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

November 30, 2011

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

SUBJECT: NORTH ANNA POWER STATION – NRC RESTART READINESS INSPECTION REPORT 05000338/2011012, 05000339/2011012

Dear Mr. Heacock:

On November 7, 2011, the U. S. Nuclear Regulatory Commission (NRC) completed an inspection at your North Anna Power Station Units 1 and 2. The enclosed integrated inspection report documents the inspection findings which were discussed on November 7, 2011, with Mr. Michael Crist and other members of your staff.

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

Based on the results of this inspection, no findings were identified. The team concluded that your staff adequately inspected plant structures, systems and components (SSCs) to ensure that any damage from the August 23, 2011, seismic event was identified and if found, would have been properly evaluated and corrected prior to initiating restart activities. As a result of the inspections performed by Dominion, industry and NRC personnel, no significant seismically-induced damage was identified which could affect the operability or functionality of plant SSCs. However, during the inspection, some examples of minor problems were identified, including: issues that had not been entered into the corrective action or work control programs as required; opportunities to enhance the root cause evaluations conducted following the seismic event; committed actions that were not being processed in accordance with program requirements; and areas which had not been inspected or evaluated before the Restart Readiness Inspection Team engaged your staff. One non-seismic issue associated with a penetration that was found to not be sealed, as required, is discussed in this report and will be dispositioned in the resident inspectors' quarterly inspection report following further review by NRC staff.

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

Sincerely,

/RA/

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

Docket Nos.: 50-338, 50-339
License Nos.: NPF-4, NPF-7

Enclosure: Inspection Report 05000338/2011012, 05000339/2011012
w/ Attachments
1. Supplemental Information
2. Walkdowns
3. Restart Readiness
   Inspection Team Identified Issues
4. Licensee Committed Actions Resulting From
   the Seismic Event

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ADAMS: X Yes ACCESSION NUMBER: ML113340345 X SUNSI REVIEW COMPLETE X FORM 665 ATTACHED

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Letter to David A. Heacock from Gerald J. McCoy dated November 30, 2011

SUBJECT: NORTH ANNA POWER STATION – NRC RESTART READINESS INSPECTION REPORT 05000338/2011012, 05000339/2011012

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U. S. NUCLEAR REGULATORY COMMISSION

REGION II

Docket Nos.:	50-338 and 50-339
License Nos.:	NPF-4 and NPF-7
Report Nos.:	05000338/2011012 and 05000339/2011012
Licensee:	Virginia Electric and Power Company (VEPCO)
Facility:	North Anna Power Station, Units 1 & 2
Location:	1022 Haley Drive, Mineral, Virginia 23117
Dates:	October 5, 2011 through November 7, 2011
Inspectors:	A. Sabisch, Senior Resident Inspector - Oconee, Team Leader A. Barker, Government Liaison Officer, Region III R. Carrion, Senior Reactor Inspector, Region II G. Kolcum, Senior Resident Inspector - North Anna L. Lake, Senior Reactor Inspector, Region II D. Lanyi, Operations Inspector, Region II N. Merriweather, Senior Reactor Inspector, Region II C. Sanders, Project Manager, NRR
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Approved by:	Gerald McCoy, Chief Reactor Projects Branch 5 Division of Reactor Projects

Enclosure

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SUMMARY OF FINDINGS

IR 05000338/2011012, 05000339/2011012; 10/05/2011 – 11/07/2011; North Anna Power Station, Units 1 and 2; Restart Readiness Inspection.

The report covered approximately a month period of inspection by two Senior Resident Inspectors, Region III Government Liaison Officer, Nuclear Reactor Regulation (NRR) Project Manager, three regional Senior Reactor inspectors and one Operations Inspector. No findings were identified. The NRC's program for overseeing the safe operation of commercial nuclear power reactors is described in NUREG-1649, Reactor Oversight Process, Revision 4, dated December 2006.

The team concluded that your staff adequately inspected plant structures, systems and components (SSCs) to ensure that any damage from the August 23, 2011, seismic event was identified and, if found, would have been properly evaluated and corrected prior to initiating restart activities. As a result of the inspections performed by Dominion, industry and NRC personnel, no significant seismically-induced damage was identified which could affect the operability or functionality of plant SSCs. However, during the inspection, some examples of minor problems were identified, including: issues that had not been entered into the corrective action or work control programs as required; opportunities to enhance the root cause evaluations conducted following the seismic event; committed actions that were not being processed in accordance with program requirements; and areas which had not been inspected or evaluated before the Restart Readiness Inspection Team engaged your staff. One non-seismic issue associated with a penetration that was found to not be sealed as required is discussed in this report and will be dispositioned in the resident inspector's quarterly inspection report following further review by NRC staff.

A. NRC Identified and Self-Revealing Findings

None

B. Licensee Identified Violations

None

REPORT DETAILS

Summary of Plant Status

North Anna Units 1 and 2 remained in Mode 5, Cold Shutdown, during the inspection period.

REACTOR SAFETY

Cornerstones: Initiating Events, Mitigating Systems, Barrier Integrity

4. OTHER ACTIVITIES

4OA3 Follow-up of Events and Notices of Enforcement Discretion (IPs 71153 and 92702)

1.0 BACKGROUND

On August 23, 2011, at 1:51 pm, with North Anna Power Station (NAPS) Units 1 and 2 operating at 100 percent power, a Magnitude 5.8 earthquake occurred approximately five miles from Mineral, Virginia. The epicenter was approximately 11 miles WSW of NAPS. Based on an evaluation of the US Geological Survey (USGS) data and plant-specific seismic data, the licensee has confirmed that the August 23, 2011, earthquake exceeded the spectral and peak ground accelerations for the Operating Basis and Design Basis Earthquakes (OBE and DBE, respectively) for NAPS Units 1 and 2. This has also been confirmed by NRC seismologists that reviewed the data.

An Augmented Inspection Team (AIT) was dispatched to the site following the event and was chartered to: (1) collect, analyze, and document factual information and evidence to determine the probable cause(s) as well as the conditions and circumstances relevant to plant equipment issues directly related to the seismic event of August 23, 2011; (2) assess the licensee's actions and plant equipment response during the seismic event and aftershocks; (3) identify any generic issues associated with the event; (4) conduct an independent extent of condition review; and (5) collect information to support the final determination of the risk significance of the event. The majority of the AIT's activities focused on the plant and personnel response to the event and immediate actions taken by the licensee, although the team did look at activities taken and planned by the licensee to support restart of the facility and conduct independent walkdowns and inspections of selected structures, systems and components (SSCs).

The licensee reported that post-shutdown plant walkdowns and inspections have been completed and no significant physical or functional damage to safety-related plant SSCs has been identified through their inspections. Limited damage to non-safety related, non-seismically designed SSCs, such as the main generator step-up transformer bushings, was identified. The licensee's stated position is that the lack of any significant physical or functional damage to safety-related SSCs and the limited damage to non-safety-related systems is consistent with an Electric Power Resource Institute

(EPRI) Damage Intensity of "0", the indicator of least damage, as defined in Electric Power Research Institute (EPRI) NP-6695, Guidelines for Nuclear Power Plant Response to an Earthquake. Despite the lack of evidence of any physical or functional damage to safety-related plant SSCs, the licensee opted to perform additional comprehensive and methodical visual inspections of plant SSCs and to perform expanded inspections and tests in accordance with an EPRI Damage Intensity of "1" versus the observed Damage Intensity of "0". The specific SSCs inspected by the licensee as well as several groups of NRC personnel are contained in this report as Attachment 2.

To support the NRC's assessment of the readiness of the NAPS to return to service, a Restart Readiness Inspection Team was dispatched to the site to provide an evaluation of the current plant condition, review the licensee's actions taken or planned to support restart, and assess the status of the corrective actions developed to address issues identified by the licensee and NRC inspection teams.

2.0. Assessment of Plant Condition Following the August 23, 2011, Seismic Event

Following the August 23, 2011, seismic event, numerous walkdowns of plant systems and focused inspections of selected structures and components were conducted by licensee personnel. In addition, independent inspections and walkdowns were performed by NRC inspectors from the AIT, the Office of Nuclear Reactor Regulation's Fuels group, the Restart Readiness Inspection Team and the North Anna resident inspector office staff as well as nuclear industry seismic experts. The purpose of these inspections was to identify any physical damage or deformation that could potentially impact operability or functionality of station SSCs. Following each of the walkdowns and inspections performed by licensee, industry, and NRC personnel, any issues identified were reviewed to determine if they were seismically-related and if so, were entered into the Corrective Action Program (CAP) for evaluation to determine if they had been seismically induced and if so, what additional inspections or testing was required to support a position of operability / functionality. Prior to the performance of the walkdowns conducted by the station's staff, training was provided to each engineer that took part in the inspection teams to ensure that a consistent approach was used in the walkdowns. The licensee identified more than 400 surveillance procedures to be performed prior to declaring the Unit 1 "ready for restart" to demonstrate the availability and operability of components and systems important to nuclear safety or required to mitigate the consequences of an accident as defined in the Updated Final Safety Analysis Report (UFSAR) and Technical Specifications (TSs). For Unit 2, more than 150 surveillance procedures were identified for performance in addition to those already scheduled to support the refueling outage prior to restarting the unit.

2.1 Walkdowns and Inspections

a. Inspection Scope

Licensee: Detailed walkdowns of all the major systems at the station were conducted by the licensee following the August 23, 2011, seismic event. The site used EPRI and NRC documents along with input from other utilities operating nuclear plants in seismically-prone areas to develop inspection procedures and associated training material used by personnel performing the inspections. The station defined a methodology to be used in the walkdowns modeled after that used by another nuclear utility in a seismically active area. This methodology was communicated to approximately 60 station and corporate engineers involved in the effort via a training module to ensure that they were performed in a consistent manner. In addition to the system walkdowns, the licensee performed a detailed inspection of the station's safety- and non-safety-related structures defined under the Maintenance Rule program using the existing Civil Design Engineering procedure ER-NA-INS-104, Monitoring of Structures at North Anna Power Station, which is performed every five years. The licensee also obtained the services of several nuclear industry seismic experts as well as engineers from another nuclear utility to perform inspections of the station looking for significant physical or functional seismically-induced damage.

NRC: The Augmented Inspection Team performed walkdowns of selected SSCs both in conjunction with licensee personnel as well as independently where equipment conditions would allow. The team composition included a structural engineer and seismologist who performed focused inspections of a structural nature to assess the impact of the seismic event on plant SSCs.

North Anna resident inspectors observed Unit 2 reactor core offload activities and inspections of the fuel removed from the vessels. Personnel from the NRR staff reviewed the inspection of reactor vessel internals to determine if there had been any damage caused by the seismic event. The staff also reviewed data from the reactor trips that occurred on August 23, 2011, following the seismic event focusing on the response of the reactor protection system and nuclear instrumentation on both units. An assessment of the spent fuel pool was performed, including performance of a walkdown of the shared spent fuel pool and support systems, assessing the post-event condition of the spent fuel pool, and reviewing the analyses completed by the licensee intended to identify spent fuel pool and rack system design margin. The report discussing the audit performed by NRR staff can be found in ADAMS as ML11305A239.

North Anna Resident Inspectors conducted walkdowns of SSCs in conjunction with licensee personnel, AIT, and Restart Readiness Inspection Team members and through their implementation of the baseline inspection program.

The Restart Readiness Inspection Team conducted walkdowns of SSCs to assess their material condition. The process used to select SSCs to be inspected was based on

what inspections NRC personnel had performed since the August 23, 2011, seismic event, the risk / safety significance of the SSC, and the issues identified by the licensee during the performance of their walkdowns. The team also reviewed the results of licensee walkdowns performed following the seismic event for SSCs, the procedures and training provided to the personnel conducting the walkdowns, and the assessments performed by the licensee on the issues identified during the walkdowns.

b. Observations and Findings

.1 System Walkdowns by Licensee Personnel

The licensee's walkdown included 82 systems for Unit 1, including those shared between the two units, and 57 systems for Unit 2. Attachment 2 of this report lists the SSCs that were walked down by licensee personnel. The station developed a site procedure, 0-GEP-30, Post Seismic Event System Engineering Walkdown, following the seismic event to guide the scope of the inspections and capture any deficiencies identified by the teams conducting the inspections. This procedure was then used to develop the training provided to the personnel performing the walkdowns. While not required by the EPRI guidance based on the observed damage as defined in EPRI NP-6695, the licensee performed inspections of nearly 100 percent of all safety-related systems, with the only exclusions being energized high-voltage cabinets that could not be accessed safely or areas that were inaccessible due to radiation levels, temperatures, space limitations, or heights. Areas that were not inspected were documented in a Boundary Log and evaluated to determine if alternate methods of inspection could be employed or if an engineering assessment could be used to justify not inspecting the area. Engineering evaluations by station personnel determined that the majority of the issues identified during the walkdowns were not seismically induced. Those that were designated as having been caused by the seismic event were evaluated and classified as being minor in nature with no impact on SSC operability or functionality. The majority of the identified issues were subsequently entered into the CAP and / or work order (WO) program for additional evaluation and resolution. The Restart Readiness Inspection Team noted that in the civil and structural areas, issues such as cracks that did not exceed pre-defined criteria were dispositioned as "minor in nature" in the field by the inspector and in most cases were not documented in any of the various station programs or processes intended to capture information for historical reference. Such information could prove beneficial in the future if these issues were found to have changed over time. Issues that were determined to be required to be addressed prior to restart were appropriately coded as such in the various station programs to ensure that they would be completed before returning the units to service. The Restart Readiness Inspection Team reviewed the documented results of the licensee's walkdowns and the resulting evaluations performed to independently assess the identified items and determine if they had been caused by the seismic event. The team did not identify any licensee-identified issues that had not been adequately evaluated or prioritized to ensure that they were corrected in an appropriate time period to support restart of the units.

The team also reviewed the training material covering the walkdown procedure, 0-GEP-30, developed following the seismic event that had been provided to the engineers performing the walkdowns and interviewed the instructor that had presented it. Interviews of a sample of engineers were also conducted to assess the effectiveness of the training in preparing the teams to conduct detailed walkdowns in a consistent manner. The team provided the licensee with comments related to the training material and its presentation that had the potential to affect the consistency of the inspections and the level of detail applied to specific components during the inspections based on the material review and interviews conducted. The guidance contained in the 0-GEP-30 procedure and associated training was focused at the generic component level rather than providing specific guidance for individual systems or additional criteria for specific components. In addition, direction to inspect certain components, such as insulation or tubing, which could indicate surface-to-surface contact during a seismic event had not been included in either the procedure or associated training. Section 6.0, Use of Operating Experience, provides additional insight into the licensee's limited use of supplemental information that could have added specificity and focus to the post-seismic event inspections. The licensee generated a CR to review the material to determine if enhancements to the content and direction given to the engineers performing the inspections were needed in the event inspections and walkdowns are required in the future due to a seismic event at the station and identified several corrective actions that will be implemented to address this area.

.2 Civil and Structural Inspections by Licensee Personnel

Inspections of civil structures at the NAPS were conducted by station personnel supplemented by engineers from other Dominion facilities and a civil engineering consulting firm using procedure ER-NA-INS-104, Monitoring of Structures at the North Anna Power Station. This five-year procedure was in process at the time of the August 23, 2011, seismic event. The Restart Readiness Inspection Team identified that data from previous performances of this surveillance - either the one that had been in progress at the time of the seismic event or those completed in previous years - had not been compared to the data obtained from the inspections performed following the event to identify any changes that could be attributed to the seismic event. The licensee's assessment of any identified cracks used existing civil inspection criteria and guidance contained in the EPRI NP-6695 document which defined the criteria that constituted significant physical or functional damage to concrete and steel structures. Many of the cracks on both safety-and non-safety-related structures that were found to be below the criteria contained in EPRI NP-6695 of 0.06 inches were dispositioned as minor in the field and not documented on the inspection sheet or captured in the correction action program (CAP). Other cracks that were classified as minor or cosmetic in nature were evaluated by civil engineering personnel, and based on their size and depth, deemed to not require any repairs. After discussions with the team, the licensee initiated an evaluation to compare the results of the inspections done prior to and following the seismic event to determine if any changes had been observed; however, the inconsistent practice of documenting cracks less than the 0.06-inch width impacted the

ability to determine if observed cracks were recent, were unchanged or had expanded following the seismic event. Relying on individual engineers to determine what level of structural issues should be documented has resulted in a degree of inconsistency in developing an overall assessment of the impact the seismic event had on the NAPS and re-establishing a baseline record of structural integrity for future use.

The inspection summaries produced by the licensee stated that no issues with safety-related structures had been identified through the structural inspections; however, some deviations were found on non-safety related structures which were entered into the CAP and WO processes for documentation, evaluation, and correction.

The Restart Readiness Inspection Team independently reviewed the inspection results obtained prior to and following the seismic event and did not identify any significant deltas between the two inspections that the licensee had not assessed. However, as stated above, the inconsistent documentation of cracks less than the 0.06-inch criteria contained in EPRI NP-6695 impacts the ability to assess crack propagation or changes following seismic events. The team also inspected selected areas where cracking had been identified by the licensee as well as additional areas where cracking had not been documented to determine if issues had been identified, documented, and evaluated appropriately. While no cracks greater than 0.06 inches were identified, some issues were identified by the team that required additional evaluation by the licensee to determine if corrective actions were required prior to restarting the units. The licensee initiated corrective action on those items deemed to be “restart dependent” and coded them appropriately to ensure that the work was completed before restart commenced. Attachment 3 provides a summary of the issues identified by the team and the actions taken by the licensee.

Additional reviews of cracking identified in structures on the North Anna site and actions defined by the licensee to address them have been conducted by Office of Nuclear Reactor Regulation personnel under the Request for Additional Information (RAI) and subsequent Safety Evaluation Report development processes.

