8 to Dominion's letter dated September 17, 2011 (Serial No. 11-520) identified several near-term actions to be completed prior to restart of Units 1 and 2. These actions included seismic monitoring improvements, completion of ongoing nuclear fuel inspections

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and testing, issuance of root cause evaluations, completion of engineering program inspections and completion of surveillance and functional testing to confirm the functionality of plant structures, systems and components (SSCs). Dominion's letter dated September 27, 2011 (Serial No. 11-520A) provided an updated Enclosure 8 that indicated the items that had been completed since the initial submittal. We also stated in the September 27, 2011 letter that we would provide additional updates as action items were completed.

Consequently, Dominion is providing a status update in Enclosure 2 of the near-term actions to be completed prior to restart of Units 1 and 2. As can be quickly ascertained from the updated list, only Units 1 and 2 hot rod drop testing, selective surveillance testing, and the Unit 2 containment sump strainer inspection remain to be completed. This is because hot rod drop testing and numerous surveillance tests are Mode dependent, and therefore cannot be completed until after the units begin startup activities. The Unit 2 containment sump strainer inspection is currently being performed. In addition, a small number of Unit 2 surveillance tests will be performed once ongoing maintenance is completed on certain systems and components.

Responses to the remaining long term RAIs identified in the NRC letters above will be submitted by October 29, 2011.

If you have any questions or require additional information, please contact Thomas Shaub at (804) 273-2763 or Gary D. Miller at (804) 273-2771.

Sincerely,

E. S. Grecheck
Vice President – Nuclear Development

Enclosure:

1. Response to Request for Additional Information - Restart Readiness Determination Plan (with Attachment)
2. Updated Enclosure 8 from Dominion Letter Serial No. 11-520 September 17, 2011

There are no commitments made in this letter.

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 20th day of October, 2011.

My Commission Expires: 4/30/2015.

Notary Public

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

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Enclosure 1

Response to Request for Additional Information
Restart Readiness Determination Plan

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

BACKGROUND

By letters dated September 26, 28, and 30, and October 6 and 13, 2011, the NRC requested additional information (RAI) regarding Dominion's Restart Readiness Determination Plan for North Anna Power Station following the August 23, 2011 Central Virginia earthquake. By letters dated September 27, 2011 (Serial No 11-544), October 3, 2011 (Serial Nos. 11-544A and 11-566), October 10, 2011 (Serial Nos. 11-566A and 11-577), October 17, 2011 (Serial No. 11-544B), and October 18, 2011 (Serial Nos. 11-566B and 577A), Dominion responded to a number of the RAI questions provided by the NRC technical review branches. Dominion's responses to the remaining questions, as well as clarifications requested by the NRC staff on previously submitted responses, are provided below.

NRC REQUEST FOR INFORMATION

Electrical

During a conference call between the NRC and Dominion personnel on October 6, 2011, the NRC requested clarification of Dominion's responses to Electrical Questions provided in Dominion's letter (Serial No. 11-566). The requested information is provided below.

Requested Clarification – Electrical Question 1

Provide a list of standards that electrical components have been qualified to for seismic events and describe how the qualification of these components is still valid (i.e., can perform the design function during a subsequent SSE).

Dominion Response

In response to RAIs from the NRC Engineering Mechanics and Civil Branch (Questions 21 and 22), as documented in Dominion's letter dated October 18, 2011 (Serial No. 11-577A), Dominion has submitted two evaluations that indicate that (1) the August 23, 2011 earthquake was of short duration and had little damage potential and (2) the North Anna structures, systems, and components (SSCs) have design margin for increased seismic loading. In addition to the evaluations, the response to these RAIs also included a sampling review of recently qualified electrical equipment to demonstrate margin. The responses to those RAIs are applicable to the current question regarding continued seismic qualification of electrical equipment following the August 23, 2011 earthquake and support the conclusion that electrical equipment will remain qualified.

Requested Clarification – Electrical Question 3

How many electrical component types have been commercially dedicated at NAPS (who performed the commercial dedication)? Explain how electrical components that were commercially dedicated remain qualified to perform their design function.

Dominion Response

Electrical components dedicated for safety related use at North Anna can be grouped into approximately forty (40) broad component types (e.g., terminal connectors and sockets, solid state electronics, motors, etc.). Dedications are performed either in-house utilizing dedication plans developed by Dominion procurement engineers or by approved third party suppliers. A data search was performed using the previous and current procurement engineering document systems which cover the time period from 1992 to the present. The review indicates that approximately 1,200 electrical components and sub-components have been commercially dedicated. Of those, approximately 90% of commercially dedicated items are either seismically insensitive or rugged (e.g., resistors, terminal blocks, etc.).

For replacement items that are "like for like" to existing plant equipment (not an alternate item), the commercial grade dedication plans provide sufficient inspection criteria to provide reasonable assurance that the item is the same as what was originally installed. For these items the original seismic qualification applies to the item being dedicated, and its ability to remain qualified is no different than the item that was originally installed. For replacement items that are not "like for like," the item is seismically qualified using Dominion approved standards and procedures. Depending on the item, seismic qualification may be completed using testing or analysis. Since North Anna is a USI A-46 plant, the UFSAR was updated to allow the use of the earthquake experienced-based approach listed in Seismic Quality Utility Group (SQUG) Generic Implementation Procedure (GIP), which has been endorsed by the NRC. Therefore, the GIP can be used for seismic evaluation of 20 classes of new and replacement equipment. However, if functionality of a sensitive component needs to be verified, only shake-table testing per IEEE Std. 344-1975 or 1987 (as endorsed by RG 1.100, Revisions 1 and 2) is used. If seismic testing is performed, the testing is conducted by approved third party suppliers, and the testing is performed to seismic levels that exceed North Anna's seismic requirements. Seismic test plans and final seismic qualification reports are reviewed and approved by Engineering to ensure the results of the testing are applicable to North Anna, and that they meet the seismic requirements for the installation location. It is noted that seismic qualification of equipment can also be performed by using similarity or the item equivalency approach by reviewing functional and structural failure modes to determine if a component is rugged or insensitive for a seismic event.

Electrical components that were commercially dedicated remained qualified to perform their design function following the August 23, 2011 earthquake. This conclusion is

based on several considerations including the non-damaging nature of the earthquake based on calculated parameters (i.e., Cumulative Absolute Velocity and the short effective durations of strong motion), the inherent margin involved in equipment testing and qualification due to conservatisms involved in the process, and the results of intensive plant inspections and functional testing, which indicate no abnormal performance in safety-related plant equipment following the earthquake. Dominion, in response to RAIs from the NRC Engineering Mechanics and Civil Branch, as documented in Dominion's letter dated October 18, 2011 (Serial No. 11-577A), has submitted two evaluations that indicate that the (1) August 23, 2011 earthquake was of short duration and had little damage potential and (2) that North Anna SSCs have design margin for increased seismic loading. In addition to the evaluations, the response to these RAIs also included a sampling review of recently qualified electrical equipment to demonstrate margin. The responses to those RAIs are applicable to the current question about the continued ability of commercially dedicated equipment to perform their design function and support the conclusion that the equipment will remain qualified.

Additional Electrical Question e-mail 10/18/11

1. *Explain how VEPCO has evaluated the NAPS switchyard and the offsite power sources including results of any walkdown performed after the earthquake to ensure that the three 500 kilovolt (kV) and the 230 kV transmission lines, the 34.5 kV system and associated switchyard connected to the plant will perform their intended functions as described in the Updated Final Safety Analysis Report (UFSAR). Specifically, describe the status of line insulators and bushings associated with breakers, transformers, (including potential and current transformers), capacitors etc. and provide details on any thermography and corona analyses performed on the equipment. If deficiencies were identified, explain how they were resolved.*

Dominion Response

A detailed discussion of the switchyard inspections and testing was provided in response to EMCB Question 2 in Dominion's letter dated October 10, 2011 (Serial No. 11-577). An update of the switchyard inspections and testing is provided in the attachment to this enclosure.

As part of the switchyard testing, oil samples were obtained and analyzed for dissolved gases. The following is a list of the typical dissolved gases that are evaluated for North Anna oil-filled large transformers:

H2-Hydrogen	CO-Carbon Monoxide	C2H4-Ethylene
CH4-Methane	CO2-Carbon Dioxide	C2H2-Acetylene
C2H6-Ethane	N2-Nitrogen	O2-Oxygen

These gases are evaluated in accordance with C57.104-2008, "IEEE Guide for the Interpretation of Gases Generated in Oil-Immersed Transformers." The warning levels for gases are used in accordance with the IEEE document, as well as Nuclear Electric Insurance Limited (NEIL) standards. The normal testing frequencies and oil sampling at North Anna depends on the transformer and NEIL testing requirements. Generally, the transformers are tested either quarterly or biannually.

Engineering has reviewed the past year's dissolved gas analyses (DGA) and has not identified any negative or adverse trends. The review by Electric Transmission personnel did not identify any adverse issues during the inspections. The following transformers were evaluated: Station Service Transformers, 1/2-EP-SST-1A/B/C (three per unit – six total), Main Generator Step-up Transformers, 1/2-EP-MT-1A/B/C (three per unit – six total), Reserve Station Service Transformers, 1-EP-ST-2A/B/C (three total for both units), Switchyard Transformers, 500/34.5 KV – Transformers 1 and 2, 230/34.5KV - Transformer 3, and 500/230 KV Transformers 5 and 6.

There have been no adverse changes since the earthquake on August 23, 2011. The Main Generator Step-Up Transformers (1/2-EP-MT-1A/B/C) have been streamlined; therefore, the new gas values are different than the previous trends. The transformers were tested after the earthquake on August 23, 2011. The North Anna transformers listed above are considered Condition 1 in accordance with IEEE C57.104-2008.

Additional Electrical Question e-mail 10/18/11

2. *According to the sequence of events for the plant trip, the loss of offsite power to the station safety busses was the result of relay actuation associated with reserve transformers. Provide an overview of the analyses performed to validate that the relay actuation should have occurred for a non-transformer related external event considering that the purpose of the relays is to detect internal transformer faults. Provide details on testing performed on the reserve transformers to validate their integrity and capability to perform their intended functions.*

Dominion Response

On August 23, 2011, North Anna Power Station experienced a 5.8 magnitude earthquake that led to the actuation of several transformers' Fault or Sudden Pressure Relays (FPRs or SPRs). The reserve station service transformers (RSST), which provide off-site power to the station, were among the affected equipment; therefore, the electric transmission network was unable to provide power to the site for approximately three hours. Evidence shows (oil samples – dissolved gases) that actuation of these relays was not due to transformer internal faults; but rather they actuated due to the effects of the earth acceleration produced by the earthquake.

The sudden pressure relay is a type of relay used to detect internal, small magnitude faults that other protective devices, such as differential and overcurrent relays, do not normally observe. When a fault occurs inside a transformer, the fault arc produces gases that create a sudden increase of pressure inside the transformer. This relay will react to the fast increase in pressure and trip the transformer before the fault evolves into a larger, and more damaging, disturbance.

In the case of the Main Transformers (GSUs) and the Station Service Transformers (SSTs) a SPR voting scheme determines when to trip this equipment. Each transformer is monitored by three SPRs. To trip the transformer two out of three relays have to actuate (2/3 logic). In the case of the RSSTs, only one SPR is installed on each transformer (1/1 logic) and the operation of this relay trips the transformer out of service.

All the SPRs that operated during this event are Qualitrol Rapid Pressure Rise Relays model 900-003-02; this was the first time this type of relay actuated in the Dominion network, during a seismic event.

The number of SPRs installed on the affected transformers during the earthquake event and the number of relays that operated is listed below.