.3 Electrical Inspections by Licensee Personnel

Detailed inspections of electrical systems and components were performed by the licensee following the seismic event including a 100 percent inspection of the high voltage switchyard. Systems reviewed in detail included Electrical Power (EP), Emergency Diesel Generators (EG), Station Blackout Diesel and Support Systems (AAC), Emergency Electrical (EE), Batteries (BY), and Vital Buss (VB). The inspections were performed by station electrical maintenance technicians, system engineers, members of the Dominion transmission group, and engineers from other Dominion facilities. The results of these inspections were documented in the Seismic Event System Deficiencies Log and subsequently evaluated by the licensee to determine if any were seismically induced and what corrective actions were required to address them.

The Restart Readiness Inspection Team reviewed the results of these inspections and how identified deficiencies had been addressed via the CAP or WO process. The team also accompanied licensee personnel conducting the detailed inspections of the switchyard and walked down selected portions of other electrical systems in the plant in conjunction with system engineers.

The team did not identify any deficiencies that had not previously been identified by licensee personnel during their inspections or have any concerns with licensee evaluations and dispositions of the issues prior to declaring the electrical systems fully operable / functional.

.4 Inspections by External Personnel

Two independent inspections were performed by personnel from outside of Dominion.

One team, consisting of nuclear industry seismic experts, focused on reviewing data obtained by the licensee related to areas or equipment where physical or functional seismically induced damage would have been likely. Their activities included discussions with civil engineers at the corporate office and a one-day site visit to visually review the structures inspected by the licensee that had been documented in the post-event report. Some structural issues were evaluated by the nuclear industry seismic experts that were speculated to be seismically induced damage but had been dispositioned by the licensee as having been previously existing or not significant. The Restart Readiness Inspection Team recognized that this inspection was primarily focused on independently assessing the licensee's evaluation of issues that had been previously identified in order to confirm that the seismic event had no or minimal impact on the station rather than performing an independent inspection of the facility to identify structural issues that may not have been identified by licensee personnel in their walkdowns.

The other independent inspection consisted of system engineers from another nuclear utility and included walkdowns of two systems (Component Cooling and Reactor Coolant) to ensure that the licensee inspections on the selected systems were thorough and had not overlooked issues that required further evaluation. No significant physical or functional seismically induced damage was identified during the systems' inspections performed by these non-Dominion engineers.

The Restart Readiness Inspection Team reviewed the reports documenting these independent inspections and did not have any comments or issues with their content but did acknowledge their limited scope.

.5 Buried Piping Inspections

The licensee's design records show that there are approximately seven miles of buried pipe on the NAPS site; however, less than 1,500 feet of the buried piping carries, or has

the potential to carry, contaminated fluids such as tritium or liquid radioactive waste. Selected inspections and testing of portions of these pipes as well as piping deemed to be important to plant operation were performed by the licensee. The condition of buried piping was evaluated by the licensee through actions that included the following:

- Approximately 100 feet of buried piping associated with the Unit 1 Refueling Water Storage Tank (RWST) was directly inspected through excavation. Specific piping inspected included:
    - The Quench Spray (QS) piping to the QS pumps' suction
    - The QS pump recirculation piping
    - The Safety Injection (SI) system piping to the High Head and Low Head Safety Injection pumps' suction
    - The RWST recirculation pumps' suction and discharge piping
    - The Refueling Purification (RP) and blender make-up piping to the RWST
    - The RWST recirculation piping.
- Two sections of approximately 100 linear feet of the Fire Protection system piping were excavated for inspection
- The Unit 2 Circulating Water discharge tunnel and associated liquid waste line was drained and inspected internally
- Data that could indicate potential leakage from buried piping such as fire water system jockey pump run time and head tank levels was collected and evaluated

The QS, SI and RWST system piping inspections involved ten piping line runs of various sizes. The inspection results for each line identified that the coating in some areas was degraded and brittle and was not very well bound to the external pipe surface. The coating in many sections of the piping was removed during soil excavation and was repaired before backfill of the piping took place. The Restart Readiness Inspection Team reviewed photographs of the work location and confirmed that the repairs had been completed. Additional details of the inspections that were conducted included ensuring that there were no signs of blistering, as determined by the coating engineer; that the piping runs had no indication of pitting or corrosion; and that the pipe penetrations showed no indication of cracks or stress caused by the seismic event. In addition, VT-1 inspections and ultrasonic testing (UT) pipe thickness examinations were performed at various locations where the protective coating was found to have come free from the pipe surface. On one run of four-inch diameter pipe (4"-QS-16-152-S), the UT pipe thickness measurement at the elbow was measured to be 0.08" with a stated minimum pipe wall thickness is 0.105". Calculations were performed to determine that the measured 0.08" thickness on the elbow was acceptable; no repairs were found to be required. The certification records of the individual who performed the VT-1 and UT measurements were reviewed by the team and determined to be acceptable.

In addition, over 650 feet of SI, Recirculation Spray (RS) and QS piping, as well as approximately 6,650 feet of non-contaminated safety-related Service Water piping, was pressure tested with satisfactory results. The pressure tests performed on these systems is conducted on an approximately three-year frequency in accordance with the

ASME Section XI requirements; however, the licensee opted to re-perform all of the periodic tests following the seismic event to ensure that there was no hidden damage to buried piping. The Restart Readiness Inspection Team reviewed the results of this testing and did not identify any issues that indicated degradation in the buried piping that was tested.

Plans for performance monitoring activities associated with buried piping as the units are returned to service have been developed and are being communicated to the operations staff and system engineers to ensure that parameters are monitored for indications of degradation of the condition of buried piping. Additional details are contained in Section 3.0, Performance Monitoring.

The team did not have any comments or issues with the licensee's actions associated with the buried piping monitoring program other than ensuring that the additional monitoring developed for restart is properly communicated and effectively implemented.

.6 Ground Water Monitoring

Following the seismic event, the station's Groundwater Monitoring Program (GWP) was modified to increase the sampling frequency of the monitoring wells in order to track levels of tritium in the groundwater within the Owner Controlled Area. No damage to buried piping systems was indicated based on the sample data obtained since the seismic event. The licensee also performed excavation inspections of selected piping as described in the previous section on Buried Piping. Planned longer term actions included continued evaluation of the groundwater monitoring program to determine if additional wells or increased sampling frequency is required. The licensee had also taken actions to address groundwater tritium levels, including additional inspections and sealing of the interior of the concrete circulating water tunnel for Unit 2.

Administrative Procedure RP-AA-502, Groundwater Protection Program, establishes the program that ensures timely and effective management of situations involving inadvertent releases of radioactive material to groundwater. The inspection team reviewed historical monitoring well sample results for tritium over the past six months. The monitoring well data reviewed by the team was for wells located within the protected area. The inspection team noted that a condition report (CR) had been generated to investigate the source of tritium previously identified in the groundwater inspection well samples that were collected during the discharge of the "B" boron recovery tank (BRT) through the Unit 1 circulating water tunnel as a result of piezometer (PZ) well #3 increasing from 2,540 pCi/l to 5,363 pCi/l, GWP well #4 increasing from <1,340 pCi/l to 3,739 pCi/l, and GWP #6 increasing from 9,950 pCi/l to 20,190 pCi/l. All other monitoring wells were less than the minimum detectable activity or in line with previous trends. The data interpretation of the increased activity of the monitoring wells appeared to identify a preferential pathway from PZ #3 to GWP #6 and was attributed to a leak from the Unit 1 circulating water discharge tunnel. The licensee had also monitored tank levels to determine if there had been any loss of inventory that could contribute to

sources of tritium but no unexplained decreases were identified. The groundwater monitoring reviews involved the engineer for the buried piping program and shift operations for input on any known system leakage pathways. The team determined that there was a strong level of cross-departmental engagement to identify and correct the source of tritium in groundwater.

The team independently reviewed the groundwater monitoring sample results to determine if any discernable changes in the tritium levels were observed following the August 23, 2011, seismic event and none were noted. The team also reviewed the reports documenting the increased sampling activities and licensee's plans to expand the monitoring program that had been in place prior to the August 23, 2011, seismic event. The team did not identify any issues with the licensee's groundwater protection program.

.7 Walkdowns and Inspections by NRC Personnel

The NRC inspection teams and the resident inspectors performed inspections of SSCs selected based on their risk significance, seismic margin or what inspections had been previously performed on the SSCs by other NRC personnel. Issues identified during NRC walkdowns conducted prior to the Restart Readiness Inspection Team arrival on site were entered in the station's CAP by the licensee. As a result of the Restart Readiness Inspection Team's walkdowns / inspections, a number of issues were identified and questions raised that the licensee had not previously identified or considered as part of their post-seismic walkdowns and inspections. The Restart Readiness Inspection Team divided the identified issues and questions into two groups – "Material Condition Issues" and "Potential Seismic Issues and Related Questions." The licensee entered the issues / questions identified by the Restart Readiness Inspection Team into the CAP to assess their potential impact on the operability / functionality of the SSC as well as to determine if they had been caused by the seismic event. The issues identified and questions raised by the team are contained in Attachment 3 which provides details on the individual issues, their status, and actions taken by the licensee. None of the issues that the team identified affected the current operability or functionality of NAPS SSCs as a result of the seismic event. The issues associated with the main steam pipe tunnel discussed below did have the potential to impact operability of safety-related equipment but were not attributed to the seismic event.

Based on the additional issues identified by the team during their walkdowns and inspections, the licensee initiated a condition report and conducted a Common Cause Analysis (CCA 000224). The scope of the CCA was to determine the reason(s) why issues were identified by the Restart Readiness Inspection Team that had not been identified previously through multiple walkdowns and inspections performed by Dominion or other personnel and implement corrective actions if determined to be appropriate. The CCA identified four barriers that were weak or had failed which contributed to the issues noted by the team. The licensee stated that their walkdowns had been focused

on identification of conditions that could indicate potential seismic damage and had failed to consistently capture other issues such as material condition or housekeeping issues that the team had identified. Additionally, the licensee determined that personnel conducting structural walkdowns were looking for conditions that exceeded specific criteria which would require additional action and, as a result, were inconsistent in the documentation of conditions that could have been valuable in assessing changes to noted conditions over time or capturing the in-field assessments to provide a basis for not documenting issues. Following completion of the CCA, the licensee initiated corrective actions to address the weak or failed barriers. Specifically, the area surrounding the containment crane wall and external wall areas on both units were walked down again with enhanced guidance and direction, additional walkdowns were conducted in the main steam valve houses on both units looking for both structural as well as material condition / housekeeping issues, and the procedures used to perform the post-seismic event system walkdowns and the five-year structural inspections to identify any enhancements deemed necessary.

Attachment 2 of this report lists the SSCs that were walked down by each of the NRC's inspection teams and the NAPS Resident Inspectors.

During the team's on-site inspection period, discussions were held between NRC inspectors and Dominion engineers regarding the high energy line break (HELB) analysis for the AFW system as well as the potential impact the seismic event may have had on the condition of the piping contained in the underground tunnel structure that connects the main steam valve house to the steam driven and motor driven pump rooms. As a result of these discussions, a physical inspection of each Unit's AFW underground tunnel structures was conducted by NAPS personnel on October 18, 2011. While no structural issues related to the seismic event were noted in the underground tunnel structures, Dominion personnel did identify an issue in the Unit 1 underground tunnel structure that is currently under review. In the underground tunnel, an unsealed penetration measuring 15 inches by 28 inches was identified that allowed the tunnel to communicate directly with the motor driven pump room. Following the identification of the unsealed penetration into the motor driven pump room, the licensee developed and implemented a design change to seal the opening and prevent fluids from entering the pump room. The inspectors require additional information from the licensee to determine if there is a performance deficiency. This issue will be identified as URI 05000338/2011012-01, Unsealed Penetration on Unit 1 Motor Driven Auxiliary Feedwater Pump Room.

2.2 Surveillance Testing

a. Inspection Scope

Licensee: The licensee utilized the guidance contained in EPRI NP-6695 as well as input from Dominion and industry personnel to define additional surveillance testing that would be performed prior to or during the restart of the NAPS. Unit 2 entered a refueling

outage following the August 23, 2011, seismic event and a number of identified surveillance tests were already required to be performed as part of the normal restart process. The tests identified to be performed on both units were intended to demonstrate availability and operability of SSCs important to nuclear safety or required to mitigate the consequences of an accident as defined in the Update Final Safety Analysis Report (UFSAR).

NRC: The Restart Readiness Inspection Team reviewed the list of surveillance procedures developed by the licensee in addition to those required to be performed following a refueling outage to determine if adequate testing of plant SSCs was being performed. They also reviewed samples of data from surveillances performed by the licensee following the August 23, 2011, seismic event to verify that the tests met established acceptance criteria. In addition, the team observed selected testing that was performed while the team was onsite.

b. Observations and Findings

Section 5 and Table 2.1 of EPRI NP-6695 provide guidelines for shutdown inspections and tests of nuclear plant equipment and structures required for operation prior to restart of a plant shut down due to a seismic event which exceeds the OBE values. The licensee documented the methodology used in their selection of surveillance tests for Unit 1 in Engineering Technical Evaluation (ETE) ETE-NA-2011-0058 and for Unit 2 in ETE-NA-2011-0065. The licensee based the evaluations on the fact that it found no significant physical or functional damage in the plant as described in EPRI NP-6695. The EPRI guidance only recommends that those surveillances required to verify compliance with all Technical Specification (TS) Limiting Conditions for Operation (LCO) be completed. The licensee chose to expand this to include all TS surveillances as well as those surveillances that would ensure the proper operation of secondary, non-safety related and fire protection systems. The licensee identified approximately 400 surveillance tests for performance prior to and during the restart of Unit 1 and approximately 150 surveillance tests in addition to those required to support a planned post-refueling outage restart on Unit 2. The majority of the Unit 1 and Unit 2 non-refueling outage surveillance tests were performed prior to the period that the Restart Readiness Inspection Team arrived onsite. Some of the remaining tests were conducted when the team was onsite and were observed by team members. The remaining tests will be performed when plant conditions support their pre-requisites during the plant startup.

The Restart Readiness Inspection Team observed selected surveillance testing of SSCs performed by the licensee to ensure that equipment operability was demonstrated as required by TSs and licensing documents. The team also observed troubleshooting of SSCs that initially failed to meet the specified operability acceptance criteria and the subsequent retesting to ensure that the equipment was operable prior to restart, including portions of the troubleshooting associated with the load fluctuations associated with the 1J emergency diesel generator. The inspectors noted that the portions

observed were completed in accordance with procedures and met station management's expectations in how the maintenance and testing activities were performed.

The Restart Readiness Inspection Team reviewed the licensee's plan for post-seismic event surveillances and did not identify any deficiencies in the methodology used to select the surveillance tests or in the test data that was reviewed; however, the team did identify that the licensee had not implemented a formal program to ensure that test data was compared to pre-seismic event data to identify potential degradation of SSCs tested. This is discussed further in Section 3.0, Performance Monitoring.

The team engaged the licensee to discuss its plans to perform flushing of additional systems to ensure that the seismic event did not cause material internal to fluid and pneumatic systems to become loose in the piping. The service water and component cooling water systems have been in continuous operation since the event and there has been no increase in differential pressure or degradation of performance since the seismic event which negates the need to perform system flushing. The licensee plans to perform a review of the surveillance data associated with the remainder of the safety-related SSCs to identify any degradation in performance and, if any is noted, flush the systems before or during plant restart.

2.3 Condition Report / Work Order Review

a. Inspection Scope

The inspection team reviewed the list of CRs and work orders that had been generated since the seismic event and coded as either "RESTART" or "EARTHQUAKE-RELATED." In addition, the team reviewed CRs that were being screened by the Condition Report Review Team (CRRT) to assess how the CRs were being evaluated and coded. The team also reviewed various lists and tools developed to track CRs assigned with these designations for consistency and to verify that appropriate connection to TS requirements were made.

b. Observations and Findings

The team attended daily CRRT meetings to observe how CRs were processed and assigned for resolution. The inspection team observed the discussions between the CRRT members to determine if a "RESTART" or "EARTHQUAKE-RELATED" classification should be designated for the issue being screened. The inspection team's assessment was that the issues being screened were given the appropriate classification and priority based on the information available to the CRRT. Through follow-up interviews, the team determined that the classification of "RESTART" meant that the licensee had designated the item as a Mode 4 start-up constraint. With this connection to Mode 4, the inspection team reviewed various lists that captured items that were coded as "RESTART." The inspection team concluded that the appropriate classification had been made for Mode 4 TS-related systems. In addition, during the

CRRT meetings, the inspection team concluded that the CRRT was properly dispositioning CR issues to existing work orders in accordance with the CAP.

The team did not have any comments or issues in the licensee's processing of CRs or Work Orders with the exception of the discussion in the following section on the consistency in the initiation of CRs resulting from the post-seismic event walkdowns performed by licensee.

2.4 Corrective Action Program Implementation

a. Inspection Scope

The team assessed the licensee's implementation of the CAP through the review of Administrative Procedure PI-AA-200, Corrective Action; interviews with the licensee's staff; the review of several root cause evaluation reports; conducting system walkdowns with station engineers; and attending CRRT screening meetings.

b. Observations and Findings

The inspection team assessed how the daily processing of CRs was conducted and observed CRRT screening meetings. The team determined that the CRRT meetings were conducted in an efficient manner aided by the CRRT chairman whose extensive research performed prior to the meetings ensured that attendees had the necessary information to evaluate the CRs as they were discussed. The CRRT chairman's knowledge of each condition report allowed him to offer recommendations to the team which was then able to expeditiously address the specific issues. The expectation of the CRRT members is for them to lead the discussion on issues that originate from their organizational area; however, in many cases, the members followed the lead of the CRRT chairman without dissent. Through equal participation by all members, a more robust review can be developed on a consistent basis to address the issue. It should be noted that while this hierarchy was evident, the inspection team did not identify any issue that was inappropriately reviewed for significance or assigned for action.

The team also noted that CRs written by plant staff often included recommended actions, such as recommending that the issue be corrected through a work order. By having the initiator include this in the CR, a qualifier to the significance of the identified issue tends to be attached and crosses into the CAP screening phase which is the responsibility of the CRRT. The inspection team did observe during the screening meetings that the CRRT recognized the recommended action by the submitter as input, however they did not feel that the submitter's recommended action influenced their decision.

The inspection team identified several issues that had not been documented in the CAP (see Section 2.1, Walkdowns and Inspections). This was recognized during plant system walkdowns conducted by the NRC team in conjunction with the licensee's

engineering staff. One area where issues were inconsistently documented by station personnel was in the area of cracking or spalling of concrete on plant structures. The licensee conducted plant walkdown inspections under the guidance of Procedure 0-GEP-30, Post Seismic Event System Engineering Walkdown, and as part of this procedure, guidance was provided to check for new open cracks and spalling of concrete. The CR initiation threshold for any identified cracks communicated to the inspection team members was that the crack magnitude needed to be at the value in excess of the threshold defined in EPRI NP-6695. This resulted in many cracks identified just below this EPRI magnitude that were not documented by a CR which could have been used for future evaluation of cracks to determine when they originated or how they propagated.

The inspection team also determined that some conditions adverse to quality were not consistently documented by the licensee in the CAP (either not entered or not accurately described to ensure the correct actions were taken). This practice was evident following a review of the documentation of the licensee's system walkdowns conducted prior to the team's onsite arrival was further amplified by licensee representatives on several occasions when the licensee representative asked if a CR should be written on issues which the team identified. The licensee initiated a CR as a result of the inspection team's having identified a number of items that had not been previously identified and evaluated, and the results of that CR's common cause evaluation is discussed in Section 2.1, Walkdowns and Inspections. Attachment 3 contains examples of issues identified by the Restart Readiness Inspection Team during its walkdowns, reviews of surveillance test data, or questions raised during discussions with licensee personnel that had not been previously identified or entered into the CAP for evaluation.

In addition, the team observed the management oversight of the CAP through the attendance of a Corrective Action Review Board meeting that included the review of two completed apparent cause evaluations associated with the seismic event.

In summary, the team determined that that station was generally implementing the CAP in accordance with the program's controlling documents; however, some minor issues identified during the walkdowns and inspections were not entered into the CAP on a consistent basis due to direction given to the engineers during pre-walkdown training.

3.0 Performance Monitoring

a. Inspection Scope

The licensee identified approximately 400 surveillance tests for performance prior to and during the restart of Unit 1 and approximately 150 surveillance tests in addition to those required to support a post-refueling outage restart on Unit 2 using the guidance contained in EPRI NP-6695, as well as input from Dominion and industry personnel to demonstrate operability / functionality of SSCs. Additional tests and inspections were performed to provide increased assurance that SSCs at the station had been unaffected

by the seismic event.

Licensee: The bulk of the planned surveillance tests and inspections tied to plant restart were performed prior to the Restart Readiness Inspection Team arrival on site. The tests were performed once the walkdowns had been completed and any outstanding issues evaluated to ensure that the operability or functionality of the SSC was not adversely affected. The testing was conducted by operations and maintenance personnel with engineering oversight and monitoring. No issues which could be attributed to the seismic event were identified as a result of performing these tests and inspections.

NRC: The Restart Readiness Inspection Team observed the performance of selected safety-related surveillance tests that were completed while the team was onsite. The team also reviewed selected data from tests completed since the seismic event and compared the test data to surveillances that were performed prior to the seismic event to determine if any degradation had occurred or anomalies identified that required additional evaluation. In particular, operating parameters and vibration data for was reviewed by the team for the following components on both units:

- Charging Pumps
- RHR Pumps
- Recirculation Pumps
- Service Water Pumps
- Chilled Water Pumps
- Component Cooling Water Pumps
- Emergency Diesel Generators
- Auxiliary Feedwater Pumps

b. Observations and Findings

The team reviewed a statistical sampling of the post-seismic event surveillance tests for the identified SSCs and verified that all were completed satisfactorily. The test data for selected components / systems was verified to meet the defined acceptance criteria with no exceptions noted.

For some of the tests, the team compared the post-seismic event data to historical data. The team identified some anomalies or adverse trends in safety-related SSC performance that had not been previously identified by the licensee and as a result had not been evaluated. Examples noted include the following:

- An increase in the vibrations of 1-CH-P-1A (Unit 1 A charging pump), 1-CH-P-1B (Unit 1 B charging pump), and all four Residual Heat Removal (RHR) pumps was identified by the team. The system engineer reviewed the data associated with these pumps and since the original data was still available on the Microlog data recorders, he was able to determine that the data had been was incorrectly copied

into the data sheets and corrected the data in the database. The team reviewed the correct data and verified that no significant changes in vibrations existed; however, this had not been identified by the licensee following performance of the associated surveillance tests.

- The results of 1-PT-77.11A, Control Room Chiller 1-HV-E-4A Pump and Valve Test, which was performed on October 7, 2011, was reviewed. The team noted that 1-HV-SOV-1200A, Heat and Vent Pump SW Seal Water Supply Isolation Valve stroke time was almost four times higher than the reference value, but within its limiting stroke time. It had previously been stroked on September 16, 2011, at approximately 60 percent of the reference time. This data was presented to the System Engineer and he could not provide an immediate explanation as to the cause. Actions taken included an evaluation of the current performance of the valve and a corrective action to provide additional focus on subsequent valve strokes to ensure that performance is not degrading.

Following discussions with the Restart Readiness Inspection Tam, the licensee recognized that a formal process had not been established to compare pre- and post-seismic event test data prior to restart to ensure that any performance degradation was identified, evaluated, and appropriately addressed. The licensee was relying on the surveillance test data meeting the acceptance criteria as the basis for verifying operability / functionality of SSCs along with engineer trending which could have lagged restart by weeks according to the performance monitoring program. The licensee had not considered that a change in performance following the August 23, 2011, seismic event could be an indicator of potential SCC degradation and that reviewing test data prior to restart could provide for early detection of equipment degradation.

The expectation to evaluate pre-/post- seismic event data has been defined in a newly developed procedure, 0-GOP-13.6, Unit Restart Readiness, drafted following discussions with the team. The trending and evaluation of all test data obtained since the seismic event versus past test data will be performed by both the responsible system engineers and the in-service test pump and valve engineers prior to restart. This procedure also defines the expectation for engineers to monitor system performance as systems are placed in operation and the plant returned to service.

The station Operations Department has issued a revision to the Common Shift Orders with new performance monitoring requirements that were implemented following discussions with the Restart Readiness Inspection Team. The new requirements as stated in the Common Shift Orders are:

- “Once a major system is started or placed in service, it will require that both an operator and system engineer perform a system walkdown and document the walkdown in the control room narrative logs.”
- “Whenever a system is started or a periodic test (PT) is performed, an entry in the control room narrative logs shall be made indicating that all conditions are normal.”

- "When equipment covered by Tech Specs or the Technical Requirements Manual is placed in service, vibration readings shall be obtained even if not required by the controlling procedure in order to document the condition of station equipment following the seismic event."

The team determined that following the implementation of the 0-GOP-13.6 guidance and the enhanced Common Shift Orders that the licensee's assessment of plant performance during and following plant restart will provide assurance that changes in SSC characteristics will be identified and evaluated in a timely manner.

4.0. Formal Action Item Tracking to Support Restart

The licensee has identified a number of actions that have been tied to restart of the NAPS following the August 23, 2011, seismic event. Some of these actions were identified as formal commitments to the NRC as part of the Virginia Electric Power Company (Dominion) North Anna Restart Readiness Determination Plan (11-520 and 11-520A) while others were developed as a result of plant walkdowns, inspections, and evaluations that have been performed or in response to Requests for Additional Information (RAI) received from the NRC.

a. Inspection Scope

The Restart Readiness Inspection Team reviewed the formal commitments made by the licensee as part of the North Anna Restart Readiness Determination Plan as well as the actions contained in the RAI responses provided to the NRC since the event (August 23, 2011) up through the start of the Restart Readiness Inspection (October 4, 2011) . The Dominion Commitment Tracking System (CTS) database was reviewed to verify that the actions were being tracked as required by the licensee's CTS program. The team also conducted interviews with personnel responsible for the implementation of the CTS.

b. Observations and Findings

Following the team's initial review of the licensee's CTS database, the inspectors identified that none of the formal commitments identified as "Near Term Actions to be Completed Prior to Unit Restart" had been entered into the CTS as required by Administrative Procedure OI-AA-110, Commitment Management. In addition, one of the formal commitments identified as "Long Term Actions to be Completed After Unit Restart" had not been entered. Following discussions with the licensee, these omissions were recognized and the missing commitments were entered into the CTS for tracking as required. The team subsequently verified that all formal commitments made in the North Anna Restart Readiness Determination Plan were entered into the Dominion CTS as required by the fleet program implementing procedure.

One of the formal commitments submitted by the licensee was to revise Procedure AP-36, Seismic Event, to address issues identified during the August 23, 2011, seismic

event. The changes were made as required; however, the team determined that the licensee had failed to follow it's programmatic requirements of flagging the changes as being tied to a formal commitment which could have resulted in the changes to AP-36 being deleted or modified without the required level of review. The licensee took actions to identify the commitment-driven changes on the procedure revision index to prevent inadvertent changes from occurring.

The licensee has also entered most actions contained in the RAI responses into the CTS and planned to continue this practice as additional RAI's were received. While this action was not programmatically required because the RAI responses were not considered to be formal commitments, the licensee entered them into the CTS to provide an additional barrier to ensure that the actions were not inadvertently rescheduled or canceled. The team reviewed selected actions taken to address both the formal commitments and the actions defined in the RAI responses to verify that the actions were complete when indicated by the tracking tool and independently inspected the actions that had been used to satisfy the item in the CTS program.

Attachment 4 provides a list of the actions contained in the CTS taken or planned by the licensee at the time the Restart Readiness Inspection Team was onsite.

5.0. Root Cause Evaluations

Following the August 23, 2011, seismic event, the licensee identified two issues that warranted formal Root Cause Evaluations (RCEs) to determine the underlying causes and identify any necessary corrective actions. The events that were evaluated under the RCE process were 1) the dual unit trip following the magnitude 5.8 earthquake and 2) the failure of the 2H emergency diesel generator during the loss of offsite power. In addition to the review of the written report narratives, the inspectors interviewed the CRRT chairman to understand the root cause evaluation process, and held telephone communications with the responsible manager of the root cause evaluations and some of the team members that had performed each of the root cause evaluations reviewed by the Restart Readiness Inspection Team.

5.1 Root Cause Evaluation RCE001061, Dual Unit Trip Following Magnitude 5.8 Earthquake

a. Inspection Scope

Root Cause Evaluation RCE001061, Dual Unit Trip Following Magnitude 5.8 Earthquake (CR439052), was reviewed for the licensee's investigative analysis of the seismic event for the CAP. In addition to the review of the written report narrative, the inspectors interviewed the CRRT chairman to understand the root cause evaluation process, and held telephone communications with the responsible manager of the root cause evaluations and some of the team members.

b. Observations and Findings

The problem statement includes two specific attributes, “identify the cause for the reactor trips on NAPS Unit 1 and Unit 2,” and “evaluate the response of the organization to the event.” The predominant investigative methodology of the root cause evaluation was focused on the cause of the reactor trips. The selection of a broader problem statement attribute, such as the loss of offsite power (LOOP), would have expanded the investigative analysis methodology. A broader root cause evaluation methodology could have included, for example, failures of the sudden pressure relays for the reserve station transformers and the gasket failure of the 2H emergency diesel generator. The potential for corrective actions to prevent recurrence (CAPRs) and contributing causes were not fully investigated because the bounding conclusion was that the reactor trip circuitry of the power range high flux reactor trip actuated as expected based on the conditions that existed.

The RCE identifies Enhancement EH14 to determine if robust design improvements could be implemented for components associated with the LOOP. This corrective action is intended to evaluate what improvements may be done to minimize complications of a LOOP event and then implement those improvements. This assignment will be tracked by Condition Report 444602 with a significance level of “3”. Significance level “3” events occur while operating a power station that can be corrected through normal processes and procedures. This enhancement was directed by the Corrective Action Review Board (CARB) that provides management oversight of the program. Enhancement EH14 would have been investigated with a broader problem statement and could have been the source of a CAPR.

The investigative methodology for the response of the organization employs fish-bone charting in accordance with PI-AA-300-3004, Cause Evaluation Methods, Attachment 6. Fish-bone charting is generic, and as cautioned in Attachment 6, the majority of evaluations require the verification of data through the use of additional root cause techniques. The fish-bone charting investigative analysis of the response of the organization identified six programmatic deficiencies. With the large number of deficiencies identified to consider for investigation and the lack of employing another root cause technique, the licensee limited its potential to identify contributing causes.

The team’s assessment of Root Cause Evaluation RCE001061 was that the investigative analysis methodology focused on the cause of the reactor trips which limited the breadth of the investigation on the complications from the LOOP event. Following discussions between the team and the licensee, CARB assigned a corrective action to evaluate what additional actions were warranted to minimize complications of a LOOP event.

5.2 Root Cause Evaluation RCE001062, 2H Diesel Failure During the Loss of Offsite Power

a. Inspection Scope

Root Cause Evaluation RCE001062, 2H Diesel Failure During the Loss of Offsite Power, was reviewed for the licensee's investigative analysis of the seismic event for the CAP. In addition to the review of the written report narrative, the inspectors interviewed the CRRT chairman to understand the RCE process, and held telephone communications with the responsible manager of the root cause evaluations and some of the team members.

b. Observations and Findings

On August 23, 2011, at approximately 1350 hours, the station loss offsite power as a result of a seismic event. A dual unit trip occurred with the automatic start of the four diesel generators that loaded to the emergency buses as designed. At approximately 1440 hours, an operator manually tripped the 2H emergency diesel generator due to an excessive leak from a mechanical joint. The problem statement was to identify the root cause for the coolant leak and the equipment failure mechanism or human performance initiating action which resulted in the failure of the jacket water mechanical joint. The RCE documents in Section 2.2.3, Earthquake Impact, that the cause of the gasket failure was attributed to the over-tightening of the adjusting nut and jam nut on the inlet fitting. Further, the evaluation states that the joint was not identified as leaking for over 30 minutes after the seismic event had passed. Thus, the seismic event did not impact the support of the inlet fitting and cause the leak. In addition, the evaluation documents that the RCE team concluded the seismic event did not cause the failure of the gasket. The gasket was in a slow step progression to eventual failure months prior to the seismic event.

On October 11, 2011, a meeting was held with the responsible manager for the RCE, some of the RCE team members and the Director, Nuclear Safety and Licensing, to communicate the inspectors' observations on both RCEs. The inspectors learned of two perspectives that the RCE team determined through investigative analysis. One was the perspective that because the gasket failure did not occur during the actual duration of when the seismic event was happening, there was no impact from the seismic event on the gasket failure. The second perspective was the importance that the RCE team placed on the NES Materials Engineering Laboratory identification of beachmark lines on one side of the failed gasket. The laboratory report's conclusion documented that the beachmark lines in the sealant along the failed segment suggested that relative movement of the gasket had occurred within the joint, eventually resulting in deformation of the gasket from pressure within the joint. These two perspectives were the primary basis to support that there was no impact from the seismic event on the failed gasket. The inspectors viewed the two perspectives as not definitive evidence that the gasket failed over a slow progression from PT test loading to the next PT test. The inspectors'

review also integrated the perspective that the RCE team did not consider all available information. This perspective is further discussed in the following paragraphs. The inspectors concluded that the deformation could have occurred as localized slippage or a blowout condition, using the Newport News Shipbuilding Laboratory Analysis Report 100085904 to support that basis.

Root Cause Evaluation RCE001062 was reviewed by the inspectors to ensure that all available information was considered during the investigative analysis of the gasket failure. This RCE approach would support a reasonable conclusion on the level of impact from the seismic event, if any, so corrective action could be appropriately developed. The inspector identified the following data that was not specifically identified as being part of the RCE.

- The 2H emergency diesel generator (EDG) loading profile during the event from connecting to the bus until the diesel was manually tripped
- The projected torque that existed at the location of gasket failure on the 2H EDG during the event
- The Newport News Shipbuilding Laboratory Analysis Report documented the following:
  - Photographs showed the failure was limited to the distorted gasket region and was suggestive of localized slippage or blow out.
  - Common causes included improper fit due to misalignment, inadequate/uneven torque or system pressure.
  - One-component silicone RTVs generally require atmospheric moisture for full cure. Delayed or insufficiently cured RTV acts as a lubricant and has been demonstrated to be a cause of gasket blow out in other instances.
  - RTV silicone may have assisted failure.
- The quality level for the procurement of the Garlock BLUE-GARD 3000 gasket and the RTV sealant. This observation is support in Section 2.10, Equipment Reliability/PM Adequacy, under parts/vendor quality, where the question, "*are there any concerns with the quality of parts?*" is responded to from a maintenance performance perspective instead of from a quality assurance Appendix B perspective.

The team's assessment of Root Cause Evaluation RCE001062 was that all of the available information applicable to the 2H EDG gasket failure had not been included in the investigative analysis. By not including this information and evaluating if it could have contributed to the failure of the gasket, the conclusion that the failure was not seismically induced was brought into question. The licensee reviewed the questions raised by the team and enhanced the RCE on the 2H EDG leak to address the additional information that had not been factored into the original evaluation. While the new information did result in additional actions, the conclusion that the leak was unrelated to the seismic event was unchanged. The Restart Readiness Inspection Team concurred with that conclusion. The gasket issue is being addressed to via the baseline inspection program and will be documented in a future resident inspector quarterly inspection

report.