Unit 1 GSUs
Phase A: 3 Relays (3 relays operated)
Phase B: 3 Relays (None operated)
Phase C: 3 Relays (None operated)

Unit 2 GSUs
Phase A: 3 Relays (3 relays operated)
Phase B: 3 Relays (3 relays operated)
Phase C: 3 Relays (3 relays operated)

Unit 1 SSTs
SST A: 3 Relays (None operated)
SST B: 3 Relays (1 relay operated)
SST C: 3 Relays (3 relays operated)

Unit 2 SSTs
SST A: 3 Relays (None operated)
SST B: 3 Relays (None operated)
SST C: 3 Relays (None operated)

RSSTs
RSST A: 1 Relay (Operated)
RSST B: 1 Relay (Operated)
RSST C: 1 Relay (Operated)

Transformers
Transformer 1: 3 Relays (None Operated)
Transformer 2: 3 Relays (3 relays operated)
Transformer 3: 1 Relay (None Operated)

Correction for Electrical Question 4

Response to Electrical Question No. 4 in Dominion's letter dated October 10, 2011 (Serial No.11-566A), listed the Technical Specifications (TS) surveillances that will be completed on Unit 1 and 2 EDGs prior to unit restart. However, one of the listed surveillances will not be performed, i.e., SR 3.8.1.7. However, SR 3.8.1.17, which includes the attributes of SR 3.8.1.7, was performed on the four EDGs. The two SRs are listed below.

SR 3.8.1.7 Verify each required EDG starts from standby condition and achieves
a. In ≤ 10 seconds, voltage ≥ 3960 V and frequency ≥ 59.5 Hz; and
b. Steady state voltage ≥ 3740 V and ≤ 4580 V, and frequency ≥ 59.5 Hz and ≤ 60.5 Hz.

SR 3.8.1.17 Verify on an actual or simulated loss of offsite power signal in conjunction with an actual or simulated ESF actuation signal:
a. De-energization of emergency buses;
b. Load shedding from emergency buses; and
c. Each LCO 3.8.1.b EDG auto-starts from standby condition and:
   1. energizes permanently connected loads in ≤ 10 seconds,
   2. energizes auto-connected emergency loads through load sequencing timing relays,
   3. achieves steady state voltage ≥ 3740 V and ≤ 4580 V,
   4. achieves steady state frequency ≥ 59.5 Hz and ≤ 60.5 Hz, and
   5. supplies permanently connected and auto-connected emergency loads for ≥ 5 minutes.

Instrument and Control

Requested Clarification – I&C Question 2

List the standards that were used for I&C equipment seismic qualification. Show how they remain qualified after August 23 earthquake.

Dominion Response

In response to RAIs from the NRC Engineering Mechanics and Civil Branch (Questions 21 and 22) as documented in Dominion's letter dated October 18, 2011 (Serial No. 11-577A), Dominion has submitted two evaluations that (1) indicate that the August 23, 2011 earthquake was of short duration and had little damage potential and (2) that North Anna structures, systems, and components (SSCs) have design margin for increased seismic loading. In addition to the evaluations, the response to these RAIs also included a sampling review of recently qualified electrical equipment to demonstrate margin. The responses to those RAIs are also applicable to this RAI, which addresses standards used for I&C equipment seismic qualification.

Older I&C equipment may have been qualified per the original North Anna licensing basis to IEEE Std. 344 – 1971. In many cases, these older tests are single-axis sine-beat tests performed for "low seismic plants"; however, as discussed below, these tests are performed to conservative levels and have margin that exceeds North Anna's design requirements. For new and replacement I&C equipment, seismic qualification is accomplished using one of the following methods, which are outlined in Dominion's seismic qualification procedure:

1. The primary industry standard used for seismic qualification of new and replacement I&C equipment is IEEE Std. 344-1975, as endorsed by Regulatory Guide 1.100 Rev. 1. If necessary, the 1987 version of this standard is also used, as endorsed by RG 1.100 Rev. 2, provided it is consistent with North Anna's licensing bases. Similarity to other items qualified by test is also occasionally used and requires engineering review of the two components to demonstrate that any changes will not affect seismic capacity.

2. It is noted that North Anna is a USI A-46 plant. The UFSAR was updated to allow the use of the earthquake experienced-based approach listed in SQUG's Generic Implementation Procedure (GIP), which has been endorsed by the NRC. Therefore, the GIP can be used for seismic evaluation of 20 classes of new and replacement equipment. However, if functionality of a sensitive component needs to be verified, only shake-table testing per IEEE Std. 344-1975/87 is used. In addition, equipment seismic qualification can also be established by using similarity or item equivalency approach and by reviewing functional and structural failure modes to determine if a component is rugged or insensitive to a seismic event.

North Anna I&C equipment has been qualified by seismic testing to the requirements of IEEE Std. 344–1971, 1975, or 1987. With respect to the durations and margins in testing, seismic tests are performed to simulate five (5) operating basis earthquakes (OBE) and one (1) design basis earthquake (DBE) events, with a typical duration of 30 seconds and minimum strong motion durations of 15 seconds for each test. In comparison, the effective strong motion duration of the August 23, 2011 earthquake was about one second in the North-South direction, about 3.1 seconds in the east-west (E-W) direction and about 1.5 second in the vertical direction. Functionality of the tested equipment is verified during and after the seismic tests. The test response spectra (TRS) in shake table testing is required to have at least 10% margin over the required response spectra (RRS) in the entire frequency range, as required by IEEE Std. 323-1974 and Dominion procedure. In practice, the TRS typically include higher margins over the location-specific RRS. Further, Dominion has been a participating member of the EPRI-SQURTS (Seismic Qualification Reporting and Testing Standardization) program for shake table testing for the past several years, and equipment tested under this program are routinely tested to table limits or to generic limits that are typically much higher than North Anna's site specific levels. The EPRI-SQURTS testing database is populated with thousands of typical nuclear power plant components tested to these higher limits.

Based on the recorded time-histories of the Kinemetrics instrument at the Containment basemat, the August 23, 2011 earthquake exceeded the North Anna DBE in the 2 to 10 Hz. range, on average, by about 12% in the North South direction, by about 21% in the vertical direction and none in the E-W direction. To confirm the existing margins in shake-testing of equipment, a seismic review was performed on a sample of seismically qualified I&C-type instrumentation used at North Anna Power Station. The instrumentation chosen was based on its use in the plant and the function it performs. Instrumentation such as Rosemount transmitters, Barton transmitters, Foxboro transmitters, Westinghouse 7300 cards, Nuclear Instrumentation System, Westinghouse Solid State Protection System, Inadequate Core Cooling Monitoring System, and Weed RTDs were chosen. The transmitters and 7300 cards were chosen because they make up the majority of the control and protection system at North Anna. The sampling seismic review looked at the various qualification documents such as Westinghouse WCAPs, Qualification Test Reports, and Vendor Technical Manuals. A brief synopsis of the seismic qualification review for each type of instrumentation selected is described below. Seismic margin is assessed for each item below.

1. Westinghouse Nuclear Instrumentation System (NIS)

   The Westinghouse NIS was seismically tested via WCAP-7817, "Seismic Testing of Electrical and Control Equipment" in December of 1971. According to WCAP-7817, the NIS was tested under the "low seismic" class of plants, those having a DBE horizontal acceleration ≤ 0.2g. Testing was performed using a vertical acceleration of 0.6g for a frequency range 1Hz to 21Hz rolling off to at 0.35g at 25Hz, and a horizontal acceleration of 0.7g at 1Hz rolling off linearly to 0.3g at 25Hz. According

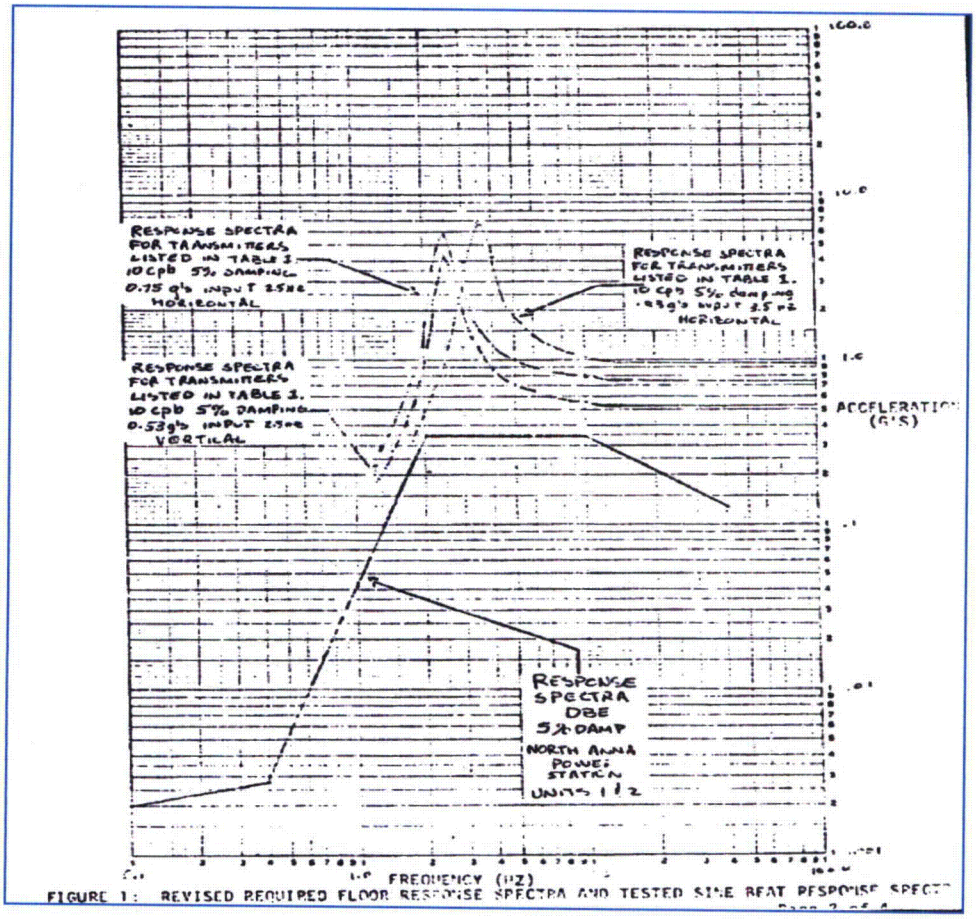
to WCAP-7817 Appendix B, a sine-beat signal was used to simulate the seismic event with a high frequency sine wave modulated by a low frequency sine wave with a series of 5 beats of the low frequency signal imparting energy into the equipment under test.

Sine-beat testing results in conservative levels being applied to tested equipment. Spectral accelerations at 5% damping corresponding to the maximum 0.7g horizontal input is approximately equal to [1/(2*0.05)](0.7) = 7g. Similarly, the peak spectral acceleration corresponding to the maximum applied vertical acceleration is approximately 6g. The minimum input acceleration of 0.2g corresponds to approximately 2g at 5% damping. Therefore, there is substantial margin for applied accelerations.

2. Foxboro Transmitter Seismic Qualification

Westinghouse Letter, VPA-80-139 "Seismic Reevaluation for Foxboro Pressure Transmitters" for North Anna Units 1 and 2 dated December 18, 1980 documents the reevaluation of the seismic qualification for the Foxboro transmitters with response spectra for the sine-beat test performed at 1.25, 1.75, 2.4, 3.5, and 5 to 35 Hz in 2 Hz increments. WCAP-7821, "Seismic Testing of Electrical and Control Equipment," and WCAP-8541, "Topical Report Seismic and Environmental Testing of Foxboro Transmitters," were referenced in the development of this document. The test results concluded that the original qualification requirements were met and therefore the transmitters are qualified under the revised seismic environment.

As mentioned above for the NIS testing, sine-beat testing results in conservative seismic levels applied to the tested equipment, as is demonstrated below.