6.0. Use of Operating Experience

The use of operating experience from both internal and external sources is a key element in evaluating events and defining corrective actions at nuclear power plants. This information can come from other utilities through direct contact, from shared databases such as those administrated by INPO and the NRC, energy-related research firms, or even searches of material found on the internet, as well as internal sources. Incorporating this information into activities such as the response to the seismic event experienced by the NAPS plays an important role in ensuring that a comprehensive plan is developed and implemented through incorporation of the lessons others have shared based on previous experiences that have similarity or relevance to the specific event.

The licensee contacted several sources immediately following the seismic event and requested procedures and other documents that could be of use to Dominion personnel. Shortly after requesting the information, the licensee received a procedure from a nuclear utility located in an area of seismic activity and used this in the development of the SSC walkdown program procedure (0-GEP-30) and the associated training material, for use in the identification of areas to inspect and in the definition of acceptance criteria used in walkdowns and inspections. Additional material associated with recommended inspections or walkdowns following a seismic event was received over a four week period from various sources.

a. Inspection Scope

The team reviewed material that had been developed by the licensee since the August 23, 2011, seismic event, including the SSC walkdown procedure, training material provided to system and structural engineers, structural inspection plans, and selection criteria for expanded inspection on SSCs such as steam generators, snubbers, and supports.

Material provided by the licensee that was reviewed by the team included inspection procedures and training material from other utilities that had experienced a seismic event or were in areas which were susceptible to seismic activity and reports and guidance documents from EPRI. This included information more recent than the 1989 EPRI NP-6695 document and was based on seismic events that affected nuclear plants in Japan in the 2003 - 2007 time frame as well as other seismic events that impacted non-nuclear power production facilities at locations around the world since the early 1980s. Some of the reports focused on SSCs that should be considered for inspection based on their vulnerability for containing hidden damage and recommended inspections to identify this damage.

b. Observations and Findings

The licensee utilized a procedure from a single utility in a high seismic activity area as a guide to develop its SSC walkdown procedure, 0-GEP-30, and the associated training material following the August 23, 2011, seismic event. The team's assessment of the training that was provided is contained in Section 2.1 of this report. Additional information was available from other sources, including utilities and EPRI, that could have been used in the development of both the walkdown procedures and the training sessions to provide more direction to the engineers conducting the inspections. The licensee intended to enhance both products with information from outside as well as the NAPS walkdowns for future use. Procedure PI-AA-100-107, Operating Experience Program, provides direction to use operating experience in developing or revising procedures, training activities, root and apparent causes and Infrequently Conducted or Complex Evolutions (ICCEs); however, the material received following the completion of the system walkdowns by Dominion personnel using the 0-GEP-30 guidance was not reviewed for possible incorporation as described in the PI-AA-100-107 procedure. Following discussions with the team, the licensee is planning to perform a review of all material received from outside sources to determine if any revisions to plant documents and training material are required and if the performance of supplemental walkdowns are warranted.

The licensee had members of their Transmission group visit the area surrounding the Fukishima Dai-Ichi nuclear plant following the March 11, 2011, Tōhoku earthquake and tsunami to assist in the assessment of the electrical switchyard and surrounding transmission grid. Shortly after the August 23, 2011, seismic event that affected the Dominion service area, this operating experience was incorporated into the inspections that were defined for the North Anna site as well as the transmission grid and substations in the surrounding area. This demonstrated an effective application of operating experience from outside of the Dominion organization in the assessment of equipment that could have been impacted by the seismic event.

7.0 Unresolved Item Review

The Augmented Inspection Team identified seven Unresolved Items (URIs) that were documented in the team's inspection report. The following section provides a status of the individual issues and if the corrective actions have been completed to support plant restart. With the exception of the one URI that is being closed in this report, the disposition of the remaining URIs in terms of determining if a performance deficiency existed and if regulatory enforcement is warranted will be addressed in future resident inspector quarterly inspection reports.

URI 05000338, 339/2011011-01; Seismic Instrumentation Implementation

The AIT report documented several issues related to the seismic monitoring equipment at the North Anna Power Station. Some of the issues are being addressed on a longer-

term schedule and have generic implications to the nuclear industry but do not impact the current ability of the NAPS to detect and respond to a seismic event. Other issues have been addressed through issuance of corrected drawings, additional training for operations and instrumentation and control (I&C) personnel, and revision of plant procedures used to respond to a seismic event.

The inspectors determined that the licensee had taken appropriate actions to address the issue and documented it in the CAP program. No restart concerns were identified.

URI 05000338, 339/2011011-02; Failure of 2H Emergency Diesel Generator Jacket Water Cooling Gasket Resulting in Inoperability during Dual Unit LOOP

The licensee performed a RCE on the failure of the 2H EDG following the loss of offsite power. The Restart Readiness Inspection Team's assessment of the RCE is documented in Section 5.2 of this report. The licensee has implemented the following immediate corrective actions in response to the failure:

- The failed gasket on the 2H EDG was replaced utilizing revised maintenance instructions and the EDG was subsequently tested under a 24-hour loaded run to verify operability
- The gaskets on all of the EDGs at the NAPS were inspected, retorqued, and then inspected using a boroscope to verify that they were properly positioned to prevent leakage from the jacket water system
- All of the EDGs at the station have been tested successfully since the seismic event and subsequent maintenance and inspections
- The maintenance procedures have been revised to include specific guidance on the application of the RTV sealant and the installation of the Garlock Blue-Guard 3000 gasket material

Based on the actions taken by the licensee on all four EDGs at the station, the team concurred with the licensee's position that the cause of the failure was identified and that adequate corrective actions were taken to preclude a similar failure in the future. The inspectors determined that the licensee had taken appropriate actions to address the issue and documented it in its CAP program. No restart concerns were identified.

URI 05000338, 339/2011011-03; Missing Orifice Plate on 1J and 2J EDG

The licensee conducted walkdowns and inspections of all four EDGs to evaluate the status of the orifice plate on the engine-driven coolant pump located on the Opposite Control Side (OCS) that was found missing on the 1J EDG. An additional orifice plate was found to be missing at the same location on the 2J EDG following these inspections. The licensee performed an engineering evaluation using previous test data and has stated that there is no immediate concern with the 1J EDG and 2J EDG performing their design functions with the orifice plate not installed; however, the licensee has installed the missing orifice plates using the enhanced maintenance procedures developed

following the seismic event. Operability Determinations OD443 and OD444 were developed to support the position that the 1J and 2J EDGs were fully operable without the orifice plates installed; however, as stated above, the plates were installed on both EDGs prior to restart. Both of the EDGs have been run using the surveillance test procedure and no issues were identified. An Apparent Cause Evaluation (ACE18836) has been completed which develops additional corrective actions associated with the maintenance practices and procedures used on the EDGs which will be implemented prior to the next time the EDGs will be worked on to ensure the enhanced guidance and other actions are in place.

The inspectors determined that the licensee had taken appropriate actions to address the issue and documented it in its CAP program. No restart concerns were identified.

URI 05000338, 339/2011011-04; 1J EDG Frequency Oscillation

The licensee performed troubleshooting following the identification of the frequency oscillations and has corrected the condition. Replacement of components and tuning by station and vendor personnel resulted in the 1J EDG successfully completing a post-maintenance run during which the frequency remained constant without any manual intervention. Based on the actions taken by the licensee on the 1J EDG governor sub-system and the testing observed by the Restart Readiness Inspection Team, the team concurred with the licensee's position that the cause of the frequency oscillations was identified and that adequate corrective actions were taken to address the issue. No restart concerns were identified.

URI 05000338, 339/2011011-06; Seismic Alarm Panel

Following the seismic event, the licensee installed a temporary uninterruptible power supply (UPS) to ensure that the seismic monitoring panel and its associated alarms that are used to determine if an emergency plan entry is required will remain operable during periods where power is being transferred between the normal supply and the semi-vital bus. While the long-term corrective action calls for the UPS to be replaced with a different configuration, the immediate issue has been addressed and functionally tested. The licensee is also looking into upgrading the existing seismic monitoring system as a long term option.

The inspectors determined that the licensee had taken appropriate actions to address the issue and documented it in its CAP program. No restart concerns were identified.

URI 05000338, 339/2011011-07; Safety-Related Instrumentation Anomalies

The licensee performed an evaluation of all alarms received during and following the seismic event to determine if the alarms were valid and if alarms were received that should have been based on actual conditions as part of the RCE on the dual unit reactor trip. The licensee's assessment showed that all of the data points and alarms received

were valid and that equipment operated as expected with the exception of five points that are discussed below. These are different than the points listed in Section 8.1 of the AIT report; however, the licensee has confirmed that all points other than those listed below functioned properly. The licensee's subsequent evaluation into the response of these points determined the following:

- Unit 1 and 2 RWST Chemical Addition Tank Low Temperature: The loops that provide indication and alarm are powered from the semi-vital bus. The sequence-of-events recorder indicated an alarm condition for both units that corresponded to the loss of the semi-vital bus and then reset when the bus was subsequently re-energized. These points functioned as designed.
- Unit 1 and 2 Loop 1C High Delta-T Deviation: Through the comparison of computer points, the licensee confirmed that the alarms received were valid for existing plant conditions and the points functioned as designed.
- Fire Water System Initiation: There are no computer indications or recorders to verify the alarm that was received; however Operations stated that the Fire Water System did initiate and therefore, the event was valid. A sprinkler head in the Turbine Building was knocked off during the seismic event that actuated the fire protection system and, as such, the alarm functioned as designed.

The inspectors determined that the licensee had taken appropriate actions to address the issue and documented it in its CAP program. No restart concerns were identified.

(Closed) URI 05000338, 339/2011011-05: Unit 1 Turbine-Driven Auxiliary Feedwater Pump Trouble Alarm

The AIT observed that procedure 1-AR-F-D8,Turbine driven AFW pump trouble or lube oil trouble, did not state that the low lube oil level switch was powered from non-vital power. As a result, during the LOOP, the alarm stayed lit. The procedure required maintenance to add oil when the turbine lube oil level is low, but does not state that during a LOOP, the level switch will lose power and the alarm will stay lit. During interviews, operators were unsure as to why the alarm was lit and therefore required additional troubleshooting during the event. This resulted in a short delay in the alignment of the Unit 1 terry turbine AFW pump to the steam generator. An unresolved item was opened pending completion of this review.

The Restart Readiness Inspection Team discussed the event with representatives of Operations and Training. The licensee did confirm that the alarm was received in the Control Room following the loss of off-site power because the alarm power is not supplied by a safety-related bus. This was not understood by the plant at the time because no one had specifically verified that this alarm's power supply and no one understood the significance of the power supply. Therefore, the simulator did not model the plant, the Operators were not trained to expect this alarm on a loss of offsite power, and the annunciator response procedure was never updated. The licensee has

corrected the simulator modeling and updated the annunciator response procedures as a result of this issue's resolution.

The inspectors determined that the licensee had multiple opportunities to identify the deficiency during the procedure revision process and the tagout process. The finding is considered minor because the deficiency did not significantly affect the operators' response to the transient. Feedwater restoration to the "A" Steam Generator was delayed less than ten minutes. Level did not go below 25 percent Wide Range, and the other two steam generators continued to have adequate feed during the event. Additionally, the licensee completed prompt actions to correct both identified deficiencies. This failure constitutes a finding of minor significance that is not subject to enforcement action in accordance with the NRCs Enforcement Policy. This URI is closed.

The inspectors determined that the licensee had taken appropriate actions to address the issue and documented it in its CAP program. No restart concerns were identified.

8.0 Exit Meeting Summary

The resident inspectors presented the inspection results to Mr. Michael Crist, and other members of licensee management on November 7, 2011. The licensee acknowledged the findings presented. The inspectors asked the licensee if any of the material examined during the inspection should be considered proprietary and the information that was identified as such was returned to the licensee prior to the team departing the site.

SUPPLEMENTAL INFORMATION

KEY POINTS OF CONTACT

Licensee Personnel:
D. Amos, Chemistry
K. Avery, System Engineer
J. Blanchard, Engineering
J. Breeden, Health Physicist 3
C. Combs, System Engineer
M. Crist, Plant Manager
K. Custer, Corrective Action Program
B. Derrebery, Supervisor - ISI/Materials/NDE Engineering
D. Driver, Manager Electrical Transmissions Nuclear
J. Duke, Transmissions Project Manager
K. Dunlap, Operations Engineer
F. Errico, Corrective Action Program Supervisor
D. Fleshood, System Engineer
P. Harper, Corrective Action Coordinator
E. Hendrixson, Director, Site Engineering
W. Hunsberger, Supervisor System and Components for Electrical and I&C
P. Ignischiski, Training
P. Kemp, Regulatory Compliance
J. Keneipp, Engineering
M. Laprade, Engineering Supervisor
K. LeBarron, System Engineer
J. Leberstien, Regulatory Compliance
C. Maxiom, Engineering Supervisor, Millstone Power Station
S. McHugh, System Engineer Electrical
J. Miller, Senior Electrical Engineer
F. Mladen, Director, Licensing & Safety
M. Mundon, Outage Planning
S. Osbourn, Buried Pipe Program Engineer
J. Patterson, System Engineer Rod Control System and Rx Protection System
N. Richter, System Engineer
J. Russell, Operations
C. Silcox, Engineer, Surry Power Station
S. Tipsword, Radiation Protection
J. Warchol, System Engineer Emergency Electrical (EE) and Electrical Power (EP)

LIST OF ITEMS OPENED, CLOSED AND DISCUSSED

Opened

05000338/2011012-01	URI	Unsealed Penetration on Unit 1 Motor Driven Auxiliary Feedwater Pump Room (Section 2.1)

Closed

05000338, 339/2011011-05	URI:	Unit 1 Turbine Driven Auxiliary Feedwater Pump Trouble Alarm (Section 7.0)

Discussed

05000338, 339/2011011-01	URI	Seismic Instrumentation Implementation (Section 7.0)
05000338, 339/2011011-02	URI	Failure of 2H Emergency Diesel Generator Jacket Water Cooling Gasket Resulting in Inoperability during Dual Unit LOOP (Section 7.0)
05000338, 339/2011011-03	URI	Missing Orifice Plate on 1J and 2J EDG (Section 7.0)
05000338, 339/2011011-04	URI	1J EDG Frequency Oscillation (Section 7.0)
05000338, 339/2011011-06	URI	Seismic Alarm Panel (Section 7.0)
05000338, 339/2011011-07	URI	Safety Related Instrumentation Anomalies (Section 7.0)

List Of Documents Reviewed

Corrective Action Documents

CR436108; ACE #018783; NRC report identified a NCV with a cross-cutting aspect with regards to transient fire loading in safety-related areas
CR439052; Dual Unit Trip Following a Magnitude 5.8 Earthquake
CR439137, Oil Leak on Spare Transformer #5/6 in the switchyard
CR439202, Need Work Orders to replace 500kV bushings on Unit 1 GSUs
CR439204, Need Work Orders to replace 500kV bushings on Unit 2 GSUs
CR440183; Spalling identified at the support plate for 2-RC-P-1A upper bearing lube oil cooler
CR440436, Battery Bank #1 in 500kV switchyard control house has shifted slightly
CR441000, Unit 2 concrete footers in Mini-Switchyard are cracked
CR441557; ACE #18830; 1-CC-2 found in the open position.
CR442041; CA212009; Groundwater inspection well activity during “B” BRT release via U-1 CW Tunnel
CR442328, Damage Found on “C” Phase Current Transformer (CT) Column for Unit 2 Switchyard Generator Breaker G202
CR444230, Minor Surface Cracks Found on 500 kV Switchyard Battery Banks #1 and #2
CR444572; RCE001061 did not pass the programmatic review in accordance with PI-AA-300-3001
CR444879, Seismic Inspection Results on Transformer #5 in Switchyard

CR445037, Damaged Bus Support on Transformer #5 in Switchyard
CR445411, Transformer #2 High Power Factor Test Results and Inconsistent SFRA Test
CR446231; Loose hand wheel with metal filings below valve 2-CC-845.
CR446325; Insulation missing on 1-CC-E-1a at floor elevation 259'
CR446329; Penetrations labeled as SPARE with conduit or pipe in penetration.
CR446689, 7300 cards installed in Unit 1 did not pass the Westinghouse seismic qualification
CR446690, 7300 cards not seismically qualified by Westinghouse seismic testing
CR447257; RCE001062 will be revised to add clarifying information to evaluation details
Root Cause Evaluation RCE001061; Dual Unit Trip Following Magnitude 5.8 Earthquake (CR439052)
Root Cause Evaluation RCE001062; 2H Diesel Failure during the Loss of Offsite Power

Drawings
11715-FM-079A; Sheet 1, Unit 1 CCW system
11715-FM-079A; Sheet 2, Unit 2 CCW system
11715-FM-079B; Sheet 1, CCW system
11715-FM-082B; Compressed Air System, Sheets 1, 2, 3 and 4
12050-FM-096A, Revision 35 (sheet 1), Flow/Valve Operating Numbers Diagram Safety Injection System U2
12050-FM-096A, Revision 37 (sheet 2), Flow/Valve Operating Numbers Diagram Safety Injection System U2
12050-FM-096A, Revision 32 (sheet 3), Flow/VOND Safety Injection System U2
12050-FM-096B, Revision 30 (sheet 1), Flow/VOND Safety Injection System U2
12050-FM-096B, Revision 25 (sheet 2), Flow/VOND Safety Injection System U2
12050-FM-096B, Revision 27 (sheet 3), Flow/Valve Operating Numbers Diagram Safety Injection System U2
12050-FM-096B, Revision 31 (sheet 4), Flow/Valve Operating Numbers Diagram Safety Injection System U2
11715-FC-15V-7; Sheet 7, Exterior Concrete Wall Details Reactor Containment
11715-FB-1E; Sheet 1, Subsurface Drains Fuel & Auxiliary Building Mats

Procedures
0-GEP-30; Post Seismic Event System Engineering Walkdown, Revision 1
ER-NA-INS-104; Monitoring of Structures at North Anna Power Station, Revision 1
Administrative Procedure OI –AA-110, Commitment Management, Revision 0
PI-AA-100-1007; Operating Experience Program, Revision 7
PI-AA-100-1007; Operating Experience Program, Revision 7
PI-AA-200; Corrective Action, Revision 17
PI-AA-300; Cause Evaluation, Revision 6
PI-AA-300-3001; Root Cause Evaluation, Revision 3
PI-AA-300-3004; Cause Evaluation Methods, Revision 2
RP-AA-502; Groundwater Protection Program, Revision 3

HP-1033.261; Liquid Tritium Counting Worksheet – Beckman LS-6000SC, Attachment 3, Revision 8

PI-AA-100; Performance Monitoring, Revision 2
0-PT-172.5, Emergency Response Data System (ERDS) Test
1-PT-14.1, Charging Pump 1-CH-P-2A
1-PT-14.2, Charging Pump 1-CH-P-2B
1-PT-14.3, Charging Pump 1-CH-P-2C
1-PT-30.7.3, Power Range Low Setpoint Channel III (N-43) Channel Operational Test
1-PT-31.3.2, Reactor Coolant Loop Flow B Protection Channel I (1-RC-F-1424) Channel Operational Test
1-PT-31.8.3, Pressurizer Level Protection Channel III (1-RC-L-1461) Calibration
1-PT-36.9.1H, Degraded Voltage / Loss of Voltage Operational Test: 1H Bus
1-PT-44.2.7, Refueling Water Storage Tank Level Channel I (1-QS-L-100C) Channel Calibration
1-PT-57.1A, Emergency Core Cooling Subsystem – Low Head Safety Injection Pump (1-SI-P-1A)
1-PT-57.1B, Emergency Core Cooling Subsystem – Low Head Safety Injection Pump (1-SI-P-1B)
1-PT-63.1A, Quench Spray System – “A” Subsystem
1-PT-63.1B, Quench Spray System – “B” Subsystem
1-PT-64.1, Outside Recirculation Spray Pump 1-RS-P-2A
1-PT-64.2, Outside Recirculation Spray Pump 1-RS-P-2B
1-PT-64.4A, Casing Cooling Pump (1-RS-P-3A) Test
1-PT-64.4B, Casing Cooling Pump (1-RS-P-3BA) Test
1-PT-66.3, Containment Depressurization Actuation Operational Test
1-PT-71.1Q, 1-FW-P-2, Turbine Driven Auxiliary Feedwater Pump and Valve Test
1-PT-71.2Q, 1-FW-P-3A, A Motor Driven AFW Pump and Valve Test
1-PT-71.3Q, 1-FW-P-3B, B Motor Driven AFW Pump and Valve Test
1-PT-77.11A, Control Room Chiller 1-HV-E-4A Pump and Valve Test
1-PT-77.17, Safeguards Exhaust Blowout Damper 1-HV-AOD-200 Functional Test
1-PT-78.3A, , Inservice Inspection – Residual Heat Removal Pump, 1-RH-P-1A
1-PT.78.3B, Inservice Inspection – Residual Heat Removal Pump, 1-RH-P-1B
1-PT-82-H, 1H Emergency Diesel Generator Slow Start Test
1-PT-82-J, 1J Emergency Diesel Generator Slow Start Test
1-PT-97.1A, Spent Fuel Pit Cooling Pump (1-FC-P-1A) Test
2-PT-14.1, Charging Pump 2-CH-P-2A
2-PT-14.2, Charging Pump 2-CH-P-2B
2-PT-14.3, Charging Pump 2-CH-P-2C
2-PT-15.1, Boric Acid Transfer Pump (1-CH-P-2C) Test
2-PT-36.9.1H, Degraded Voltage / Loss of Voltage Operational Test: 2H Bus
2-PT-44.11, Inadequate Core Cooling Monitor System Channel Checks
2-PT-57.1A, Emergency Core Cooling Subsystem – Low Head Safety Injection Pump (2-SI-P-1A)
2-PT-57.1B, Emergency Core Cooling Subsystem – Low Head Safety Injection Pump (2-SI-P-1B)
2-PT-63.1A, Quench Spray System – “A” Subsystem
2-PT-63.1B, Quench Spray System – “B” Subsystem
2-PT-64.1, Outside Recirculation Spray Pump 2-RS-P-2A

2-PT-64.2, Outside Recirculation Spray Pump 2-RS-P-2B
2-PT-64.4A, Casing Cooling Pump (21-RS-P-3A) Test
2-PT-64.4B, Casing Cooling Pump (2-RS-P-3BA) Test
2-PT-71.1Q, 2-FW-P-2, Turbine Driven Auxiliary Feedwater Pump and Valve Test
2-PT-71.2Q, 2-FW-P-3A, A Motor Driven AFW Pump and Valve Test
2-PT-71.3Q, 2-FW-P-3B, B Motor Driven AFW Pump and Valve Test
2-PT-71.3Q.1, 2-FW-3B, Motor Driven AFW Pump IST Comprehensive Pump and Valve Test
2-PT-78.3A, , Inservice Inspection – Residual Heat Removal Pump, 2-RH-P-1A
2-PT-78.3A, , Inservice Inspection – Residual Heat Removal Pump, 2-RH-P-1B
2-PT-82-H, 2H Emergency Diesel Generator Slow Start Test
2-PT-82-J, 2J Emergency Diesel Generator Slow Start Test

Miscellaneous
WGST – Post Seismic Event Walkdown training package
Pipe Support training package
Station seismic walkdown deficiency log
CM-AA-ETE-101, Documentation of Post Seismic Event Inspections, Revision 1
Regulatory Guide 1.167; Restart of a Nuclear Plant Shut Down by a Seismic Event
EPRI NP·6695, Guidelines for Nuclear Plant Response to an Earthquake
Inspection Procedure 92702, Follow-up on Traditional Enforcement Actions Including Violations, Deviations, Confirmatory Action Letters, Confirmatory Orders, and Alternative Dispute Resolution Confirmatory Orders
Dominion Restart Report, 11-520 dated September 17, 2011
ETE-NA-2011-0056; Post Seismic Event Inspections
CM-NA-ETE-101; Impact of August 2011 Seismic Activity at NAPS on Engineering Programs, Revision 1
ETE-CEM-2011-0008, Report of Walkdowns by a Seismic Review Team Including Industry Experts
CM-AA-ETE-101, Attachment 2, Documentation of Post Seismic Event System Inspections with Beaver Valley System Engineers
CR list generated for issues related to the SI system identified since the earthquake
License Amendments and License Commitments as documented in licensee's spreadsheet
ETE-NA-2011-0058, Unit 1 Post Seismic Event Startup PT List, Rev. 1
Letter's to the NRC: 11-544A, 11-520A, 11-566, 11-520
Administrative Procedure LI-AA-110, Revision 0, "Commitment Management"
NEI 99-04 Revision 0," Guidelines for Managing NRC commitment Changes"
Abnormal Procedure O-AP-36, Revision 20 "Seismic Event"
CR446671 as part of 0-AP-36
Operating Procedure 0-OP-4.29, "RCC Drag Testing Fuel Assemblies."
ETE-NAF-2011-0149, "RCCA Drag Test Evaluation for North Anna 2 EOC 21 and BOC 22" includes AREVA Letter FAB11-642, "AREVA Fuel Assembly Drag Load Evaluation"
1-PT-57.3.1, Revision 0, as part of ETE-NA-2011-0070, "Evaluation of Unit 1 Containment Sump Strainer As left Gaps (Fall 2011 Forced Outage)"
Letter from John Stang, NRC Project Manager, to Mr. David Christian, President and Chief Nuclear Officer Virginia Electric and Power Company, "North Anna Power Station, Unit Nos.

1 and 2 – Audit of Virginia Electric and Power Company's management of Regulatory Commitments (TAC Nos. MD9338 and MD9339)" dated September 18, 2008.
NAPS LCO Tracking Log
NAPS Engineering Log
General Engineering Procedure 0-GEP-30, "Post seismic Event System Engineering Walkdown"
Results of 0-GEP-30 relative to the SI system (issues identified and area's walked down)
Work orders and condition report review of CRRT screening data for October 6, 2011
Work orders and condition report review of CRRT screening data for October 7, 2011
Work orders and condition report review of CRRT screening data for October 8, 2011
Work orders and condition report review of CRRT screening data for October 10, 2011
2H Emergency Diesel Generator load profile during its operation for the earthquake
RAI 5906 Question Response on Ground Water Monitoring Program, October 12, 2011
NAS-1023/NUS-3007; Specification for installation of Hilti Kwik Bolt II and Hilti Kwik Bolt 3 Anchor Bolts, Revision 2
Contract NDE Personnel Certification Record for individual ID #6606, dated September 1, 2011
Buried Pipe Program post-seismic inspection at location 6"-CH-249-153A-Q3
Buried Pipe Program post-seismic inspection at location 6"-RH-27-153A-Q3
Buried Pipe Program post-seismic inspection at location 12"-SI-5-153A-Q3
Buried Pipe Program post-seismic inspection at location 10"-QS-1-153A-Q3
Buried Pipe Program post-seismic inspection at location 10"-SI-8-153A-Q3
Buried Pipe Program post-seismic inspection at location 6"-QS-14-152-Q3
Buried Pipe Program post-seismic inspection at location 10"-QS-2-153A-Q3
Buried Pipe Program post-seismic inspection at location 16"-SI-7-153A-Q3
Buried Pipe Program post-seismic inspection at location 4"-QS-30-152-Q3
Buried Pipe Program post-seismic inspection at location 4"-QS-16-152-S
DC NA-10-00171; Approximate Groundwater Monitoring Well locations inside the protected area, Revision 0
North Anna Power Station Life Cycle Management Plan Underground Piping and Tank Integrity Program, September 23, 2011
Instrument Calibration Procedure #1-ICP-FW-L-1474, Steam Generator A Narrow Range Level Protection Channel I (1-FW-L-1474) Calibration, Rev. 15, Completed September 5, 2011
Design Change NA-11-01156, Sudden Pressure Relay Protection Bypass, approved on October 7, 2011
Technical Specification Table 3.8.6-1, Battery Cell Parameters Requirements
11715-FE-1BB, One Line Diagram Electrical Distribution System North Anna Power Station Units 1 and 2, Rev. 44
1-PT-86A, Electrical Periodic Test, Quarterly DC Distribution System Test For Batteries 1-I and 1-FP-P-2, Rev. 41
WCAP-8687, Supplement 2-E13C, Equipment Qualification Test Report Process Protection System (Seismic and Environmental Testing of Printed Circuit Cards), Revision 2
Design Change NA-11-01194; Unit 1 Auxiliary Feedwater Pipe Tunnel High Energy Line Break Protection, Rev. 0
ETE-CME-2011-017, Sealing Requirements for AFW Tunnel Penetration to the U1 MDAFW Pump Room, Rev 0

Condition Reports Generated Based on the NRC Restart Readiness Inspection Team's Activities

CR446231 - Loose hand wheel with metal filings below valve 2-CC-845.
CR446329 - Penetrations labeled as SPARE with conduit or pipe in penetration.
CR446325 - Insulation missing on 1-CC-E-1a at floor elevation 259'.
CR446421 - Possible boric acid on FC Discharge line.
CR446442 - Hair-line crack observed in marinate board under cable tray 2TX016Y.
CR446452 - Strut found with pipe clamp rotated in excess of 5 degrees.
CR446459 - 3/8" copper air line found with 3 missing Unistrut clamps.
CR446460 - Paired NRC walkdown - 1-MS-TV-111B loose insulation.
CR446461 - Paired NRC walkdown - Insulation laying near 1-MS-TV-111A.
CR446462 - Paired NRC walkdown - Thread engagement on 1-FW-100 pipe support plate.
CR446465 - Paired NRC walkdown - cracked caulking on insulation.
CR446469 - Paired NRC walkdown - loose metal insulation & hair line cracking on wall.
CR446569 – Banding found around U2 Containment penetrations 40 and 41
CR446570 – Work Order needed to repair conduit support in Unit 2 Containment
CR446612 - Paired NRC walkdown - bolt missing out of a conduit clamp supporting a 3/4" conduit
CR446613 - Paired NRC walkdown - flex conduit was noted damaged at its connection to a junction box.
CR446615 - Paired NRC walkdown - conduit clamp was found missing from a 3/8" instrument air line.
CR446616 - Paired NRC walkdown - A conduit support was found with the fastener missing on the crane wall
CR446644 - Paired NRC walkdown - 02-RC-R-1: CRDM Seismic support platform requires adjustment
CR446671 - NRC Commitment reference omitted from 0-AP-36 Rev. 20
CR446711 – 3 loose jam nuts on CRDM seismic support platform
CR446750 - Anchor bolt nut found missing from 2-WT-PH-R-404.1B
CR446753 - Work order needed to repair conduit support.
CR446757 - Work order needed to add tubing clamp.
CR446767 - Work Order needed to tighten duct support bolting.
CR446769 - 1" pipe found displaced from its pipe support.
CR446782 - Two tubing lines touching at one point. Vent lines for 2-FW-E-7C1.
CR446791 – Loose support bracket for 1-IA-415.
CR447009 - Unit 2 Main Steam Safety Valves PCS point indications
CR447020 - Flux Thimble tube moderately bent.
CR447100 - Concrete crack found on south exterior wall of the Fuel Building
CR447241 - Concrete found spalled around Unit 1 Main Steam Valve House Door
CR447257 - RCE001062 will be revised to add clarifying info to evaluation details
CR447264 - Unit 1 Main Steam and Feedwater insulation found degraded.
CR447270 - Thimble tube 11 for L9 was noted as showing minor corrosion due to rubbing its support
CR447272 - Insulation found damaged near penetration

CR447283 - Shims found loose and not captured on lower Steam Generator support Foot.
CR447349 - Boric acid deposit found on floor behind U2 B Accumulator tank
CR447366 - Rust staining drain supports below ring duct at 2-HV-E-2B
CR447386 - Spring Hanger observed out of plumb on the U2 'C' MS Header
CR447514 - NRC question concerning inspection of neutron shield tank base bolts
CR447518 - NRC has questioned if a inspection plan for the Rx supports has been developed
CR447536 – Insulation found displaced from Unit 2 MSVH Main Steam penetration
CR447542 - Unfilled gap found in seismic rattlespace
CR447547 - Work Order need to repair Unit 2 MSVH roofing
CR447551 - Unit 2 MSVH bird screens found with missing mounting bolts.
CR447569 - Spring hangers found with corrosion on the interior springs
CR447571 - NRC Inspection team identified several items that warrant additional evaluation
CR447576 - Come-a-long found in Unit 2 MSVH
CR447579 – Piece of plywood attached to south wall of the MSVH
CR447581 - Work Orders found unattended in the basement of the Unit 2 MSVH
CR447653 - U2 MSVH - Uppermost level - grout dislodged at seismic rattlespace cover
CR447656 - Boric Acid on Multiple Surfaces in the U2 Containment keyway
CR447657 - U-1 MSVH Missile blocks found with large spalls on the corners of some blocks
CR447667 - Oily substance found on support steel in Unit 1 Containment.
CR447670 - Shakespace cork found degraded in Service Water Valve House.
CR447683 - Spacer Plates on the Unit 1 Reactor head showing light shining through
CR447754 - Documents regarding a HELB in AFW Tunnel
CR447784 - Pipe hanger not supporting discharge pipe of 1-LW-P-1A
CR447797 - Potential degrading trend identified for 1-HV-SOV-1200A
CR447812 - Snubber support 2-FW-HSS-234 found with spalled concrete
CR447904 - Commitments and action items from NRC correspondence not tracked IAW LI-AA-110
CR447925 - Unit 2 Containment liner found with an uncoated corroded area in basement
CR447927 - Personnel performing walkdowns with NRC asked if a CR should be submitted
CR447930 - Possible crack found in penetration weld
CR447933 - Tubing support found with member missing
CR447973 - Spring hanger found with corrosion on the interior spring
CR447981 - Initial condition in 1-PT-30.7.3 was incorrectly N/A'd.
CR448171 - Substance on U2 "B" S/G support appears to be residue from prior PT examinations

Walkdowns Conducted On The Following Systems Or Components By Licensee And / Or NRC Personnel:

SYSTEM	CATEGORY	LICENSEE	AIT TEAM	NRR STAFF FUEL	RESIDENTS	RESTART TEAM
Component Cooling	A	U1 & U2	Sampled		U1 & U2	U1 & U2
Residual Heat Removal	A	U1 & U2	U1 & U2		U1 & U2	
Service Water	A	U1 & U2	U1 & U2		U1 & U2	
Electrical Power - external	A	U1 & U2			U1 & U2	U1 & U2
Electrical Power - internal	A	U1 & U2			U1 & U2	U1 & U2
Fuel Pit Cooling	B	*Common*				U1 & U2
CVCS	A	U1 & U2	RWSTs		U1 & U2	
Reactor Coolant System	A	U1 & U2			U1 & U2	
Safety Injection	A	U1 & U2	U1		U1 & U2	U2
Recirculation Spray	A	U1 & U2			U1 & U2	U2 Heat Exchangers Only
Feedwater	A	U1 & U2				Sampled
Main Steam	A	U1 & U2			Valve House and Turbine building	Valve House and inside containment U2 – Both areas U1 – Valve House Only
Quench Spray	A	U1 & U2				
Emergency Diesel Generators	A	U1 & U2	U1 & U2		U1 & U2	
Emergency Electrical – External	A	U1 & U2	Sampled		U1 & U2	U1 & U2
Emergency Electrical – Internal	A	U1 & U2	Sampled		U1 & U2	U1 & U2
Nuclear Instrumentation	A	U1 & U2			U1 & U2	Record Review
Instrument Air	A	U1 & U2				U1 & U2
Service Air	A	U1 & U2				U1 & U2
Auxiliary Feedwater	A	U1 & U2				U1
Batteries & Chargers	A	U1 & U2	Sampled			
Heating & Ventilation	A	U1 & U2	Sampled			
Radiation Monitors	A	U1 & U2				
Vital Bus	A	U1 & U2			U1 & U2	
Reactor Protection System	A	U1 & U2			U1 & U2	U1 & U2
Bearing Cooling	A	U1 & U2			U1 & U2	
Condensate	A	U1 & U2				
Turbine	A	U1 & U2				
Circulating Water	A	U1 & U2				Sampled