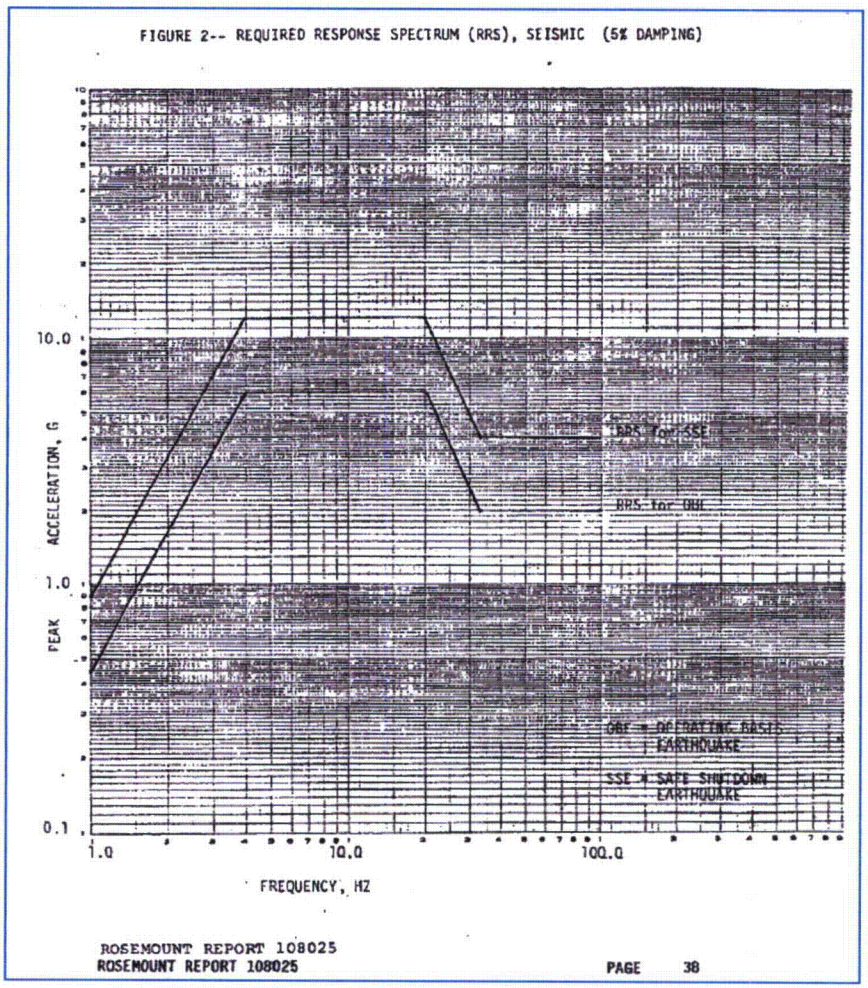


Seismic Reevaluation for Foxboro Pressure Transmitters

3. Rosemount Transmitter Seismic Qualification

Rosemount transmitters have replaced many of the older style transmitters in the plant. These transmitters were purchased nuclear qualified, where applicable, to meet the same seismic qualifications as specified in IEEE Std 323-1974 and IEEE Std 344-1975 and is documented in the vendor technical manuals, Rosemount Reports, and Wyle Test Reports 45592-3 and 49283-1. Three models, which are representative of those used in safety related applications, are reviewed.

Rosemount transmitter model number 1153 Series B is seismically qualified to an accuracy of ± 0.5% of URL during and after a seismic disturbance defined by a required response spectrum with a zero period acceleration (ZPA) of 4g as stated in Rosemount Report 108025. Figure 2 (shown below) from Rosemount Report 108025, shows that the transmitters have significant margin. The qualification levels will envelop any North Anna installation locations with substantial margins..



Model number 1153 Series D and Model 1154 are seismically qualified with an accuracy within ± 0.5% of URL (± 0.75% URL for Range Code 0 transmitters) during and after seismic disturbance defined by a required response spectrum with a ZPA of 7g as stated in Rosemount Reports D8300040 and D8400102 and Wyle Test Report 45592-3.

Model 1154 Series H is seismically qualified with accuracy within ± 0.5% of URL during and after seismic disturbance defined by a required response spectrum with a horizontal ZPA of 8.5g and a vertical ZPA of 5.2g as stated in Rosemount Report D870096 and Wyle Test Report 49283-1.

Based on the above ZPAs, the seismic capacities of the Model 1153, Series D and the Model 1154, Series H are also very high and will envelop any North Anna installation locations with margin.

4. Westinghouse Inadequate Core Cooling Monitoring (ICCM) System

Westinghouse WCAP-11479 dated April 1987 presents the results of the qualification programs which demonstrated the seismic adequacy of the Westinghouse Inadequate Core Cooling Monitoring (ICCM) System equipment for North Anna Power Station Units 1 and 2. According to WCAP-11479, North Anna Plant specific seismic requirements were provided in Dominion Specification No. NAS-2063, Revision 0 and Addendum No. 1 to the specification dated September 10, 1986.

1) The ICCM Microprocessor Equipment is housed in a single bay dual compartment cabinet (PSMS Cabinet) and contains the microprocessor cards, power supply, A/D converters and D/A converters. The PSMS cabinets were seismically tested using multiple frequency test inputs. The PSMS cabinet was oriented during testing to produce the equal excitation in all three equipment orthogonal axes. Five multiple frequency OBE tests were performed to one half of the safe shutdown earthquake (SSE) required response spectrum. Four multiple frequency SSE tests were performed after OBE testing. The PSMS cabinet was tested in four orientations by rotating the cabinet 90 degrees from the previous orientation. Based on WCAP-11479 dated April 1987 the PSMS cabinet and the ICCM microprocessor equipment was adequately qualified for North Anna.

2) The Modular Plasma Display for North Anna was seismically qualified using a multiple frequency test input. Five multiple frequency OBE tests were performed to two–thirds of the RRS for the SSE. After the OBE testing, four multiple frequency SSE test were performed in four orientations. Each orientation was obtained by rotating the test fixture horizontally 90 degrees from the previous orientation. Based on WCAP-11479 dated April 1987, the Modular Plasma Display was adequately qualified for North Anna.

The Qualification SSE Test Response Spectrum (at 1% damping) for the ICCM Microprocessor Equipment and the Modular Plasma Display is shown below. As is demonstrated, the equipment was tested to significantly higher levels than required by Dominion's specification.

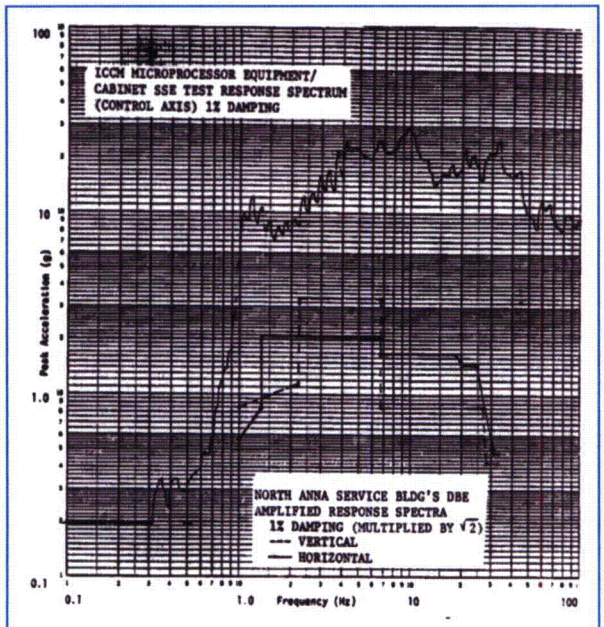


Figure 4-2
SSE Qualification Test Response Spectrum for
ICCM Microprocessor Equipment/Cabinet Compared to
North Anna Plant SSE Amplified Response Spectra Envelope

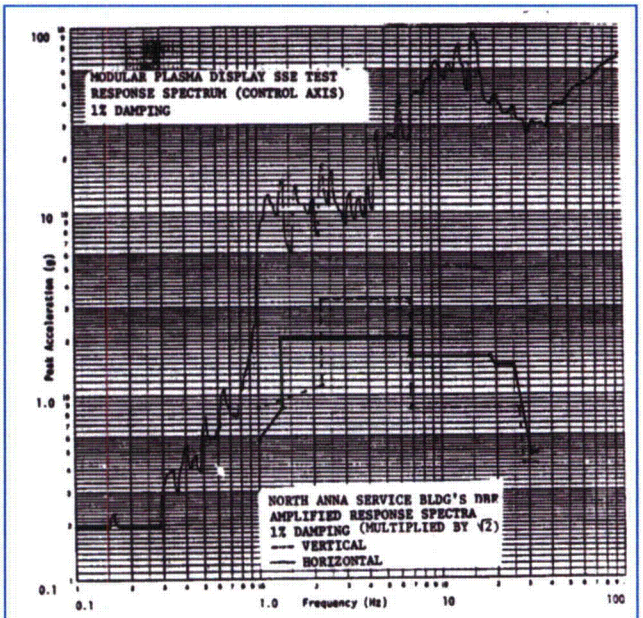


Figure 4-4
SSE Qualification Test Response Spectrum
for Modular Plasma Display Compared to
North Anna Plant SSE Amplified Response Spectra Envelope

5. Reactor Vessel Level Instrumentation System (RVLIS)

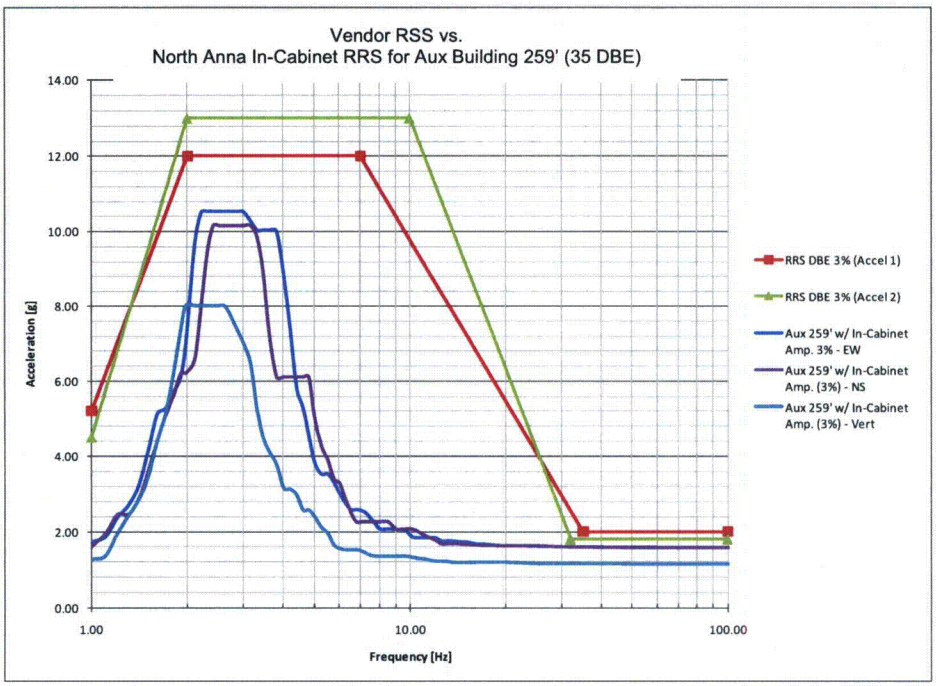
Westinghouse EQDP-ESE-4, Rev. 6, dated 3/83, Equipment Qualification Data Package, Differential Pressure Transmitters: Qualification Group B contains information relative to the qualification of certain equipment in accordance with the methodology of WCAP-8587. The Barton Differential Pressure transmitters, Model 752 used in RVLIS are identified in this document. The objective of the test was to demonstrate, employing the recommended practices of Reg. Guide 1.89 (IEEE Std. 323 – 1974) and Reg. Guide 1.100 (IEEE Std. 344 – 1975), the capability of the Differential Pressure Transmitters (qualification Group B) to complete their safety related functions while exposed to the applicable environments defined in the EQDP Report. For seismic testing, four Barton Differential Pressure transmitters were tested. The seismic testing reported in References 1 and 3 of EQDP-ESE-4, Rev. 6 was completed on new equipment employing multi-axis, multi-frequency inputs in accordance with Reg. Guide 1.100 (IEEE Std. 344 – 1975). Figure 1 of EQDP-ESE-4, Rev. 6 shows the required response spectra (three sets of spectra input used for Group B testing). The report indicates that the RRS contains significant margin with respect to any single plant application referencing the qualification program. However, the report then recommends comparison to site-specific RRS to ensure adequate margin. That comparison for North Anna's pressure transmitters is provided in the next paragraph.