Walkdowns Conducted On The Following Systems Or Components By Licensee And / Or NRC Personnel:

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SYSTEM	CATEGORY	LICENSEE	AIT TEAM	NRR STAFF FUEL	RESIDENT	RESTART TEAM
Fire Protection	A	U1 & U2			U1 & U2	U1 & U2
Rod Control System	A	U1 & U2			U1 & U2	Record Review
Refuel Purification	B	U1 & U2				
Incore Instrumentation	B	U1 & U2				
Auxiliary Steam	B	U1 & U2				
Blowdown	B	U1 & U2				
Containment	B	U1 & U2			U1 & U2 Not the Spray Rings	U2; Containment – All areas except for Spray Rings
Containment Vacuum	B	U1 & U2				
Chilled Water	B	U1 & U2				
Extraction Steam	B	U1 & U2				
Gland Steam	B	U1 & U2				
Main Generator Gas Supply	B	U1 & U2				
Heat Tracing	B	U1 & U2				
Secondary Drains	B	U1 & U2				
Secondary Vents	B	U1 & U2				
Sampling System	B	U1 & U2				
Computer	B	U1 & U2			U1 & U2	
Emergency Lighting	B	U1 & U2			U1 & U2	
Condensate Polishing	B	U1 & U2				
Gaseous Waste	B	U1 & U2				
Rod Position Indicator	B	U1 & U2				
Water Treatment	B	U1 & U2				
Vacuum Priming	B	U1 & U2				
Meteorological Monitoring	B	Common			U1 & U2	
Post Accident	B	U1 & U2				
Early Response Capability	B	U1 & U2				
Fuel Handling	C	U1 & U2		U1 & U2		
Auxiliary Boiler	*C*	Common				
Primary grade water	*C*	U1 & U2				
Boron Recovery	*C*	U1 & U2				
Fuel Oil	*C*	U1 & U2	U1 & U2		U1 & U2	

Walkdowns Conducted On The Following Systems Or Components By Licensee And / Or NRC Personnel:

3

SYSTEM	CATEGORY	LICENSEE	AIT TEAM	NRR STAFF FUEL	RESIDENT	RESTART TEAM
Ambient Monitor	C	U1 & U2				
Bearing Lube	C	U1 & U2				
Compressed Air	C	U1 & U2				U1 & U2
Communications	C	U1 & U2	U1 & U2		U1 & U2	
Drains – Service Building	C	U1 & U2				
Decontamination	C	U1 & U2				
Domestic Water	C	U1 & U2				
Earthquake	C	U1 & U2	U1 & U2		U1 & U2	
Primary & Secondary Gas	C	U1 & U2				
High Radiation Sampling	C	U1 & U2				
ICCM	C	U1 & U2				
Dry Cask Storage	C	ISFSI	NUHOMS		NUHOMS	
Loose Parts Monitoring	C	U1 & U2				
Liquid and Solid Waste	C	System				
Oil Separation	C	System				
Sanitary Sewage	C	System				
Primary Vents and Drains	C	U1 & U2				
Leak Monitoring	C	U1 & U2				
Security	C	Station	U1 & U2		U1 & U2	
Lab Vacuum	C	System				
Standby Nuclear Service Water pond	C	Dam Inspected	Dam Inspected			

Walkdowns Conducted On The Following Systems Or Components By Licensee And / Or NRC Personnel:

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SSC	LICENSEE	AIT TEAM	NRR STAFF FUEL	RESIDENT	RESTART TEAM
Emergency Condensate Storage Tank *	YES	YES			
Refueling Water Storage Tank *	YES	YES		YES	
Refueling Water Chemical Addition Tanks *	YES	YES			
Service Building Masonry Walls	YES	Sampled			Sampled
Turbine Building Masonry Walls	YES	Sampled			Sampled
Buried Piping	Sampled	Sampled			Sampled
Main Control Room	YES			YES	YES
Electrical – 4160VAC *	YES	Sampled		Sampled	Sampled
Electrical – 480 VAC *	YES	Sampled		Sampled	Sampled
Electrical – Vital / Semi-Vital 120 VAC	YES	Sampled		Sampled	Sampled
Electrical – 125 VDC	YES	Sampled		Sampled	Sampled
Boric Acid Tanks	YES	Sampled			
Steam Generator Blowdown Containment Isolation Valves	YES	Sampled			
Service Water Pump House	YES				YES
Containment Base Mat Sump (U1 & U2)				YES	
Containment Spray Ring Headers (U1 & U2)	YES				
Reactor Vessel Supports	YES				Reviewed Data

* - Identified as a “High Confidence of Low Probability of Failure (HCLPF)” component having a capacity of less than 0.3 g

RESTART READINESS INSPECTION TEAM IDENTIFIED ISSUES / QUESTIONS AND THEIR RESOLUTION / STATUS

MATERIAL CONDITION ISSUES			
DESCRIPTION	**CR / WO**	**RESOLUTION INFORMATION**	**STATUS**
UNIT 1:			
Main steam valve house, large chipped areas were noted on some missile shield blocks	CR 447657 WO 59102382469	Upon detailed inspection by the licensee it was determined that the east center missile block was degraded with numerous large spalls and rebar exposed. This missile block will require a new missile block be constructed to replace the degraded one due to the extent of the damage. The other two center missile blocks do not have the extent of damage the center east one has and will only require grout repair. The degradation is typical of damage from removal / installation of missile blocks during outage maintenance. Some spalling may have been exacerbated by the August earthquake, however, most of the areas appear to be older damage. The Unit 1 Main Steam Valve House continues to provide its design function with the missile blocks in this condition and repair is not required prior to plant start-up. The Restart Readiness Inspection Team concurred with the licensee's assessment and actions to address this issue.	CLOSED
Main steam valve house, concrete found spalled around Unit 1 Main Steam Valve House Door	CR 447241 WO 59102379388	The licensee stated that the condition does not affect the function of the Unit 1 main steam valve house. A WO was initiated to address the condition. The Restart Readiness Inspection Team concurred with the licensee's actions to address this issue.	CLOSED
Steam generator support was found to have what appeared to be dye penetrant developer on the paint which would invalidate any NDE test that may have been performed	CR 448171	Certain welds on the SG supports are in the ISI Augmented Program with a VT-1 exam. The welds near the areas where the developer was noted are not in the ISI Program. The licensee stated that the staining appears to be PT staining from someone staging their PT equipment in that area when performing PT's on adjacent piping. Note there was other PT staining on the floor and SG support structure within 4 feet of this area that had a similar appearance. There was no cracking in the paint. Cleaning was attempted using cleaner/remover after inspecting the area but could not completely remove the stain. The Restart Readiness Inspection Team concurred with the licensee's assessment of this issue.	CLOSED
Indications of a possible boric acid leak were noted on a section of the spent fuel pool cooling pipe above the heat exchangers	CR 446421	It was subsequently determined to have not been from a piping leak; however, condition had not been identified during the post seismic event system walkdown. The Restart Readiness Inspection Team concurred with the licensee's assessment of this issue	CLOSED

RESTART READINESS INSPECTION TEAM IDENTIFIED ISSUES / QUESTIONS AND THEIR RESOLUTION / STATUS

MATERIAL CONDITION ISSUES			
DESCRIPTION	**CR / WO**	**RESOLUTION INFORMATION**	**STATUS**
UNIT 1:			
Pipe hanger not supporting discharge pipe of 1-LW-P-1A, low level waste drain tank pump	CR 447784 WO 59102382465	A WO was initiated to address the condition. The licensee's Engineering staff has no functionality concerns with the operation of the Low Level Liquid Waste System and the Restart Readiness Inspection Team concurred with the licensee's assessment of this issue.	CLOSED
Main Steam and Feedwater insulation found degraded	CR 447264 WO 59102379393	A WO was initiated to address the condition. The condition does not affect Main Steam and Feedwater line functionality. The Restart Readiness Inspection Team concurred with the licensee's assessment of this issue.	CLOSED
Loose support bracket for 1-IA-415 on the instrument air system	CR 443791 WO 59102378664	A WO was initiated to address the condition.	CLOSED
Valve hand wheel for 1-CC-845 is loose on the Component Cooling system	CR 446231 WO 59102375831	A WO was initiated to address the condition	CLOSED
Auxiliary Building wall penetrations labeled as SPARE with conduit & pipe installed	CR 446329 WO 59102376589	A WO was initiated to address the condition	CLOSED
Strut found with pipe clamp rotated in excess of 5 degrees.	CR 446452 WO 59102376724	The licensee stated that the piping system (3"-SGD-14-153A-S) is still functional in this condition, however the strut and pipe clamp require alignment to conform to design specifications. A WO was initiated to address the condition. The Restart Readiness Inspection Team concurred with the licensee's assessment of this issue.	CLOSED
3/8" copper instrument air (IA) line found with 3 missing Unistrut clamps.	CR 446459 WO 59102376726	The IA valve is rigidly connected to the equipment by a short run of tubing and the IA line is still functional. A WO was initiated to repair the condition	CLOSED
Insulation laying near 1-MS-TV-111A	CR 446461 WO 59102376727	A WO was initiated to address the condition	CLOSED
Thread engagement on 1-FW-100 pipe support plate does not appear to be adequate	CR 446462 WO 59102376728	A Corrective Action assignment performed an evaluation and actions will be required to address this condition prior to startup.	CLOSED
Cracked caulking was noted on insulation around the main steam line entering the turbine driven auxiliary feedwater pump room	CR 446465 WO 59102376730	A WO was initiated to address the condition and was determined to have not been caused by the seismic event. The Restart Readiness Inspection Team concurred with the licensee's assessment of this issue.	CLOSED

RESTART READINESS INSPECTION TEAM IDENTIFIED ISSUES / QUESTIONS AND THEIR RESOLUTION / STATUS

3

MATERIAL CONDITION ISSUES			
DESCRIPTION	**CR / WO**	**RESOLUTION INFORMATION**	**STATUS**
UNIT 2:			
Main steam valve house; two spring cans exhibited significant corrosion	CR 447569 CR 447973 WO 59102382110 WO 59102383400	The licensee stated that the springs are functional in this condition, but are being considered for replacement before further degradation can hinder their function. WO's were initiated to address the condition. The Restart Readiness Inspection Team concurred with the licensee's assessment of this issue.	CLOSED
Main steam valve house; a piece of plywood was found attached to south wall of the main steam valve house	CR 447579 WO 59102382111	The building function is not affected by this condition. A WO was initiated to address the condition	CLOSED
Two tubing lines off the Unit 2 inboard bearing cooler on the feedwater pump were noted to be touching at one point	CR 446782 WO 59102378626	WO initiated to address the condition on the vent lines for 2-FW-E-7C1	CLOSED
Boric acid deposit found on the floor behind Unit 2 "B" Accumulator tank	CR 447349 WO 59102381178	A Corrective Action assignment was initiated to perform an evaluation to determine the extent of any boric acid degradation and corrective actions required for this component in accordance with the BACC Program. WO initiated for repairs/cleaning.	CLOSED
Boric Acid on Multiple Surfaces in the Unit 2 Containment keyway	CR 447656 WO 59102382425	A Corrective Action was generated to perform an evaluation to determine the extent of any boric acid degradation and corrective actions required for this component in accordance with the BACC Program prior to startup. A WO was initiated for repairs/cleaning.	CLOSED
Hair-line cracking observed in marinate board under cable tray 2TX016Y in the Unit 2 cable vault	CR 446442 WO 59102376706	The licensee evaluated the crack and it was not judged to affect the functional requirement of the board. This marinate board is installed under the tray in this location in order to meet standard separation requirements of NAS-3012. A WO was initiated to address the condition. The Restart Readiness Inspection Team concurred with the licensee's assessment of this issue.	CLOSED
Banding found around U2 Containment penetrations 40 and 41	CR 446569 WO 59102378097	The licensee determined that the insulation banding has no adverse affect on the function of the penetrations. One of the two bands was removed and the other re-attached as required. The Restart Readiness Inspection Team concurred with the licensee's assessment of this issue.	CLOSED
Conduit support repair needed in Unit 2 Containment	CR 446570 WO 59102378096	The licensee has stated that the conduit is adequately supported by adjacent supports and is fully capable of providing its design function. A WO was initiated to address the condition	CLOSED

RESTART READINESS INSPECTION TEAM IDENTIFIED ISSUES / QUESTIONS AND THEIR RESOLUTION / STATUS

MATERIAL CONDITION ISSUES			
DESCRIPTION	**CR / WO**	**RESOLUTION INFORMATION**	**STATUS**
UNIT 2:			
Flex conduit repair required on the Component Cooling system	CR 446613 WO 59102378370	Per the licensee, as the exposed conductors showed no sign of stress or insulation damage, 2-CC-SOV-205A remains functional in this condition. A WO was initiated to address the condition	CLOSED
Conduit clamp repair needed in Unit 2 containment	CR 446612 WO 59102378281	The licensee has stated that the conduit clamp is providing support for the conduit, even with the fastener missing and has no affect on the function of containment. A WO was initiated to correct the condition	CLOSED
Work Order needed to repair conduit clamp on the instrument air system	CR 446615 WO 59102378282	The licensee has stated that the instrument air line is adequately supported by redundant supports and the IA system remains functional in this condition. A WO was initiated to correct the condition	CLOSED
Work Order needed to repair conduit support	CR 446616 WO 59102378255	The licensee has stated that the conduit is adequately supported by other supports and the function of containment is not affected by this condition. A WO was initiated to correct the condition	CLOSED
Work order needed to repair conduit support	CR 446753 WO 59102378591	The licensee has stated that the conduit remains stable due to other conduit supports and is functional in this condition. A WO was initiated to correct the condition	CLOSED
Anchor bolt nut found missing from 2-WT-PH-R-404.1B	CR 446750 WO 59102378637	The licensee evaluated the existing condition for the design loads and determined that the support is adequate to carry the loads. The evaluation is based on the results of a pipe stress analysis and pipe support calculation. A WO was initiated to install the missing nut be installed to conform to design drawings.	CLOSED
Work order needed to add tubing clamp	CR 446757 WO 59102378593	The licensee has stated that the 3/8" copper tubing is supported by adjacent hangers and is functional in this condition. A WO was initiated to correct the condition	CLOSED
Work Order needed to tighten duct support bolting	CR 446767 WO 59102378638	The licensee has stated that the seismic support and duct remain functional in this condition. A WO was initiated to correct the condition	CLOSED

MATERIAL CONDITION ISSUES			
DESCRIPTION	**CR / WO**	**RESOLUTION INFORMATION**	**STATUS**

OTHER:			
Shakespace cork found degraded in Service Water Valve House	CR 447670 WO 59102383043	The licensee has stated that the Service Water Valve House continues to provide its design function with this condition. Going forward, this issue will be put into the Maintenance Rule Structures program for future inspection and evaluation and if accelerated degradation should be found, it will be evaluated and repaired if required. A WO was initiated to address the condition. The Restart Readiness Inspection Team concurred with the licensee's assessment of this issue.	CLOSED

RESTART READINESS INSPECTION TEAM IDENTIFIED ISSUES / QUESTIONS AND THEIR RESOLUTION / STATUS

POTENTIAL SESIMIC ISSUES / QUESTIONS			
DESCRIPTION	**CR / WO**	**RESOLUTION INFORMATION**	**STATUS**
UNIT 1:			
The team identified a potential degrading trend for 1-HV-SOV-1200A, control room chiller service water seal water supply isolation valve performance following a review of pre and post seismic event test data	CR 447797	The current values were reviewed by the system engineer and operability of the valve is not impacted. A Corrective Action has been developed and assigned to Engineering to monitor 1-HV-SOV-1200A stroke times for the next scheduled performance of 1-PT-77.11A and have contingencies in place if the SOV fails the stroke time acceptance criteria. The Restart Readiness Inspection Team concurred with the licensee's assessment of this issue. In addition, the licensee has committed to ensure all post-seismic event test data is compared to pre-event data in order to identify any changes and evaluate them to ensure there are no latent issues present.	CLOSED
Cracks between low level liquid waste tanks	CR 447775	The licensee determined that the cracks were pre-existing between the Low Level Liquid Waste tanks (1-LW-TK-3A/B) and to the north of the tanks on the 259' elevation of the Auxiliary Building. The cracks were previously noted by system engineering and inspected by civil engineering 5-7 years ago. The cracks were discussed with the NRC prior to performing a walk down of the LW system. The NRC recommended documenting the issue in case of another seismic event. A CR was generated for documentation purposes. Note that cracks in the floor identified between 1-LW-TK-3A, 1-LW-TK-3B and the wall were previously documented by CR443035 (9/15/2011) submitted by Operations personnel. The cracks are not structurally significant and no further actions required. The Restart Readiness Inspection Team concurred with the licensee's assessment of this issue.	CLOSED
Section of the outer coating of the 'A' component cooling heat exchanger was noted to have come off with portions remaining under adjacent coating	CR 446325 WO 59102376572	A WO was initiated to repair coating / determined to have caused by prior work activities in the area. This was not determined to be a restart item.	CLOSED