Barton Differential Pressure Transmitters associated with RVLIS are installed in the Auxiliary Building, 259' elevation in the Cable Vault and Tunnel, 2.5 to 3 ft above the floor. Comparing the floor spectra corresponding to the Cable Vault and Tunnel to the RRS presented in Figure 1 of EQDP-ESE-4, Rev. 6 shows significant margin. The minimum peak spectral acceleration from 2 to 16 Hz at 5% damping for any of the three RRS curves used for qualification is about 3.6g with peak spectral accelerations of approximately 7g. The ZPA for all three RRS is 2g. By comparison, the floor spectra for the Cable Vault and Tunnel has a peak spectral acceleration of only 1.12g at 5% damping and a maximum ZPA of 0.23g.

6. Remote Multiplexer Associated with the ICCM

Remote Multiplexer modules are installed in the Emergency Switchgear Rooms (Service Building elevation 259') and the Auxiliary Building Cable Vault and Tunnel area (elevation 259').

The qualifications of the Validyne Remote Multiplexer Unit Models MC170AD-Q2 and MC370AD-Q2 are discussed in Validyne Test Report Qualification Test Report (QTR) 82-002 dated March 1982. For the Seismic Functional Test, the signal conditioning cards were installed in the module case and tested as a system. The results of the Seismic Functional Test on the system for functionality and failsafe operation were evaluated against the requirements as described in the acceptance test procedure. WYLE Laboratories Report Number 58666 describes the seismic test performed on the multiplexer. The test specimens were subjected to a biaxial multi-frequency random motion which was amplitude-controlled in one-third octave bandwidths from 1.25 to 100 Hz. Two simultaneous, but independent 30-second recordings of the random signal were used as the excitation to produce incoherent horizontal and vertical motions. The test table motions were iteratively calibrated to produce a test response spectra (TRS) which enveloped the RRS shown in the figures attached to WYLE Labs test report 58666. The vendor RRS is compared below to the governing North Anna RRS corresponding to the Auxiliary Building Cable Vault and Tunnel including a conservative in-cabinet amplification factor. The RRS used by the vendor envelops North Anna RRS with margin; the reported TRS envelops the vendor RRS with even more margin (especially at higher frequencies).



7. Westinghouse Solid State Protection System

The Solid State Protection System (SSPS) is a dual train, redundant protection system housed in two three bay cabinets, one single bay Control Board Demultiplexer Cabinet and a Computer Mounted Demultiplexer assembly. Each train cabinet has an Input Relay Bay, a Logic Bay and an Output Relay Bay.

The input relay bay contains relays which are operated by the nuclear instrumentation system bistables, process instrumentation bistables, and field contacts. The Logic Bay contains printed circuit cards for performing Logic functions; and the Output Relay Bay contains master and slave relays used to actuate safeguards components. The Three Bay SSPS Cabinet was tested for Low Seismic Plants (plants with a DBE horizontal ground acceleration not exceeding 0.2g) in accordance with WCAP-7817, December 1971 and WCAP-7817-S2, December 1971.

The simulated seismic testing consisted of three elements:

1) Inputting a sine-beat type acceleration to the base of the equipment
2) Monitoring the resulting accelerations at various locations in the equipment
3) Monitoring the electrical functions of the equipment both during and after the test.

Westinghouse WCAP-7817-S2, "Seismic Testing of Electrical and Control Equipment (Low Seismic Plants)," describes the Test Procedures used for simulating the seismic test. The testing consisted of applying a sine-beat of ten cycles of the test frequency with the amplitude of the beat (acceleration of "g" level of the vibration)

increasing from a small value to the specified maximum value and returning to the initial value. Per WCAP-7817-S2, dated December 1971 the test results showed that the electrical functions of each type of equipment were maintained within the criteria defined in the report both during and after each simulated seismic condition.

As noted for the Westinghouse NIS and the Foxboro Transmitters, sine-beat testing results in a conservative levels applied to tested equipment. Spectral accelerations at 5% damping corresponding to the maximum 0.7g horizontal input applied, as shown in WCAP-7817, Figure B-2, is approximately equal to [1/(2*0.05)](0.7) = 7g. Therefore, there is substantial margin for applied accelerations.

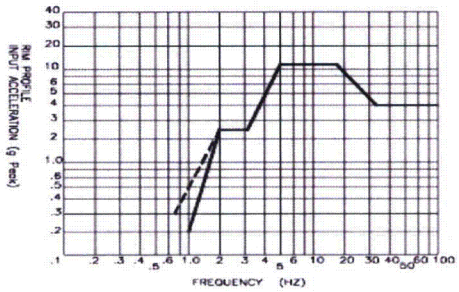
8. Weed Resistance Temperature Detectors

North Anna utilizes Weed Resistance Temperature Detectors (RTD) that are located in each reactor coolant loop hot and cold leg piping which are qualified IEEE 323-1974 and IEEE 334-1975. QDR-N-8.24 Revision 24, "Qualification Documentation," lists the qualification basis for the Weed RTDs. The RTD model series 612, N9001, N9003, N9007, and N9019 RTDs are based on the National Technical Systems Test Report 548-8854-2, dated December 4, 1980. The Weed N9004 series RTDs are qualified to Southwest Research Institute Report 06-8680-003, Revision 1.

The following Weed RTD Models are qualified for nuclear service to the qualification level shown below:

a. N9004 Thermowell Mounted Fast Time Response RTD
b. N9001 Thermowell Mounted Wide Range RTD
c. N9007 Direct Immersion Fast Time Response RTD
d. N9017 Atmospheric RTD
e. N9019 Direct Immersion Fast Time Response RTD
f. N612D Spring Loaded RTDs

Seismic Spectrum for Weed RTDs



Earthquake Response Spectra: OBE, H&V

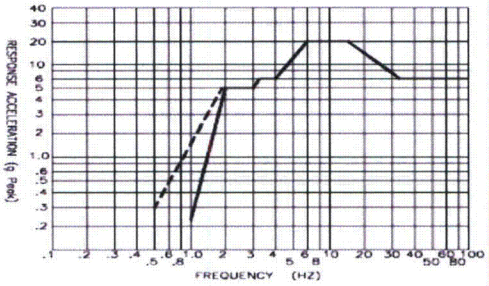
Damping: 1%

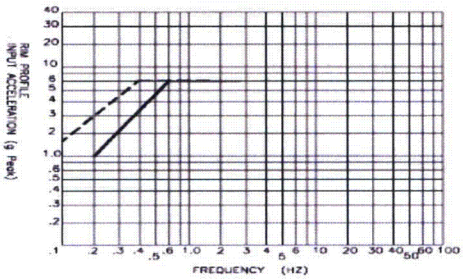
The dashed line of the profile represents regions to be tested analytically.

Earthquake Response Spectra: SSE, H&V

Damping: 1%

The dashed line of the profile represents regions to be tested analytically.





Required Input Motion (RIM)

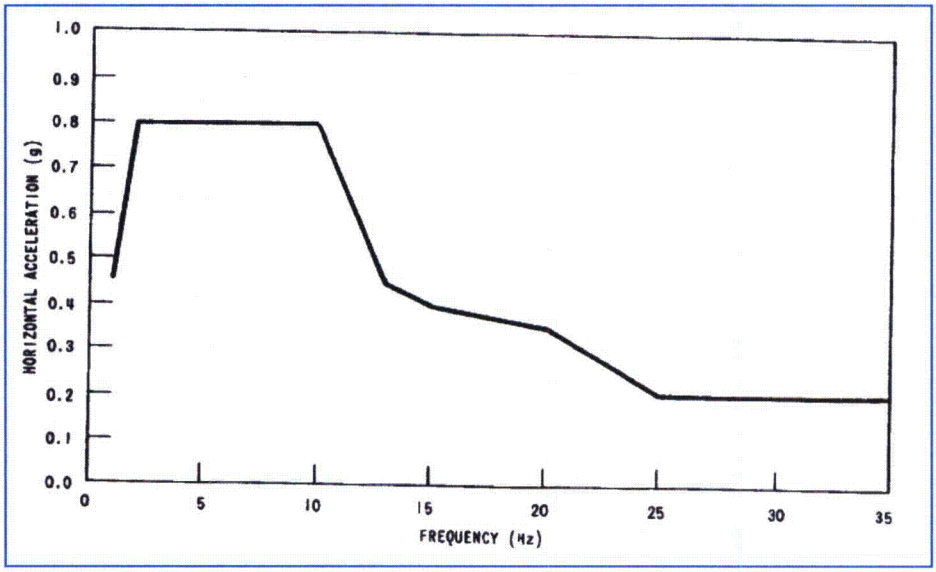
The dashed line of the profile represents regions to be tested analytically.

Therefore, the Weed RTDs are qualified to high seismic levels and have margin to accommodate increased seismic loading.

9. Westinghouse 7300 Process Protection and Control System

The Licensing and Design qualification reference for North Anna's 7300 Process Protection System is WCAP-7817. North Anna was licensed to the 1971 standards and therefore WCAP-7817 is the appropriate licensing qualification document.

Per Seismic Qualification Test Report WCAP-7817, Supplement 4, dated November 1972, the WCID 7300 Series Process Equipment, which consists of 2-bay or 3-bay cabinet configurations, was qualified to requirements which are consistent with those of IEEE Std. 344-1971. The testing consisted of single frequency, single axis, sine-beat inputs at several discrete frequencies ranging from 1 to 35 Hz. An entire WCID 7300 series prototype cabinet was installed on the table for the test. Applied horizontal input accelerations ranged from 0.8g at low frequencies (up to 10 Hz) down to 0.2g at 35 Hz, as shown in the figure below. Vertical input accelerations were applied at 2/3 of the horizontal level.



Horizontal Input Acceleration from WCAP-7817

For North Anna, the maximum Design Basis Earthquake acceleration (i.e. the ZPA in the DBE Response Spectra Curves) is 0.19g in any of the two horizontal directions, and 0.1g in the vertical direction, at the cabinet mounting location. Therefore, the test levels envelop North Anna's Design Basis levels. Although there is no specific mention of contact monitoring in the mercury-wetted relays or of the NTC, NPC, or NCH Cards in this test report, the test results indicate that no loss of signal, malfunction, or change of contact status occurred during the seismic tests. Therefore, the seismic tests qualify the 7300 Series Process Equipment to the requirements of IEEE Std. 344-1971, and envelop North Anna's seismic levels with margin. As previously mentioned in the review of the Westinghouse Nuclear Instrumentation System testing (Item 1), sine beat testing results in conservative levels applied to tested equipment. For this test, spectral accelerations at 5% damping corresponding to the maximum 0.8g horizontal input are approximately equal to [1/(2*0.05)](0.8) = 8g]. Similarly, the peak spectral acceleration corresponding to the maximum applied vertical acceleration is approximately 5g. The minimum input acceleration of 0.2g corresponds to approximately 2g at 5% damping. Therefore, there is margin for applied accelerations over the design basis requirements.