POTENTIAL SESIMIC ISSUES / QUESTIONS			
DESCRIPTION	**CR / WO**	**RESOLUTION INFORMATION**	**STATUS**
UNIT 1:			
Spacer Plates on the Unit 1 Reactor head were found to have light shining through (see Unit 2 issue under CR447386). This may be indivative a loose jam nuts securing the seismic spacer plates on the upper section of the CRDM's.	CR 447683 WO 59102382441	The licensee evaluated this issue and developed the following information. In the cold condition, the Reactor CRDM seismic support structure is designed to have gaps between adjacent seismic spacer plates and between CRDM support plates and the adjustable support end bumper. The total gap ranges between 0.875" and 1.22" depending on the number of CRDMs in the particular row. The gap between the outer CRDMs support plates and the support end bumpers are set at 0.25" to accommodate the thermal growth of the reactor head and growth due to RCS internal pressure during unit operation. The additional gap between adjacent support plates assists in dampening CRDM vibrations. The Reactor CRDM seismic support platform spacer plates and the support end bumpers were inspected on 10/9/11 by Engineering and Maintenance. The seismic plates were noted to be aligned with no overlapping plates observed. Performed a total gap inspection of each row of seismic plates in two orthogonal directions. The total gap inspection was conducted from one end of a seismic plate row by pushing all seismic plates in a particular row against the far screw pad. The gap between the closest seismic plate and screw pad was then visually estimated. Overall gaps for each row were estimated to vary from 3/4" to 1". No loose jam nuts were found and the condition of the paint on the screw pads and jam nuts appeared undisturbed. The seismic plates were noted to be in an orderly alignment. Measuring tapes/rulers were not used during this inspection due to the lack of accessibility to the area. Based on the reported condition and estimated total gap dimensions between the spacer plates and the support end bumpers, the Reactor CRDM seismic support platform is acceptable as-is for continued operation. The estimated total overall gap exceeds the minimum required to accommodate thermal/pressure expansion of the reactor head. Also, from the reported condition of the paint on the support end bumpers and their associated jam nuts and confirmed tightness of the jam nuts on the adjustable support end bumpers, (each jam nut was checked for tightness by hand during 10/9/11 inspection and re-confirmed on 10/17/11), there is no	CLOSED

		evidence that the support gaps have been altered from their original installation settings. A work order has been initiated to inspect the gaps and make adjustments as-necessary during the next Unit 1 refueling outage. This action is desired only to confirm that current gap settings 'precisely' match the design drawings. Based on the licensee's evaluation performed in ETE-NA-2011-1002 using Unit 2's measured gap data, it was concluded that the as-found gaps for both Unit 1 and Unit 2 were acceptable, and there is no concern that the CRDM assemblies, seismic support or Reactor Head Penetrations would be overstressed or overloaded as a result of a seismic event. Observations performed by licensee personnel confirmed that the measured Unit 2 gaps enveloped the Unit 1 gaps and it was physically verified that no jam nuts were loose on Unit 1. On this basis, the licensee determined that there was no imminent need to perform precise measurements on Unit 1; however, the gaps will be verified to match the design drawings on Unit 1 during the next refueling outage when safe access will be available. The basis for this position is contained in ETE-NA-2011-1002 and has been reviewed by the Restart Readiness Inspection Team with no issues noted.	
Insulation found damaged in Unit 1 Containment near a crane wall penetration`	CR 447272 WO 59102379409	The licensee's Engineering group investigated the concern and determined the dented insulation was not due to the seismic event. All supports were inspected and no distress was observed on the supports. There was no distress to the side of the penetration in the area of the insulation damage and the supporting configuration would not allow pipe movement necessary to cause damage to the insulation. Based on field walkdowns performed by Secondary Systems and Civil Engineering, the licensee found no evidence of damage or deformation in any of the adjacent spring support snubbers or the branch line located closer to the 'B' Steam Generator. The issue has been closed to a WO which will repair the damage to the insulation. Following the licensee providing additional verification that the snubbers and supports in the area of the damaged insulation did not exhibit any signs of distress, the Restart Readiness Inspection Team concurred with the licensee's assessment of this issue.	CLOSED

RESTART READINESS INSPECTION TEAM IDENTIFIED ISSUES / QUESTIONS AND THEIR RESOLUTION / STATUS

POTENTIAL SESIMIC ISSUES / QUESTIONS			
DESCRIPTION	**CR / WO**	**RESOLUTION INFORMATION**	**STATUS**
UNIT 1:			
Loose metal insulation and slight cracking on wall	CR 446469 WO 59102376756	The licensee initiated a WO to repair the damaged insulation. Civil Engineering was consulted to assess the hair line crack (<0.06" threshold) and it was evaluated to be inconsequential for the non-safety related steam drain header piping in the area noted. The hair line cracks are not structurally significant and do not require repair. It is not possible to tell for sure whether the wall cracks were caused by the August earthquake; however, the licensee did not document them during walkdowns as they were deemed to not be functional damage. The Restart Readiness Inspection Team concurred with the licensee's assessment of this issue.	CLOSED
CRDM seismic restraints at the upper end of the rod travel housing have not been adequately inspected for clearances and jam nut tightness that may allow movement during a seismic event. A similar issue has been identified on Unit 2	CR 446711 WO 59102378464	A Corrective Action (CA215365) assigned to Engineering evaluated the CRDM Seismic support platform including the issues documented in CR446711 and initiated required actions. The evaluation is ETE-NA-2011-1002. The actions taken are addressed above under the issue described as "*Spacer Plates on the Unit 1 Reactor head showing light shining through*." The Restart Readiness Inspection Team concurred with the licensee's assessment of this issue.	CLOSED

RESTART READINESS INSPECTION TEAM IDENTIFIED ISSUES / QUESTIONS AND THEIR RESOLUTION / STATUS

POTENTIAL SESIMIC ISSUES / QUESTIONS			
DESCRIPTION	**CR / WO**	**RESOLUTION INFORMATION**	**STATUS**
UNIT 2:			
"C" main steam spring support riser appears to be damaged and observed out of plumb	CR 447386	The licensee walked down the hanger and identified it as 2-SHP-SH-48 shown on support drawing 12050-PSSK-101D.01. They determined that the spring rod had approximately 3/8" clearance to the spring can. They verified the load at 9650# which is within +/- 10% of the cold load of 10,161#. In addition verified the other spring hanger with the same cold load. As the spring loads are within allowable values and there is no physical contact causing friction loads, the spring is fully functional in this condition and requires no CA. There is no apparent relationship between the hanger condition and the August earthquake. There is no indication that there was any shifting of the support structure, the piping, or the spring can itself. The licensee stated that this appears to have been installed in this condition. As the spring loads are within allowable and there is no physical contact causing friction loads, the spring is fully functional in this condition and requires no corrective action. In addition, the licensee inspected the internals of the spring can with external lighting as well as adjacent spring cans and did not identify any internal damage to the components. Following additional discussion which provided verification that the spring was not broken inside the can, the Restart Readiness Inspection Team concurred with the licensee's assessment of this issue.	CLOSED
Shims on the steam generator supports were found to be out of position on all steam generators	CR 447283	The licensee performed an evaluation of the acceptability of the displaced shims as well as the possibility of the shims falling out. The location of the shims was determined to have been acceptable as found, and would not have hindered the steam generator support foot from performing its designed function due to the large factor of safety for the steam generator support feet. The licensee performed a follow-up inspection on all 3 steam generators in both Units. The inspection found that the shims were captured by retainer clips preventing the shims from displacing and falling out. These were extremely difficult to see due to their location so close to the steam generator body and they are not obvious details on design drawings, which is why they had not been previously identified during discussions with the Restart Readiness Inspection Team.	CLOSED

		The licensee stated that based on the fact that no other shims were found to be out of position and the fact that the shim in question had to be broken free from the rust, it is likely that this shim had been displaced long before the August earthquake. This evaluation was reviewed by the Restart Readiness Inspection Team and no additional issues were identified.	
Main steam valve house - Screen frames showed signs of having been pulled from the wall and the bolting was missing (appears recent)	CR 447551 WO 59102381554	The licensee stated that the function of the Unit 2 Main Steam Valve House is not affected by this discrepancy. From their inspection, the screen is relatively light mass and would not be expected to generate significant loading during a seismic event. The missing bolts are all at locations where the bolt holes do not line up and were therefore, most likely not installed when the screen was last removed. Based on the low seismic loading, the lack of damage to the screens, and the fact that the missing bolts were not found, it does not appear possible that the missing bolts were caused by the August earthquake. The Restart Readiness Inspection Team concurred with the licensee's assessment of this issue.	CLOSED
Main steam valve house, Gaps in excess of 0.5 inches were noted along the intersection of the north wall and the ceiling and corners which appeared to be recent in nature, unfilled gap found in seismic rattlespace	CR 447547 CR 447653 CR 447542 WO 59102381527 WO 59102382406 WO 59102382121	Per Engineering inspection, the gap was found to be acceptable. The Styrofoam referenced in the CR is Rodofoam which was used during construction to maintain designed seismic rattlespace gaps between concrete placements. The fact that there is a gap between the foam and adjacent structure does not adversely affect the structural stability of either structure on either side of the rattlespace nor does this gap adversely affect the seismic rattlespace. WO's have been initiated to drive repairs to Rodofoam / grout per normal schedule. This was determined to not be a start-up issue. The Restart Readiness Inspection Team concurred with the licensee's assessment of this issue.	CLOSED

POTENTIAL SESIMIC ISSUES / QUESTIONS			
DESCRIPTION	**CR / WO**	**RESOLUTION INFORMATION**	**STATUS**
UNIT 2:			
The status of the main steam safety valves lifting during the seismic event needs to be determined	CR 447009	The licensee stated that after a detailed review, it was confirmed that the Main Steam Safety Valve (MSSV) "not full closed" indications were only seen on Unit 2 valves. Following discussions conducted by the licensee between the Shift Technical Advisor, Engineering and I&C, it has been concluded that the 15 safety valves in question (5 per Steam Generator) did not actually open but were a momentary anomalous indication. This conclusion was based on the following: 1) All valves indicated opening well before their setpoints were reached, 2) The "B" S/G valves were all tested satisfactorily following the event, and 3) No decrease or change in overall trend of steam pressure was noted at the time that the safety valves indicated "not full closed". No alternate indication supports that the MSSVs opened. The PCS trace for Main Steam Pressure response during the time that indications for MSSVs alternately indicated open and closed. The response shown is as expected for a Unit Trip with steam release through the Atmospheric Dump Valves (ADVs). No indication is given that pressure rose to the MSSV setpoint (1085psig for first MSSV, 1135psig for the last MSSV), or dropped as a result of opening at any point that would back up MSSVs alternately opening and closing. For additional confidence, Work Orders were issued to perform a sampling of calibration procedures for both Unit 1 and Unit 2 MSSV Flow Switches. These work orders verified function of the instrument loops from flow switch to PCS indication points and all work orders were completed SAT. The Restart Readiness Inspection Team concurred with the licensee's assessment of this issue.	CLOSED

POTENTIAL SESIMIC ISSUES / QUESTIONS			
DESCRIPTION	**CR / WO**	**RESOLUTION INFORMATION**	**STATUS**
UNIT 2:			
Two integral attachment welds have apparent indications on the containment recirculation spray heat exchanger floor mounted integral support attachments were identified, follow-up required	CR 447366 WO 59102382252	The licensee's inspection of the stitch welds found no visual evidence of weld cracks. However, the three indicated welds were found to have rust discoloration deposits due to surface corrosion of the associated carbon steel structural steel. The carbon steel structural supports at this location are stitch welded to the stainless steel Recirculation Spray heat exchanger (RSHX). The exposed portion of carbon steel that mates up to the RSHX and is not welded cannot be coated and has minor surface corrosion that has deposited onto the surface of the stitch weld below at all three locations. Most of the surface deposit was able to be removed by hand and was not found to have adversely affected the structural integrity of the associated weld or coatings. Civil DEO has no structural concerns with the `D' RSHX support at this location or any of the supports of similar design for the `A', `B', or `C' RSHX's at Elev. 241'. Following additional discussion with the licensee, that provided reasonable assurance that the wall of the heat exchanger was not impacted by the potential indication noted in the field, the Restart Readiness Inspection Team concurred with the licensee's assessment of this issue.	CLOSED
Snubber support 2-FW-HSS-234 on the feedwater systems was found with spalled concrete where it attached to the wall	CR 447812 WO 59102383067	This condition may have been caused by the August earthquake or the subsequent Feedwater isolation causing the snubber to lock and load the support. It is not clear whether this is new spalling or an existing condition. The spalling was minor and associated with the cantilevered section of the support and not the insert plate. It does not affect the function of the support, but should be repaired. 2-FW-HSS-234 remains functional in this condition and no immediate repair is required. The Restart Readiness Inspection Team concurred with the licensee's assessment of this issue.	CLOSED
1" \ RCS high point vent line was found displaced from its pipe support, 'B' loop room	CR 446769	The licensee performed an assessment of the as-found condition at the time of submittal of CR446769, which was provided to the NRC on 10/14/11. As indicated in this CR, the line in question was 3/4"-VA-402-154; it is high point vent line downstream of 2-RC-48. The line is currently attached to the RCS by a flexible spool piece but will be disconnected when the unit is preparing to go on-line. To further clarify information provided in CR446769, this line was also inspected prior to being connected to the RCS as part of the post seismic event walkdowns, at which time it was	CLOSED

		found to be properly supported. Therefore, it was concluded that temporary vent line 3/4"-VA-402-154 became dislodged from the support as describe above during installation and connection to the RCS via the temporary spool piece. The discussion in the CR relates to the acceptability of the as-found condition of the vent line during the period of time the line was in service to support outage maintenance and operations activities. The line was repositioned to restore the designed support configuration and no additional actions are required. The Restart Readiness Inspection Team concurred with the licensee's disposition of this issue.	
Rubbing was noted on piping support associated with location L9 thimble 11	CR 447270 WO 59102381296	The licensee subsequently inspected all flux thimble tubes and noted that some of the tubes are flexed due to their routing with a focus on the keyway area inspected by the team. The licensee did not find any tube to be bent or flexed in such a way as to impede operation of inserting / extracting the thimbles or that the indications noted were the result of seismic motion. The licensee initiated a work order to clean and address potential rubbing. CA216295 is tracking the follow-up inspection by Engineering to confirm no material degradation and rubbing concern addressed. The corrective action has been designated as "required prior to start-up" and has been completed. The Restart Readiness Inspection Team concurred with the licensee's assessment of this issue.	CLOSED
An inspection of the area beneath the Unit 2 reactor vessel identified boric acid streaming coming from a leak on the reactor head leak-off line that could have been caused by seismic movement	CR 448802 WO 59102388107	Following identification of the boric acid streaming, the location was identified as being from the reactor head leak-off line. The tubing is normally not pressurized or filled with fluid based on its design function. A section was removed and sent offsite for metallurgical analysis to determine the cause of the two cracks that were found on the tubing. Based on this analysis and the oxidation that was present in the area of the cracks, the licensee determined that the crack had existed for some time and had allowed water containing boric acid to leak out during the post-seismic event refueling outage where the refueling canal was filled to facilitate fuel movement. The Restart Readiness Inspection Team concurred with the licensee's assessment of this issue following a review of the metallurgical analysis report and discussions with the personnel conducting the analysis.	CLOSED

POTENTIAL SESIMIC ISSUES / QUESTIONS			
DESCRIPTION	**CR / WO**	**RESOLUTION INFORMATION**	**STATUS**
COMMON:			
Reactor pressure vessel supports, neutron shield tank, neutron shield tank skirt and bolts have not been inspected in the ASME Section XI process. In addition, due to boric acid potentially coming into contact with one of the supports due to a leak-off line leak, inspections of the support under the Boric Acid Corrosion Control Program may be warranted	CR 447518 CR 447514 WO 59102382614 WO 59102385531	After this issue was raised by the team, the licensee performed visual inspections of the Reactor Sliding Foot Supports for both Units 1 and 2 with satisfactory results. The team reviewed the results in detail and following extensive discussions with the inspectors and engineering staff at the station agree with the licensee's position that there was no indication of damage to the support structure as a result of the seismic event. The NAPS Engineering staff performed an inspection of the bottom of the Unit 2 Reactor Vessel with one panel of insulation removed to investigate whether leakage from the vessel flange leak-off line leak had come in contact with the bare metal. All of the leakage is on the outside of the insulation panels in that area and the inside of the support skirt. No borated water has contacted the bare metal of the vessel. Surface rust stains and flaking of the coating that has been seen on the vessel during past inspections were seen but no indication of boric acid. No corrosion or wastage was observed on any of the affected areas inside the support skirt. An augmented VT-3 visual examination of the accessible areas of the neutron shield tank support structure in the Unit #2 keyway was performed in accordance with ER-AA-NDE-VT-603. No signs of degradation, distortion, cracks or other unacceptable conditions were observed during the inspection and the examination was completed with no issues noted. The licensee also performed a general visual examination of the accessible areas of the U2 keyway for evidence of liner degradation in that area. Some areas were observed with boric acid in contact with the liner from the reactor flange leak-off tubing leak and those areas were decontaminated during the examination. No evidence of liner degradation was observed during the inspection and the examination was completed with no issues noted.	CLOSED

		Some floor insulation panels on Unit 2 were pulled to verify that boric acid from the head seal leak-off line leak has not caused damage to the liner. The actual floor bolting will not be inspected as there is a weld leak channel that covers the bolting. Significant corrosion was not expected as the acid leak has not existed for a long time, the condition is relatively cold, and hence any corrosion rate would be small. A visual examination has been performed under the Unit 2 reactor vessel with two panels/shields removed from the floor over the containment liner. The panels removed were the ones below the manway where boric acid was observed from the leak in the reactor flange leak-off line. The inspection revealed minor rust staining on the liner that was consistent with previous examinations and some boric acid was observed between the panels when the panels were separated. The area under the neutron shield tank that was visually accessible when the panels were removed was also examined and no degradation was evident. A 0-GEP-30 inspection of the Unit 1 keyway was performed. Two pre-existing component cooling leaks from the neutron shield tank were documented (CR440679). These leaks are directed to installed drip troughs and were inactive at the time of the inspection. No structural issues identified above acceptance criteria. The Restart Readiness Inspection Team concurred with the licensee's assessment of this issue.	