Upon further review (beyond the NAPS Licensing basis), it has been noted that the Westinghouse 7300 ISD Process Instrumentation was seismically tested again in 1988 via WCAP- 8687, Supp 2 E13C, Revision 2 (Dated September 1988). This testing was conducted at much higher seismic spectra than the North Anna spectra. According to WCAP-8687, Supp 2 E13C, Revision 2, the 7300 Series printed circuit boards were tested at three SSE levels and RRS levels to determine functional operability during and after a simulated seismic event. The seismic test input to the 7300 Series PC Cards was multifrequency in composition and was applied to the

equipment in all three directions simultaneously. The input to the 7300 equipment was based on a generic Safe Shutdown Earthquake (SSE) and Required Response Spectra (RRS). With the exception of four cards (see below), WCAP-8687, Supp 2 E13C, Revision 2 concluded that all of the 7300 Cards used in North Anna's 7300 NSSS Protection and Control System are qualified to the in-cabinet SSE and RRS shown in Figures 1, 2, and 3 of WCAP-8687, Supp 2 E13C, Revision 2. The four 7300 Series Cards listed below did not meet the qualification test requirements. Although this testing was performed at a much higher seismic test input than used for qualification under WCAP-7817, one of the problems identified, the opening of contacts on mercury-wetted relays, was on a seismically sensitive component.

Subsequent to qualification testing, the USNRC issued NRC Information Notice No. 83-38 on June 13, 1983 that discusses issues associated with 7300 NLP Cards (i.e., Loop Power supplies) and the induced chatter associated with the 7300 NTC Cards listed below.

- NTCG01, NTCG03, and NTCG04 – Nuclear Channel Test Cards, are used for temperature loops (i.e., $\Delta T/T_{AVG}$, RCS Wide Range Temperature).

- NCHG01 – Nuclear Function Generator Card, used for FΔI input to OTΔT RX Trip, Containment Partial Pressure, and for the Power Mismatch and Rod Speed and Direction circuits in the 7300 NSSS portion of the Rod Control System.

- NPCG01 – Nuclear Potentiometer Card, used for FΔI input to OTΔT RX Trip and PZR Pressure Input to OTΔT RX Trip and in the Power Mismatch Portion of Rod Control.

- NTDG01 – Nuclear Tracker Driver Card - used in the NSSS Control System for Feedwater Bypass Flow Control.

Internal station processes (i.e., the Corrective Action Process) are being utilized to perform an evaluation of the four 7300 series cards. All other cards in use have been qualified based on the WCAP-8687, Supp 2 E13C, Revision 2. The generic qualification levels used in that WCAP far exceed North Anna's site specific in-cabinet response spectra corresponding to the Emergency Switchgear Room in the Service Building (elevation 252') for the 7300 switchgear cabinets.

The NTCG01, NTCG04, and NTDG01 cards were just recently seismically tested by Westinghouse for North Anna's site specific levels to ensure seismic acceptability of the mercury-wetted relays used (Appendix B qualification report is in progress). Note that testing the NTCG01 and NTCG04 cards envelops the NTCG03 card. The tested NTC and NTD passed seismic testing with no recorded chatter. Further, these cards were subjected to higher test levels as part of fragility testing. The NTC cards did not chatter until a seismic level corresponding to approximately four times North Anna's site specific in-cabinet RRS (no chatter was measured for approximately 3 times the

North Anna in-cabinet RRS). The NTD cards did not chatter at approximately four times the North Anna level.

The NCHG01 and NPCG01 cards are acceptable at the WCAP-8687 seismic spectra (significantly higher than North Anna's design or licensing seismic spectra and significantly higher than WCAP-7817seismic spectra) based on the following:

During the seismic testing described in WCAP-8687, Supp 2 E13C, Revision 2, the NCHG01 Cards exhibited a total card output error of ± 0.87% of span. Also, based on the seismic testing described in WCAP-8687, Supp 2 E13C, Revision 2, the NPCG01 Cards exhibited a total card output error of less than ± 0.1% of span. Westinghouse considered this result to be unacceptable and increased the error to ± 0.5% of span for the NPCG01 Cards due to the small sample size of the tested components. A revised setpoint study was conducted to determine the effect on the Safety Margin for the Protection and Indication functions that use these cards. The tolerance of the NPCG01 Card was increased from ± 0.5% of span to ± 0.6% of span and the tolerance of the NCHG01 Card was increased from ± 0.5% of span to ± 1.0% of span in the affected Channel Statistical Allowance (CSA) Calculations to determine if there was still Safety Margin for the Protection and Indication Function. The CSA Values in the affected calculations increased only slightly causing a minimal decrease in Safety Margin. Based on this setpoint analysis, the NCHG01 and NPCG01 Cards currently in use at North Anna Power Station are acceptable and will perform their design function.

In each of the above cases, the seismic qualification levels showed margins above the requirements. Although the in-structure response spectra (ISRS) from the August 23, 2011 event are not available at various structures and elevations, based on the review of the spectra at containment basemat and elevation 291' developed from the recorded time-histories, it is judged that the margins available will envelop the spectra from the August 23, 2011 event. Additional justification of margins is provided in Enclosures 2 and 3 to Letter 11-577A.

It is again noted that inspections and calibrations were performed on a select number of instrumentation associated with Unit 1 and all the instrumentation required for a normal refueling outage on Unit 2. The results of the inspections have shown no visible damage to the components, or its mounting or electrical connections. Also, for the calibrations that have been performed on the various instrumentation, tracking and trending has not shown an adverse trend in the required calibrations (adjustments/magnitude of adjustments) of the various seismically qualified instrumentation.

Fire Protection

In a letter dated October 19, 2011, the NRC requested information to clarify Dominion's responses to the fire protection information provided in Dominion's letter dated October 3, 2011 (Serial No. 11-566).

Fire Protection Clarification 1

The licensee stated that the Unit 2 Main Control Room Halon System was tested. The control room has a Unit 1 and Unit 2 side but there is no separation between the two. Per the UFSAR, it appears that there are two separate halon systems that cover the underfloor area of the Control Room. Was the Unit 1 control room halon system also tested? If not, why not? Is the underfloor area common to the entire control room or is there separation between the Unit 1 and Unit 2 sides?

Dominion Response

There are two (2) Halon Systems in the underfloor area of the Main Control Room, System 5 (Unit 1) and System 6 (Unit 2). The underfloor Halon systems are identical in layout, equipment type and design function. Halon System 6 was tested, with no discrepancies noted, which provided assurance that the Halon system remained functional. Halon control panels, halon storage bottles and system piping for both System 5 and System 6 were visually inspected and no evidence of damage attributed to the earthquake was indentified. Due to the similar configuration (piping layout and design), System 5 was not tested. System 5 was last tested on June 20, 2011. Based on the post-earthquake functional testing of System 6, the detailed inspections of both System 5 and System 6, and the similar configurations of the two systems, there is reasonable assurance that the August 23, 2011 earthquake did not result in any seismically-induced damage that would prevent the discharge nozzles from performing their intended function.

Halon System 5 and System 6 are separated by an underfloor gas suppression barrier as shown on UFSAR Figure 9.5-3.

Fire Protection Clarification 2

The licensee stated that the emergency switchgear halon discharge nozzles were observed but did not indicate if both units were observed or not. The licensee should confirm that observations were made for both Units 1 and 2 emergency switchgear rooms, and if not, why not.

Dominion Response

The Unit 1 and Unit 2 emergency switchgear room halon nozzles were visually inspected. The Unit 1 and 2 emergency switchgear rooms' halon discharge nozzles were found intact. Thus, the earthquake did not result in any seismically-induced damage that would prevent the discharge nozzles from performing their intended function.

Fire Protection Clarification 3

The licensee stated that plant inspections were conducted to verify functionality of the fire doors, dampers and penetration seals in Unit 1 Containment, Units 1 and 2 Emergency Switchgear Room, Units 1 and 2 Cable Vault and Tunnel, Units 1 and 2 Cable Tray Spreading Room, Unit 2 Quench Spray, and Unit 2 Safeguards fire areas with no deficiencies found. Were inspections in Unit 2 Containment, Unit 1 Quench Spray, and Unit 1 Safeguards areas also conducted? If not, why not?

Dominion Response

The Unit 2 containment, Unit 1 Quench Spray and Unit 1 Safeguards were inspected. Some minor deficiencies of penetration seals outside containment were identified, documented and corrected but the damage was not attributed to earthquake damage.

During inspection of the cable tray cover boards in Unit 2 containment, several covers were determined to have been broken due to physical damage during a rigging operation and work orders have been initiated for repairs. Several minor cracks were observed in marinite cable tray covers, which could have been caused by the earthquake since they were not identified in 2010 walkdowns and there was no evidence of someone stepping on these particular covers. These cracks are not considered functional damage, as they are minor and do not impact the ability of the cover board to provide a fire barrier. A Condition Report was submitted for repairs / replacement as required.

Fire Protection Clarification 4

The licensee stated that cable tray covers, conduit seals, conduit fire wraps, radiant energy shields and cable tray firestops were inspected in the containments. Were inspections of these items in other areas of the plant besides containment also conducted? If not, why not?

Dominion Response

Other areas of the plant were visually inspected for fire protection items similar to those in the containment. Passive fire protection features such as fire wrap installed on charging and component cooling pumps cables in the Auxiliary building were also inspected and found to be intact. Based on the observed condition, these passive fire protection features outside containment meet their functional requirements.

Radiant energy shields are unique to the containments and are not located in other plant areas.

Fire Protection Clarification 5

The licensee stated that based on performance monitoring of the Fire Protection System since the seismic activity, it has been concluded that the Fire Protection Instrumentation, Suppression System, Detection System, and Passive Fire Protection Barriers are capable of performing their design functions. What seismic activity is being referred to? Is it the August 23, 2011 earthquake, or subsequent seismic activity that occurred after August 23, 2011?

Dominion Response

The statements regarding the seismic activity refer to the earthquake of August 23, 2011. This conclusion bounds subsequent after-shocks since August 23, 2011 to the present, since the magnitudes of the follow-on events were less than the initial event.

Fire protection design functions following subsequent seismic activities continue to meet their functional requirements.

Fire Protection Clarification 6

EPRI NP-6695, Table 5-1 states the following: "Fire mains, service and circulating water piping, especially dead legs, are susceptible to buildups of corrosion and growths which are knocked loose by earthquake motion. These loosened accumulations can clog screens and small diameter pipes such as fire hose hydrants. Checks for clogging and flushing of pipe mains are necessary." Provide verification that smaller diameter fire protection pipes and dead legs were checked for clogging and that fire mains were flushed as described in EPRI NP-6695, Table 5-1.

Dominion Response

The fire main was flushed on September 23, 2011. The fire main flush flows water in one direction in each plant area using selected hydrants with a quantity of outlets that provide sufficient flow rates for flushing. This method enhances the possibility of

removing any objects and sediments that may be in the system. Each plant area is flushed for 15 minutes.

Discharge from the fire main was clear and free of sediment or corrosion products in each plant area. Based on clarity of the fire main water discharge, it was not necessary to flush the smaller diameter piping associated with sprinkler and deluge systems.

Snubbers

The following is in regard to the previously issued snubber questions numbered 2 and 4, which were responded to in Dominion's letters of October 3, 2011 (11-566) and October 10, 2011, (11-566A).

Short Term:

NRC Clarification - Question 2

The second paragraph of the October 10, 2011, response (11-566A), to snubber question 2, states: "These visual inspection results are consistent with the previous visual inspection performed in the spring of 2009." The last paragraph of the response to question 2 for Unit 2 states: "These visual inspection results are consistent with the previous visual inspections performed in spring 2010."

a. *Provide additional details on the Unit 1 spring 2009 inspections results beyond just stating that they are consistent with previous examination results.*

Dominion Response

Spring 2009 was the last performance of the TRM required visual inspection prior to the earthquake for Unit 1. During that inspection, five (5) snubbers were found to have low oil level. Subsequent functional testing confirmed that they were fully functional and therefore considered acceptable for the purpose of establishing the next visual inspection interval. One snubber was found with a missing snap ring on a vertically oriented attachment pin and was evaluated to have been non-functional if there had been a seismic event since it was not evident that the pin would have stayed engaged. This snubber was considered unacceptable for the purpose of establishing the next visual inspection interval. Additionally, there were several minor issues identified that were determined not to have an impact on functionality (e.g., missing spacers, oil on snubber needed cleaning, level below 50%, but determined functional based on piston setting). The findings of the visual inspections performed following the earthquake are very similar to what was seen in spring 2009.

b. *Provide details about any fourth inservice interval snubber examination and testing (based on the Technical Requirements Manual (TRM) program) for Unit 1 that may have been performed between spring 2009 and summer 2011. If no such snubber examination or testing was performed, provide the basis for that condition.*

Dominion Response

Functional testing of predetermined sample group 'A' was performed during the Unit 1 fall 2010 refueling outage as required by the TRM. Fifty-five (55) small bore snubbers

and two (2) large bore snubbers were tested with acceptable results. Functional testing takes place every refueling outage in accordance with our TRM requirements.

As a result of having only one visual inspection unacceptable finding during the spring 2009 refueling outage, no reduction in inspection interval was required. Therefore, the next visual inspections to meet TRM surveillance requirements are scheduled for the spring 2012 refueling outage. Note that we do not sub-divide into accessible/inaccessible as allowed by our TRM. We simply perform visual inspection of each snubber every other refueling outage.

c. *Provide additional details on the Unit 2 spring 2010 inspections results beyond just stating that they are consistent with previous examination results.*

Dominion Response

Spring 2010 was the last performance of the TRM required visual inspection on Unit 2 prior to the earthquake. During that inspection, four (4) snubbers were found to have low oil levels. Subsequent functional testing confirmed that the four (4) snubbers were fully functional and therefore considered acceptable for the purpose of establishing the next visual inspection interval. Additionally, there were several minor issues identified that were determined not to have an impact on functionality (e.g., missing jam nut, loose jam nut, oil on snubber needed cleaning, level below 50%, but determined functional based on piston setting). The findings of the visual inspections performed following the earthquake are very similar to what was seen in spring 2010.

d. *The response to question 2 states that "The attachment lug will be repaired and the associated snubber will be replaced and functionally tested." Provide the date when this will be completed.*

Dominion Response

The attachment lug has been replaced and the associated snubber was functionally tested with satisfactory results.

NRC Clarification - Question 4

The second paragraph of the October 10, 2011, response to Snubber Question 4, states that:

In addition to the TRM functional test group for Unit 2, an additional twelve (12) small bore snubbers have been selected from Unit 1 for functional testing. This sample was developed based on a combination of various buildings/elevation, ease of access (ALARA, scaffold concerns, etc.), and snubbers expected to experience high loading

during a seismic event. Also, two (2) large bore snubbers on Unit 1 will be tested. The Unit 1 snubber testing will be completed prior to entering Mode 4 on Unit 1.

a. *Explain the method or evaluation that was performed to determine which snubber may have experienced higher loads during the seismic event at NAPS.*

Dominion Response

As stated in our previous letter, we considered ease of access (ALARA, scaffold concerns, etc) and combination of various building/elevations to develop a list of over fifty (50) small bore snubbers. We then went back to the piping stress analysis to identify the snubbers with the highest seismic design loading. The sample was intended to identify snubbers that would have the best chance of being loaded during the August 23 earthquake. Functional testing of this sample group of small bore and large bore snubbers has been completed with acceptable results.

b. *Explain the method or evaluation that was performed to identify snubbers that may have exceeded their design load capacity as a result of the August 23, 2011, seismic event felt at NAPS. Furthermore, discuss the prior-to-restart actions that will be taken to ensure proper operation for these snubbers.*

Dominion Response

It is not expected that any snubber exceeded their design load capacity as a result of the August 23, 2011 earthquake. Due to the relatively short duration of the strong motion accelerations, piping systems did not fully develop designed loading conditions. Additionally, snubber load acceptance criteria are based on allowable design load criteria. For small bore hydraulic snubbers used at North Anna, the allowable design load is typically 30% to 50% of the faulted allowable loading provided by the manufacturer. Even if the assumption is made that the August 23, 2011 earthquake fully developed design type loading conditions in the piping systems, and assuming that those loads were 20% above the design basis earthquake loading, there is still substantial margin to snubber failure. Since snubbers are available in discrete sizes, with discrete allowable loads, in the design process the next larger size snubber is selected based on the calculated load. The difference between the calculated load and load rating of the next largest size snubber is an additional margin to the maximum capability of a snubber.

c. *Regarding the last sentence in the response to question 4 above, discuss the action to be taken, prior to entering Mode 4, if the snubber test results are unacceptable.*

Dominion Response

The functional testing performed on Unit 1 and Unit 2 snubbers has been completed with acceptable results.

EMCB Branch

Supplemental Questions

Short Term:

1. *Nuclear Regulatory Commission Inspection Manual Part 9900, "Operability Determinations & Functionality Assessments for Resolution of Degraded or Nonconforming Conditions Adverse to Quality or Safety," Section C.10, states that piping or pipe supports in a degraded or nonconforming condition should be evaluated in accordance with the criteria of Appendix F of the American Society of Mechanical Engineers (ASME) Boiler &Pressure Vessel (B&PV) Code, Section III, to demonstrate operability/functionality of the affected piping and supports. Confirm that the aforementioned Appendix F criteria have been utilized in the operability/functionality determination of piping and pipe supports which are required to be operable/functional. If the criteria of Appendix F have not been utilized in these operability determinations, please state the criteria or evaluation methods utilized to demonstrate operability/functionality of the piping and pipe supports in lieu of the Appendix F criteria. If sampling is utilized for analytical models for piping and pipe supports which are required to be seismically qualified by structural analysis, please discuss the criteria and methods of sampling that will ensure structural operability/functionality of the remainder population of piping and pipe supports.*

Dominion Response

In accordance with the guidance of RG 1.167 and EPRI NP-6695, evaluations will be conducted to identify areas where, by analysis, exceedances of Code faulted allowables are predicted to have occurred, based on input spectra derived from the recorded seismic time history data. If exceedances of faulted allowables are predicted, more detailed inspections of the affected piping, supports or components, will be conducted. The type of inspection performed would be based on the findings of the analysis. For example, if the piping analysis predicts that faulted stress limits are exceeded at a pipe elbow due to predicted longitudinal movement of a long run of piping, appropriate non-destructive examination (NDE) will be performed on the pipe wall or weld at the location where the faulted limit is predicted. If a support is predicted to have experienced an overload of a weld connecting structural components, the weld would be inspected by a dye penetrant test. If a concrete expansion anchor was predicted to be overloaded, visual inspection of the bolt and baseplate would be performed and if movement of the baseplate is detected, anchor bolts would be checked for correct torque.

A scoping evaluation has been performed, as discussed in Dominion's response to Piping Question 1 in letter dated October 18, 2011 (Serial No. 11-577A), on six piping segments contained in the Containment Building utilizing Instructure Response Spectra

developed from the recorded time-history of the August 23, 2011 seismic event, and no exceedances of code allowables, or significant support load increases were identified.

As noted in Attachments 2 and 3 to Letter 11-577A, the recorded accelerations from the seismic instrumentation show that the earthquake lacked the energy, as demonstrated by the CAV calculated for the event, to cause damage to the plant. This is confirmed by the extensive inspection and testing activities that have taken place to ensure that no significant damage has been sustained by plant structures, systems and components (SSCs). Therefore, although the spectral accelerations recorded during the event exceeded the DBE spectra used for the DBE, the effect of the earthquake is less than would be experienced in a DBE. To date, no degraded or nonconforming conditions relative to the earthquake have been found or are expected due to the August 23, 2011 earthquake.

EMCB Question 1 Clarification

Considering the information presented in Virginia Electric and Power Company's (VEPCO) report dated September 17, 2011, additional information is requested in the mechanical and civil engineering area regarding the planned inspections, evaluations and testing of systems, structures, and components (SSCs).

1. *Provide (1) a summary result of inspections of the NAPS Units 1 and 2 SSCs listed below; (2) assessment of possible root cause and the extent of condition for any identified damage; and (3) a discussion on the corrective actions (if any) that will be implemented, prior to restart, to demonstrate that the affected SSCs will continue to perform their required design functions:*

   d. *Support structures, including anchor bolts and surrounding concrete, for major equipment (e.g., reactor vessel, steam generators, pressurizer, and reactor coolant pumps).*

Address the specific components listed in item d.

Dominion Response

Inspections were performed for major equipment support structures on both North Anna Unit 1 and Unit 2 as part of the previously discussed civil and system inspections. These inspections looked for potential earthquake damage indicated at baseplates, anchor bolts, structural members, and supporting concrete in accordance with procedures ER-NA-INS-104 and 0-GEP-30. These inspections included the major equipment such as, reactor vessel, reactor coolant pumps, pressurizer, steam generators, safety injection accumulators, recirculation spray heat exchangers, and residual heat removal heat exchangers. Major equipment not in containment, such as turbine/generator, feedwater heaters, feedwater pumps / motors, secondary drain pumps, bearing cooling pumps, service water pumps, circulating water pumps, low head

safety injection pumps, safety injection pumps, component cooling pumps, instrument/service air compressors and tanks, steam generator blowdown heat exchangers and tanks, etc. was also inspected. No findings of earthquake damage were identified. Additional inspections on major equipment supports structures were performed on Unit 2 as part of the normal ISI Program. These included VT-1 inspection of specific welds on the Unit 2 'A' SG support frame, PT of integral foot on the RHR heat exchangers, and VT of integral support feet for the RHR heat exchangers. Finally, VT-3 inspections were completed for Unit 1 and Unit 2 reactor vessel supports (cold leg/hot leg). These inspections have identified no functional damage related to the August 23, 2011 earthquake.

EMCB Supplemental Question 2:

Short Term:

Confirm and provide a technical justification that the geometry and configuration of the North Anna Units 1 and 2 are sufficiently similar, such that the dynamic behavior observed in North Anna Unit 2, as a result of the seismic event, is representative of Unit 1.

Dominion Response

The geometry and configuration of North Anna Units 1 and 2 are sufficiently similar to support common unit conclusions for common unit SSC's. For example, Unit 1 and Unit 2 containments both are rock-founded and have similar internal arrangements. Both units share a common fuel building, service building, main control room area (split into unit 1 and 2 sides) and auxiliary building. Equipment is arranged similarly. For example the high head safety injection pumps for both units are in the auxiliary building basement and both unit 1 and 2 pumps are side by side with intervening wall separation. The protection instrumentation (7300 system) for both units are located on lower service building level and similarly arranged. Station battery sets are at the same levels in the common service building and similarly arranged. The safeguards building surrounding the containments for each unit, while not common, are almost identically built and pumps, piping, MOV's, and other equipment in these building are arranged at the same levels and identical relative locations with few exceptions. System piping runs and supports arrangements are very similar.

Inservice Testing Program (IST)

NRC Requested information

1 *Please discuss your inspections and evaluations to determine that all the safety-related pumps and valves (manual, AOVs, MOVs, POVs, RVs, and associated actuators) are operationally ready and functional following the August 23, 2011 earthquake. If no such inspections/evaluations were performed, please justify why they are not needed. Provide your response for each unit separately.*

Dominion Response

Safety related pumps and valves were inspected as part of the system inspections. These inspections concentrated on identifying earthquake damage such that for these components, the focus was on anchorage / support and pipe nozzle conditions. No damage was identified for the safety related pumps and valves. Many manual valves (safety related and non-safety related) have been operated for both units as part of system maintenance with no anomalous issues identified in the corrective action system. Functional testing and IST performance testing have been performed as described in questions 2 and 3 below. Relief valve testing was previously discussed in Dominion's response to Reactor Systems RAI No. 2 in Dominion's letter dated September 27, 2011 (Serial No. 11-544).