POTENTIAL SESIMIC ISSUES / QUESTIONS			
DESCRIPTION	**CR / WO**	**RESOLUTION INFORMATION**	**STATUS**
COMMON:			
Potential impact on movement of the CRDM tubes on the J-groove weld on the reactor head was not evaluated nor was the excessive gap at the support identified prior to the team walkdown being performed	CR 447683 (U2) CR 446711 (U1)	The licensee stated that the CRDM seismic support structure is designed for movement of the CRDMs and seismic support plates during a seismic event with the largest resulting total gap between adjacent seismic plates and/or bumper stops equal to 1.22". The seismic and LOCA loads developed with this gap size when applied to the reactor head adapters and their associated attachment welds have been reviewed and found to be less than their design load limits. The as-found gap measurements do not add significant thermal loads to the reactor head attachment welds. The maximum as-found gap measurement (1.25") can be accommodated by the seismic spacer plate tabs, therefore dislodging of a plate would not occur. The total gaps however should be corrected to the design specified gaps to preclude other effects on the reactor head and CRDMs. Estimated increase in seismic loads on the CRDM adapters experienced on August 23, 2011 are less than the design % margin for applied external loads. The evaluation that discusses this issue is ETE-NA-2011-1002. The actions taken by the licensee are addressed above under the issue described as "*Spacer Plates on the Unit 1 Reactor head showing light shining through*."	CLOSED
A review of the records for the walkdowns performed by the licensee raised questions about the detail that was obtained during the licensee's inspection of the spray rings inside of the Unit 1 and Unit 2 containment buildings	0-GEP-30 CR 447571	After the team discussed the inspection methodology and tools used for the original post-seismic event inspections under the 0-GEP-30 procedure, the licensee developed a plan to re-inspect these areas for possible seismic damage using better lighting and visual aids. These inspections were performed on both units with no issues identified. The Restart Readiness Inspection Team concurred with the licensee's assessment of the inspection results following review of the inspection sheets and discussions with the engineers that performed the inspections.	CLOSED

POTENTIAL SESIMIC ISSUES / QUESTIONS			
DESCRIPTION	**CR / WO**	**RESOLUTION INFORMATION**	**STATUS**
COMMON:			
Several cracks were noted on the south exterior wall of the fuel building, including one that was noted from ground level that extended approximately twenty-five feet from the ground	CR 447100	A follow up inspection was performed with the NRC on 10/13/11 in the Fuel Building to determine if the crack continued up on to the top surface of the wall. No cracking associated with this crack was found on the top surface and it was concluded that this crack was only a surface crack that had propagated up the south wall. This wall is the south wall of the Fuel Building/fuel pool and is a reinforced wall 6' thick with minimal reinforcement. The reinforcement on the south face of the wall has a 3"concrete cover without sufficient temperature reinforcement to arrest minor cracking. The EPRI criteria was developed assuming a heavily reinforced structure with a minimum concrete cover of 1-1/2". With this condition, a .06" crack could develop prior to yielding the reinforcement. As the Fuel Building wall is not heavily reinforced and the cover is twice as thick as the EPRI criteria, a crack of .06" would have less consequence of yielding the rebar. As the crack measured is .05", it can be concluded that there was no yielding of the reinforcement and that the crack is acceptable at this location. This crack has been added to the Fuel Building Maintenance Rule Structures report that is currently being performed with subsequent inspections performed every 5 years. Under this process, it will be tracked and evaluated to assure it remains inactive and that no new cracks develop as a result of this crack.	CLOSED
An inspection of the pipe tunnel between the main steam valve house and the turbine driven auxiliary feedwater pump room identified unsealed penetrations between the tunnel and the motor-driven auxiliary feedwater (MDAFW) pump room (on Unit 1) and the quench spray pump room (on Unit 2)	CR 448893	The licensee determined that a steam line break in the pipe tunnel could adversely affect the equipment in the Unit 1 MDAFW pump room and the Unit 2 quench spray pump room due to the resulting environment in the rooms. This issue has been captured in both the licensee's CAP as a CR, ETE and corresponding WO and the Restart Readiness Inspection Team's inspection report as an Unresolved Item	This is being tracked as an URI in the inspection report

POTENTIAL SESIMIC ISSUES / QUESTIONS			
DESCRIPTION	**CR / WO**	**RESOLUTION INFORMATION**	**STATUS**
COMMON:			
94 cards in the 7300 protection system were found to be not seismically qualified (47 per unit)	CR 446689 CR 446690	During a post-earthquake review of the seismic qualifications of the 7300 System, WCAP-8687 Supplement 2-E13C Revision 2, Process Protection System (Seismic and Environmental Testing of Printed Circuit Cards) was reviewed and found to have identified 4 cards types that did not pass the testing for seismic qualification. The identified card types that are applicable at North Anna Power Station are 1) NTC G01 & G04 (part # 2837A94G01 and 2837A94G04), 2) NCH G01 (part # 2837A11G01), 3) NPC G01 (part # 2837A93G01), and 4) NTD G01 (part # 2838A45G01). The applicable cards totaled 47 per unit. Research for evaluation of the applicable 7300 cards installed at North Anna Unit 1 has located a June 19, 1992 correspondence between Dominion (Virginia Power at the time) and Westinghouse regarding North Anna's applicability in meeting the requirements of WCAP-8687. The correspondence from Westinghouse states: *Upon review of our records, we have determined the licensing qualification reference at North Anna's 7300 Process Protection System is WCAP-7817 and not WCAP•8587/8687. The 7300 system is qualified by WCAP-8587/8687 which is consistent with the requirements of the 1975 standards (IEEE STD's 323-1974 and 344-1975), however, North Anna was licensed to the 1971 standards and therefore WCAP-7817 is the appropriate licensing qualification document. However, the Inadequate Core Cooling Monitoring System (ICCHS) was qualified under WCAP 8687.* Based on the aforementioned correspondence, North Anna's 7300 System is qualified per WCAP-7817 Supplement 4, Seismic Testing of Electrical and Control equipment (WCID Nucana 7300 Series Low Seismic Plants). In order to alleviate immediate concerns over the NDT circuit operability (which was potentially affected by the NTC G01 cards installed in the wide range Tcold loops), seismic qualified replacement NTC cards were purchased from Westinghouse (part # 6D30815G21 Y) and installed in the Unit1 and Unit 2 Tcold wide range loops.	CLOSED

		The WCAP-8687 test results found that the NPC G01 card showed inaccuracies up to 0.1% which Westinghouse expanded to 0.5% based on the small population of NPC cards tested. The 0.5% accuracy is what is assumed in the respective CSA's and is therefore bounded and acceptable. The NCH G01 cards were shown to have an increased inaccuracy from the specified 0.5% to 0.87%. In the applicable circuits in which the NCH G01 cards are used, that represents a widening of accuracy by an additional 0.37%. The affect on the CSA's is insignificant and will be absorbed in the existing margin (of which there is 6% margin existing). ETE-CEE-2011-0010 Rev 0 is being written to finalize the evaluations and incorporate the use of additional margin where applicable. The cards were just recently seismically tested by Westinghouse for North Anna's site specific levels to ensure seismic acceptability of the mercury-wetted relays. The tested NTC and NTD cards 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. The NTD cards did not chatter at approximately four times the North Anna level. 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 base mat and elevation 291' developed from the recorded time-histories, the licensee determined that the margins available will envelop the spectra from the August 23, 2011 event. The licensee performed inspections and calibrations on a select number of instrumentation circuits 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, trending of the data from the calibrations that have been performed on the various instrumentation has not shown an adverse trend in	

		the required calibrations (adjustments/magnitude of adjustments) of the various seismically qualified instrumentation. In summary, the licensee has confirmed that the 7300 cards installed at North Anna are acceptable for use from a seismic stand point. The Restart Readiness Inspection Team concurred with the licensee's assessment of this issue.	

LICENSEE COMMITTED ACTIONS RESULTING FROM THE SEISMIC EVENT
Reviewed by the Restart Readiness Inspection team

"Near Term Actions to be Completed Prior to Unit Restart" From Enclosure 8 of 11-520; North Anna Power Station Restart Readiness Plan				
LC000833 Parent Doc	**ID**	**Restart Activity***	**Status**	**Reviewed By:**
A.		**Seismic Monitoring and Design Basis**		
N/A *	1	Provide temporary backup power to the Main Control Room Seismic Monitoring Panel	Complete	Reviewed by the North Anna Residents and AIT
N/A *	2	Install temporary free field seismic monitoring instrumentation	Complete	Reviewed by the AIT
N/A *	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	Reviewed by the Restart Readiness Inspection team
B.		**Nuclear Fuel**		
1 Unit 1 Core				
LA002779	a	Perform hot rod drop testing	Prior to Unit 1 entering Mode 2	Captured as a Mode List item
2 Unit 2 Core				
LA002780	a	Perform RCCA [rod cluster control assemblies] drag testing	Complete ETE-NAF-2011-0149 Areva Letter dated September 28, 2011. To use 0-OP-4.29	Captured as a Mode List item
LA002781 Due Date: 10/31/2011	b	Perform hot rod drop testing	Prior to Unit 2 entering Mode 2. TS SR 3.1.4.3 verify rod drop time of each rod, from the fully withdrawn position, is <=2.7 seconds from the beginning of decay of stationary griper coil voltage to dashpot entry, with All RCP's running and T_{avg} >= 500F…. Prior to reactor criticality after each removal of the reactor head	Captured as a Mode List item
N/A	c	Perform routine binocular visual inspection during core offload	Complete	NRR (Fuels Team)
N/A	d	Perform video inspections on 13 benchmark assemblies and additional vendor-recommended assemblies	Complete	NRR (Fuels Team)
N/A	e	Perform video inspection of RCCS hubs	Complete	NRR (Fuels Team)

B.		Nuclear Fuel (continued)		
LC000833 Parent Doc	**ID**	**Restart Activity***	**Status**	**Reviewed By:**
N/A	f	Perform video inspections on assemblies with anomalies observed during binocular inspections	Complete	NRR (Fuels Team)
C.		**Root Cause Evaluations**		
N/A	1	Dual Unit Reactor Trip Following a Loss of Offsite Power	Complete (RCE 001061)	Reviewed by the Restart Readiness Inspection team
LA002782 Due Date: 10/26/2011	2	Unit 2H Emergency Diesel Generator Coolant Leak	Complete (RCE 001062)	Reviewed by the Restart Readiness Inspection team
D.		**Inspections**		
Unit 1 – NA Unit 2 – LA002783 (ETE-NA-2011-0076 document results)	1	Steam Generators – Perform a 20% sample inspection of Unit 1 and Unit 2 steam generators	Complete Used EPRI, "Steam Generator Management Program Pressurized Water Reactor Steam Generator Examination Guidelines," Rev 7 Section 3.10	RII-DRS reviewed under planned ISI inspections conducted during the Unit 2 refueling outage and included the supplemental inspections performed on Unit 1
N/A	2	Containment – Perform inspection of Unit 1 and Unit 2 containment buildings to identify and remove debris that may have resulted from the earthquake, as required	Complete	Completed as part of licensee's Seismic Walk down and results were documented in the 0-GEP-30 log
LA002784	3	Containment Sump Strainers – Perform a visual examination of the sump strainer gaps in accordance with the applicable periodic test	Complete (used 1/2-PT-57.3.1)	Reviewed by the North Anna Resident Inspectors
N/A	4	Inservice Inspection – Perform sample weld inspections (**Enclosure 7 of RAI Letter 11-520 expands this to say weld inspections of reactor coolant loop drain lines, service water tie-in vault, and penetration area pipe lines with anchors)	Complete EPRI LR-2008-008 EPRI-1019199	Reviewed by the Restart Readiness Inspection team

LICENSEE COMMITTED ACTIONS RESULTING FROM THE SEISMIC EVENT

Reviewed by the Restart Readiness Inspection team

D.		Inspections (continued)		
N/A	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 ER-AA-BPM-101, “Underground Piping and Tank Integrity Program”	Reviewed by the Restart Readiness Inspection team
E.		**Testing**		
LA002785	1	Complete Unit 1 and Unit 2 Surveillance Periodic Tests as determined by the Seismic Event Response Team	Prior to and during Unit 1 and 2 Startup per TS (Unit specific tests will be completed prior to and during that Unit’s startup) EPRI NP-6695, Section 5 guidance	Reviewed by the Restart Readiness Inspection team and additonal observations to be performed by the North Anna Resident Inspectors
LA002796		Provide an update to the completion of the Unit 2 surveillance and functional testing in an updated letter	Not a formal commitment	To be reviewed by the North Anna Resident Inspectors as part of restart monitoring

LICENSEE COMMITTED ACTIONS RESULTING FROM THE SEISMIC EVENT

Reviewed by the Restart Readiness Inspection team

"Long Term Actions to be Completed After Unit Restart" – Enclosure 9 to 11-520, North Anna Power Station Restart Readiness Plan				
LC000827 Parent Doc	**ID**	**Restart Activity**	**Status**	**Comments**
A.	**Seismic Monitoring and Evaluations**			
LA002743	1	Provide permanent backup power to the Main Control Room Seismic Monitoring Panel	Record # LA002743 Due Date: 12/31/2011	Parent Document LC000827:" Summary Report of August 23, 2011 Earthquake Response and Restart Readiness Determination Plan"
LA002744	2	Install permanent free field seismic monitoring instrumentation	Record # LA002744 Due Date: 12/31/2011	Parent Document LC000827:" Summary Report of August 23, 2011 Earthquake Response and Restart Readiness Determination Plan"
LA002745	3	Reevaluate plant equipment identified in the IPEEE review with HCLPF capacity <0.3g	Record # LA002745 Due Date: 3/31/2012	Parent Document LC000827:" Summary Report of August 23, 2011 Earthquake Response and Restart Readiness Determination Plan"
	4	Perform seismic evaluation in the context of EPRI NP-6695, NRC GI-199 and as an outcome of NRC Task Force recommendations identified in SECY-11-0124	Record # LA002774 Due Date: 10/01/2013	Long term issue
B.	**Reactor Vessel Internals**			
LA002746	1	Develop a plan with the NSSS vendor consisting of additional evaluations or inspections, as warranted, to assure long term reliability the reactor internals.	Record # LA002746 Due Date: 12/31/2011	Parent Document LC000827:" Summary Report of August 23, 2011 Earthquake Response and Restart Readiness Determination Plan"

LICENSEE COMMITTED ACTIONS RESULTING FROM THE SEISMIC EVENT

Reviewed by the Restart Readiness Inspection team

LC000825	11-566 RAI Response Letter Actions			
LA002727	1	The ECCS PREACS Train A filter (1-HV-FL-3A) in-place test is scheduled to be performed prior to either unit entering Mode 4 to confirm that bypass leakage is less than the Technical Specifications 1% acceptance criteria.		Captured as a Mode List item
LA002728	2	Measurement of the CRE pressure relative to the external area adjacent to the CRE pressure boundary will be completed with the CRE operating in the outside supply mode of operation prior to entering Mode 4.		Captured as a Mode List item
LA002729	3	The following valves closed but failed their IST stroke time test and will be repaired prior to Unit 1 restart: • 1-CC-TV-102A • 1-MS-TV-101A • 1-MS-TV-101B	1-MS-TV-101A and 1-MS-TV-101B repaired (WO102349886 and WO102360649). 1-CC-TV-102A repaired. PMT completed SAT after limit switch repairs (WO 102345237)	Actions taken reviewed by Restart Readiness Inspection Team
LA002730	4	One additional valve, 1-CC-TV-104B, indicated a negative trend in stroke time (but the time was satisfactory per the surveillance procedure). Adjustment will be completed prior to plant startup.		Captured as a Mode List item
LA002733	7	Unit 2 “H” train batteries will be measured prior to Unit 2 start up as required by normal refueling outage testing. Unit 2 “H” train batteries (2-I, 2-II, and 2H EDG) will have modified performance discharge testing performed prior to Unit 2 restart.	2-I, 2-II, and 2H EDG performance discharge testing has been completed with no issues noted	Actions taken reviewed by Restart Readiness Inspection Team
LA002742	9	Detailed Unit 2 S/G inspection results will be provided in a subsequent update	Complete	Reviewed by RII DRS inspectors under baseline inspection activities
LA002734	11	An additional five (5) snubbers are planned to be functionally testing on Unit 2 due to low fluid levels identified during visual examination.	The additional testing was performed by the licensee	Results reviewed by the Restart Readiness Inspection Team

LC000825	**11-566 RAI Response Letter Actions (continued)**			
LA002735	12	There is no passage of air or light and fire barrier integrity has not been jeopardized by this cosmetic damage. The work order process is being used to complete repairs as required.		
LA002736	13	Approximately 10 hours after the earthquake, the Unit 2 "A" Main Transformer deluge actuated. No fire was noted and the system was isolated. Repairs will be completed prior to Unit 2 restart.	Repairs have been completed	Actions taken reviewed by Restart Readiness Inspection Team
RAI Response Letter 11-544A				
LC000825 Parent Doc	**ID**	**Restart Activity**	**Status**	**Comments**
LA002786	1	Complete Tests and inspections delineated in Response to RAI-8 (Fuel and RVI components)	Complete	

* Completed prior to Enclosure 8 Commitments being entered into the Commitment Tracking System following Restart Readiness Inspection Team discussions