2. *Discuss if each safety-related pump in your Inservice Testing (IST) Program will be tested (i.e., quarterly test, comprehensive test) in order to demonstrate operational readiness and functionality. If tests will not be performed for some pumps prior to restart, please discuss why they are not needed and how these pumps are judged to be operationally ready to perform their designated safety functions. Where tests will be performed, prior to restart, provide the results from this testing. Provide your response for each unit separately.*

Dominion Response

The Unit 1 and Unit 2 safety related pumps included in the IST Program have been tested with satisfactory results in accordance with the ASME IST program, except for the Unit 1 Inside Recirculation Spray (IRS) pumps (1-RS-P-1A/1B) and the steam driven auxiliary feedwater (AFW) pumps (1/2-FW-P-2). Both units' steam driven AFW pumps will be tested during start-up activities (when steam is available). However, the Unit 1 IRS Pumps will not be tested. The Unit 2 IRS pumps (2-RS-P-1A/1B) were tested with satisfactory results during the refueling outage and those test results were used to evaluate the operability of the Unit 1 IRS pumps. Testing results of similar pumps (in a similar orientation) on Unit 2 as well as a general lack of degradation noted as a result of the earthquake for SSCs provides assurance that the Unit 1 IRS pumps will continue to be able to perform their designated safety functions.

3. *Discuss if each safety-related valve in your IST Program will be tested in order to demonstrate operational readiness and functionality. If tests will not be performed for some of these valves prior to restart, please discuss why they are not needed and how the valves are judged to be acceptable to perform their designated safety functions. Where tests will be performed, prior to restart, provide the results from this testing. Provide your response for each unit separately.*

Dominion Response

For Unit 1, stroke time testing has been performed on valves in the IST program and results compared with pre-earthquake testing results. Overall, valve performance was consistent and did not indicate any earthquake-related degradation and the valves are acceptable to perform their designated safety functions. Dominion's letter dated October 3, 2011 (Serial No. 11-566), details testing done on Unit 1 valves and lists three (3) valves that did not pass their stroke time. Those valves were repaired. One additional valve, in the Main Control Room air condition service water seal water supply isolation valve, 1-HV-SOV-1200A, indicated a negative trend in stroke time (but the stroke time was within the allowable stroke time limit established in surveillance procedure). Evaluation of the valve's performance is being tracked by the corrective action process. In addition, functional testing on Unit 1 verified valves (including check valves) stroked to the required positions and provided required flow in the required time.

For Unit 2, stroke time testing has been performed on about 40% of the IST program valves so far, and the rest of the valves will be tested as the systems are brought back to service following the refueling outage activities. There have been no valve failures on Unit 2. Functional testing will be performed on Unit 2 which verifies valves (including check valves) stroke to the required positions and provide the required flow in the required time.

Relief valve testing was previously discussed in Dominion's response to Reactor Systems RAI No. 2 in Dominion's letter dated September 27, 2011 (Serial No. 11-544).

Attachment to Enclosure 1)

Switchyard Inspection and Testing Status Update

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

North Anna Power Station Post-Seismic Switchyard Inspection

Summary of Identified Conditions Resulting From Seismic Event

Below is a list of issues identified so far during post seismic inspections at North Anna. The status of each item is included in the list below. This attachment has been divided into 3 lists. List 1 contains issues attributed to the seismic event. List 2 contains issues that may have been caused or exacerbated by the seismic event. List 3 contains the present schedule for remaining items. All schedule dates contained in these lists are as of 10/19/2011, and may be subject to change based on risk assessments from North Anna Power Station Operations and Dominion Electric Transmission System Operations. All items that are recommended to be completed before a Nuclear Unit is returned to service are explicitly stated in the lists below:

List 1: Seismic related issues:

- Mitsubishi GSU bushings –
  - All eight (8) 500kV bushings on the Mitsubishi GSUs shifted on their respective flanges. The bushings have been replaced on the six (6) in-service transformers. This work was completed.
  - Bushings have not been installed to the spare units as man-power resources are allocated to the inspection of in-service equipment. This item is a Long Term Corrective Action (LTCA) that is not required prior to returning a nuclear unit to service.
- Switchyard Transformer (Tx) #5/6 spare – 500kV bushing cracked near the flange and began leaking oil. The bushing required replacement, and this activity was completed.
- Switchyard Tx #5 conditions –
  - 230kV arrestors: A & C phase 3" support tube bus section had broken 4-bolt pad connections. This connection was repaired.
  - 500kV bushing on A phase unit shifted and gasket was out of place. No oil leaking and transformer tested SAT. Transformer will be returned to service and a future outage will be scheduled to replace the bushing. This item is a Long Term Corrective Action (LTCA) that is not required prior to returning a nuclear unit to service.

North Anna Power Station Post-Seismic Switchyard Inspection

Summary of Identified Conditions Resulting From Seismic Event

- Tx #3 –
  - A phase had elevated micro-ohm readings: 41 μΩ – 9 μΩ corrected
  - B & C phase termination caps loose. These caps were tightened down prior to returning to service.
  - High side arrestor bracket requires repairs for long term reliability. There are no short term concerns with this equipment. This corrective maintenance will be scheduled in a subsequent outage. This item is a Long Term Corrective Action (LTCA) that is not required prior to returning a nuclear unit to service.
- 230kV House Batteries –
  - Apparent torquing/shifting of the battery cells with mechanical stresses on intercell straps and battery posts. These batteries will be re-strapped and tested as resources allow. This item is a Long Term Corrective Action (LTCA) that is not required prior to returning a nuclear unit to service, and is presently scheduled for 10/20/2011.
  - Cellcorder testing reviewed by Grayland SMEs – no operating concerns identified. Discharge testing not yet complete. This item is a Long Term Corrective Action (LTCA) that is not required prior to returning a nuclear unit to service, and is presently scheduled for 10/24/2011.
  - Projects are being created to replace these batteries and to install seismic battery racks. This item is a Long Term Corrective Action (LTCA) that is not required prior to returning a nuclear unit to service.
- 500kV House Batteries #1 & #2 –
  - Hairline cracking identified on the lids of battery jars due to mechanical stresses (Identified on both Battery #1 and Battery #2). This item is a Long Term Corrective Action (LTCA) that is not required prior to returning a Nuclear Unit to service.
  - Noticeable shifting on Battery #1 cells 16 – 30 after the earthquake. These batteries were repositioned to a normal alignment.
  - Cellcorder testing reviewed by Grayland SMEs – no operating concerns identified. Discharge testing was completed with satisfactory results.
  - Projects are being created to replace these batteries and to install seismic battery racks. This item is a Long Term Corrective Action (LTCA) that is not required prior to returning a nuclear unit to service.

North Anna Power Station Post-Seismic Switchyard Inspection

Summary of Identified Conditions Resulting From Seismic Event

- 57508 –
  - Disconnect Switch was found out of adjustment. This work was completed prior to returning the switch to service.
- L105 Disconnect Switch had high micro-ohm resistance readings from the Lead to Switch. This work was completed.
  - A pad: 45.6μΩ – 1.6 μΩ corrected
  - C pad: 54.6 μΩ – 8.1 μΩ corrected
- 352 Disconnect Switch had high micro-ohm resistance readings from the Switch to Breaker. This work was completed.
  - A pad: 41.8 μΩ – 12.8 μΩ corrected
  - B Pad: 76.6 μΩ – 11.3 μΩ corrected
- T343 Disconnect Switch had high micro-ohm resistance readings. This work was completed.
  - A pad to Bus: 44 μΩ – 4 μΩ corrected
  - B pad to Bus: 69 μΩ – 5 μΩ corrected
  - C pad to Bus: 114 μΩ – 6 μΩ corrected
  - B phase of switch: 250 μΩ – 34 μΩ corrected (CM work order in place after hurricane winds)
- T334 Disconnect Switch had high micro-ohm readings resistance from the Lead to Switch. This work was completed.
  - B pad: 36 μΩ – 2 μΩ corrected
- G2T575 Circuit Breaker - An air leak was identified and repaired. This work was completed.
- G202: C phase – damaged freestanding current transformer (CT) bellows. This work was completed.

North Anna Power Station Post-Seismic Switchyard Inspection

Summary of Identified Conditions Resulting From Seismic Event

- 34202-4 had high micro ohm readings on lead connecting to Bus #4. This work was completed.
  - B pad to Bus: 53.4 μΩ – 6.4 μΩ corrected
- 244 Disconnect Switch lead to 242 CB. This work was completed.
  - C pad to Bus: 57.3 μΩ – 6.1 μΩ corrected
- 242 Disconnect Switch to Bus #4. This work was completed.
  - A pad to Bus: 33.9 μΩ – 2.6 μΩ corrected
  - B pad to Bus: 32.0 μΩ – 9.6 μΩ corrected
  - C pad to Bus: 56.4 μΩ – 3.6 μΩ corrected
- T344 Disconnect Switch to Bus #4. This work was completed.
  - A pad to Bus: 77.2 μΩ – 8.6 μΩ corrected
  - B pad to Bus: 90.6 μΩ – 2.4 μΩ corrected
  - C pad to Bus: 127.4 μΩ – 2.4 μΩ corrected
- T344 Disconnect Switch to 342. This work was completed.
  - A pad to Breaker: 73.5 μΩ – 5.1 μΩ corrected
- H304 –
  - Disconnect switch as found out of adjustment, and realigned prior to returning to service.
- X34204-4 bus side pad to pad (Spare disconnect switch). This work was completed.
  - B pad to Bus: 40.5 μΩ – 7.3 μΩ corrected
  - C pad to Bus: 90.4 μΩ – 2.6 μΩ corrected
- H308 –
  - Disconnect switch out of plum, and was adjusted prior to returning to service.

North Anna Power Station Post-Seismic Switchyard Inspection

Summary of Identified Conditions Resulting From Seismic Event

- 144 Disconnect Switch to 142. This work was completed.
  - A pad to Breaker: 73.2 μΩ – 5.4 μΩ corrected
  - B pad to Breaker: 152 μΩ – 8.7 μΩ corrected
  - C pad to Breaker: 133 μΩ – 8.3 μΩ corrected
- 254 Disconnect Switch to 252. This work was completed.
  - A pad to Breaker: 52 μΩ – 5 μΩ corrected
- 254 Disconnect Switch to Bus #5. This work was completed.
  - C pad to Breaker: 44 μΩ – 18 μΩ corrected
- 354 Disconnect Switch to 352. This work was completed.
  - A pad to Breaker: 79.8 μΩ – 8.1 μΩ corrected
- 354 Disconnect Switch to Bus #5. This work was completed.
  - A pad to Breaker: 181.2 μΩ – 13.2 μΩ corrected

North Anna Power Station Post-Seismic Switchyard Inspection
Summary of Identified Conditions Resulting From Seismic Event

List 2: Possibly Seismic Related

- Switchyard Tx #2 –
  - 34.5kV low-side bushing X1 was identified as having high power factor test results. In response to this finding, all three 34.5kV low-side bushings have been replaced. This work was completed.
- H502 Circuit Breaker –
  - Hardware had fallen off of the aux stack. This hardware has been replaced and torqued appropriately prior to returning the equipment to service.
    - A phase: 1 nut
    - B phase: 2 nuts
- Mini-Switchyard Disconnect Switches G106M & G206M
  - Needed to pour new foundations and reset switches. These foundations are of an old vintage, and this may not be a result of the seismic event. (May have exacerbated the situation, but not the primary cause). This work was completed.
- Switchyard foundation inspection
  - ~15-20 concrete foundations in the switchyard require repair/replacement/sealant (Extent of actions to be taken are to be determined on case by case basis). Vintage of these foundations are the same approximate age as Mini-switchyard and the identified conditions may not be a result of the seismic event. (May have exacerbated the situation, but not the primary cause). The primary inspection for these foundations has been completed, and this item is a Long Term Corrective Action (LTCA) that is not required prior to returning a nuclear unit to service.
- G57602: B phase –
  - Oil leak identified that required epoxy seal on freestanding CT. This work was completed.

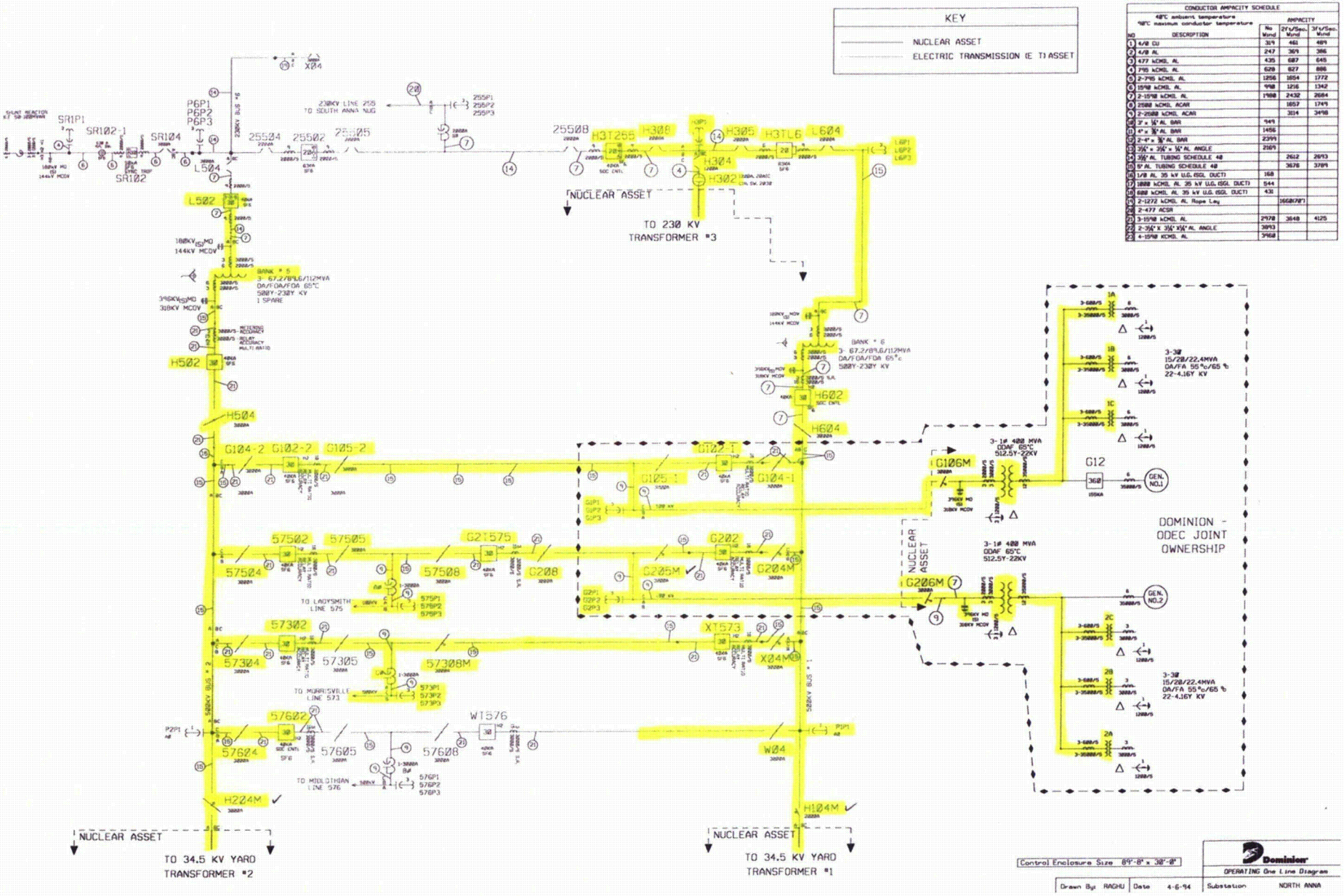
North Anna Power Station Post-Seismic Switchyard Inspection

Summary of Identified Conditions Resulting From Seismic Event

List 3: Inspection & Maintenance Schedule as of October 19, 2011

- **230kV Line – 255:**
  - This work is presently scheduled to begin 10/19/2011, and to complete Saturday 10/22/2011. This work is recommended to complete prior to returning a nuclear unit to service.
- **500kV Line – 576:**
  - This work is presently scheduled to begin on 10/24/2011, and to complete 10/27/2011. This work may be completed after returning a nuclear unit to service.
- **230kV House Battery testing:**
  - The re-strapping of the 230kV House Batteries is scheduled for 10/20/2011.
  - The discharge testing for the 230kV House Batteries is scheduled for 10/24/2011.
  - This work may be completed after returning a nuclear unit to service.
- **230kV Reactor Bank – SR1:**
  - This equipment will be removed from service for inspection after at least one Nuclear Unit has been returned to service.
  - This work is recommended to be completed after returning a Nuclear Unit to service.
  - **34.5kV distribution line zone equipment – 342:**
  - This inspection has not yet been scheduled as of 10/19/2011.

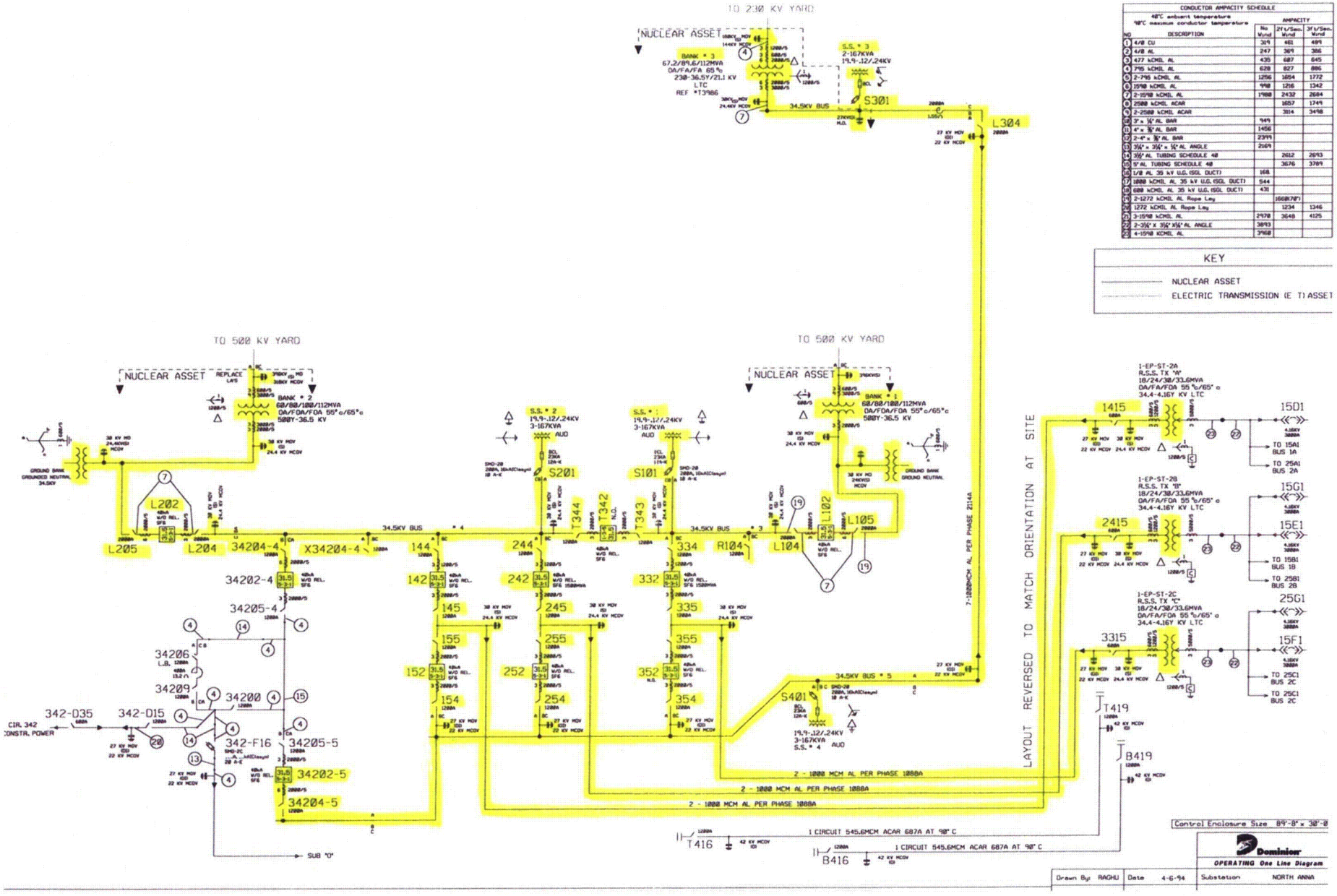
This work may be completed after returning a nuclear unit to service.



CONDUCTOR AMPACITY SCHEDULE

40°C ambient temperature
90°C maximum conductor temperature

NO	DESCRIPTION	AMPACITY No Wind	AMPACITY 2ft/Sec. Wind	AMPACITY 3ft/Sec. Wind
1	4/0 CU	319	461	489
2	4/0 AL	247	369	396
3	477 kCMIL AL	435	687	645
4	795 kCMIL AL	628	827	886
5	2-795 kCMIL AL	1256	1654	1772
6	1590 kCMIL AL	998	1216	1342
7	2-1590 kCMIL AL	1988	2432	2684
8	2500 kCMIL ACAR		1657	1749
9	2-2500 kCMIL ACAR		3314	3498
10	3" x ½" AL BAR	949		
11	4" x ½" AL BAR	1456		
12	2-4" x ½" AL BAR	2399		
13	3½" x 3½" x ½" AL ANGLE	2189		
14	3½" AL TUBING SCHEDULE 40		2612	2913
15	5" AL TUBING SCHEDULE 40		3676	3789
16	1/0 AL 35 kV U.G. (SGL DUCT)	168		
17	1000 kCMIL AL 35 kV U.G. (SGL DUCT)	544		
18	600 kCMIL AL 35 kV U.G. (SGL DUCT)	431		
19	2-1272 kCMIL AL Rope Lay		1668(78°)	
20	2-477 ACSR			
21	3-1590 kCMIL AL	2978	3648	4125
22	2-3½" x 3½" x ½" AL ANGLE	3993		
23	4-1590 kCMIL AL	3968		



CONDUCTOR AMPACITY SCHEDULE

40°C ambient temperature
90°C maximum conductor temperature

NO	DESCRIPTION	AMPACITY No Wind	2ft/Sec. Wind	3ft/Sec. Wind
1	4/0 CU	319	481	499
2	4/0 AL	247	369	386
3	477 kCMIL AL	435	687	645
4	795 kCMIL AL	628	827	886
5	2-795 kCMIL AL	1256	1654	1772
6	1590 kCMIL AL	990	1216	1342
7	2-1590 kCMIL AL	1980	2432	2684
8	2500 kCMIL ACAR		1657	1749
9	2-2500 kCMIL ACAR		3314	3498
10	3" x ¼" AL BAR	949		
11	4" x ⅜" AL BAR	1456		
12	2-4" x ⅜" AL BAR	2399		
13	3½" x 3½" x ½" AL ANGLE	2169		
14	3½" AL TUBING SCHEDULE 40		2612	2693
15	5" AL TUBING SCHEDULE 40		3676	3789
16	1/0 AL 35 kV U.G. (SGL DUCT)	168		
17	1000 kCMIL AL 35 kV U.G. (SGL DUCT)	544		
18	600 kCMIL AL 35 kV U.G. (SGL DUCT)	431		
19	2-1272 kCMIL AL Rope Lay		1668(76°)	
20	1272 kCMIL AL Rope Lay		1234	1346
21	3-1590 kCMIL AL	2970	3648	4125
22	2-3½" x 3½" x½" AL ANGLE	3893		
23	4-1590 kCMIL AL	3960		

KEY

NUCLEAR ASSET

ELECTRIC TRANSMISSION (E T) ASSET

Serial Number 11-566C
Docket Nos. 50-338/339
Enclosure 1, Attachment
Page 10 of 10

Enclosure 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.	Complete
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

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**
2	Unit 2H Emergency Diesel Generator Coolant Leak	Complete
D. Inspections		
1	Steam Generators - Perform a 20% sample inspection of Unit 1 and Unit 2 steam generators.	Complete
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.	Unit 1 Complete
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)