DD-12-02

UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION
OFFICE OF NUCLEAR REACTOR REGULATION

Eric J. Leeds, Director

In the Matter of	)	Docket Nos. 50-338 and 50-339
	)	
VIRGINIA ELECTRIC	)	
AND POWER COMPANY	)	License Nos. NPF-4 and NPF-7
	)	
North Anna Power Station,	)	
Units 1 and 2	)	

PARTIAL DIRECTOR'S DECISION UNDER 10 CFR 2.206

I. Introduction

By letter dated October 20, 2011 (Agencywide Documents Access and Management System (ADAMS) Accession No. ML11293A116), Paul Gunter, Kevin Kamps, Thomas Saporito, Paxus Calta, Alex Jack, Scott Price, and John Cruickshank (Petitioners), filed a petition under Title 10 of the *Code of Federal Regulations* (10 CFR) 2.206, "Requests for Action Under This Subpart." Upon their request, the U.S. Nuclear Regulatory Commission (NRC, the Commission) added Eleanor Amidon, Erika Kretzmer, Lovell King II, David Levy, Hilary Boyd, G. Paul Blundell, Erica Gray, Edmund Frost, and Richard Ball to the list of petitioners. The Petitioners requested in the petition that the NRC suspend the operating licenses for the North Anna Power Station, Units 1 and 2 (North Anna 1 and 2), until the completion of a set of activities described in the petition.

A letter dated November 2, 2011 (ADAMS Accession No. ML11308A027), and an e-mail message dated December 15, 2011 (ADAMS Accession No. ML12060A197), supplemented the petition. Two meetings with the NRC Petition Review Board (PRB), held on December 12, 2011

Enclosure

(meeting transcript at ADAMS Accession No. ML12033A025), and February 2, 2012 (meeting transcript at ADAMS Accession No. ML12047A240) further supplemented the petition. Section II of this Director's Decision (DD) describes the bases for the request.

The PRB met on November 7, 2011, to discuss the petition and it denied the petition's request for immediate action, because it identified no immediate safety concern to North Anna 1 and 2, and no undue risk to the health and safety of the public. The PRB concluded that the requirement "to demonstrate to the Commission that no functional damage has occurred to those features necessary for continued operation without undue risk to the health and safety of the public" already exists in Appendix A, "Seismic and Geologic Siting Criteria for Nuclear Power Plants," to 10 CFR Part 100, "Reactor Site Criteria." The PRB communicated this decision to the petitioners in an e-mail dated November 10, 2011, and the petitioners requested an opportunity to address the PRB before its initial meeting to provide supplemental information for the PRB's consideration.

The petitioners met with the PRB at a public meeting on December 12, 2011, to discuss the petition. The PRB met on January 9, 2012, to consider if it would accept or reject the petition based on the criteria in the NRC staff's Management Directive (MD) 8.11, "Review Process for 10 CFR 2.206 Petitions" (ADAMS Accession No. ML041770328). The PRB made an initial recommendation to partially accept the petition based on the fact that some of the concerns identified in the petition met the criteria in MD 8.11, while other concerns did not. The PRB communicated its initial recommendation to the petitioners in an e-mail dated January 19, 2012. The petitioners received additional information about the PRB's recommendation through an e-mail dated January 30, 2012. During the public meeting held on December 12, 2011, the petitioners requested a second opportunity to address the PRB at a public meeting. The petitioners met with the PRB on February 2, 2012, to provide supplemental information in support of the petition request.

The PRB considered the results of these discussions, along with the additional information, in determining its final recommendation to partially accept the petition for review and in establishing the schedule for reviewing the petition. In an acknowledgment letter dated March 16, 2012 (ADAMS Accession No. ML12060A090), the NRC informed the petitioners that it had partially accepted the petition for review under 10 CFR 2.206 and that the petition had been referred to the Office of Nuclear Reactor Regulation for appropriate action. This partial DD addresses the concerns raised in the original petition, along with the additional concerns raised during the public meetings between the petitioners and the PRB held on December 12, 2011, and February 2, 2012, and in the supplemental letter and e-mail message to the NRC dated November 2, 2011, and December 15, 2011, respectively.

The NRC has treated the transcripts of these meetings between the PRB and the petitioners as supplements to the petition and made them available in ADAMS for inspection at the Commission's Public Document Room (PDR), located at One White Flint North, Public File Area O1F21, 11555 Rockville Pike (first floor), Rockville, MD, 20852. Publicly available documents created or received at the NRC are accessible electronically through ADAMS in the NRC Library section of the Web site at http://www.nrc.gov/reading-rm/adams.html. Persons who do not have access to ADAMS or who encounter problems accessing the documents located in ADAMS should contact the NRC PDR reference staff by telephone at 1-800-397-4209 or 301-415-4737, or by e-mail at PDR.Resource@nrc.gov.

The NRC staff sent a copy of the proposed partial DD to the petitioners and to the licensee for comment on July 10, 2012 (ADAMS Accession Nos. ML12165A208 and ML12165A209, respectively). The licensee indicated by letter dated July 30, 2012 (ADAMS Accession No. ML12219A120), that it had no comments. By e-mail dated July 31, 2012 (ADAMS No. ML12261A228), Paul Gunter and Kevin Kamps of Beyond Nuclear, one of the parties to the petition, sent comments on the proposed partial DD. By e-mail dated

July 31, 2012 (ADAMS Accession No. ML12261A227), Scott Price of the Alliance for Progressive Values (APV), another party to the petition, indicated that the comments submitted by Beyond Nuclear "accurately describes APV's concerns as well" and restated the comments contained in the letter by Beyond Nuclear. The comments by the petitioners and the NRC staff's response to them are included in the attachment to this partial DD.

II. Discussion

Background

On August 23, 2011, with North Anna 1 and 2, operating at 100 percent power, the site experienced ground motion from a seismic event (a magnitude 5.8 earthquake reported by the U.S. Geological Survey) in Mineral, VA, approximately 11 miles from the site. Shortly after the earthquake, both of the North Anna reactors tripped, and the station lost offsite power. After the earthquake, both units were stabilized, taken to a hot shutdown condition, and offsite power was restored. During the loss of offsite power, the four emergency diesel generators, along with the one alternate alternating current (AC) diesel generator, were activated to provide onsite AC power. Subsequent analysis indicated that the spectral and peak ground accelerations for the operating-basis earthquake (OBE) and design-basis earthquake (DBE) for North Anna 1 and 2, were exceeded at certain frequencies for a short time.

In accordance with 10 CFR Part 100, Appendix A, Section V(a)(2), a licensee is required to shut down a nuclear power plant when the vibratory ground motion exceeds that of the OBE. In addition, the regulations state that "prior to resuming operations, the licensee will be required to demonstrate to the Commission that no functional damage has occurred to those features necessary for continued operation without undue risk to the health and safety of the public." As the August 23, 2011, earthquake resulted in ground accelerations greater than those assumed in the design of North Anna 1 and 2, 10 CFR Part 100, Appendix A, Section V(a)(2) required

North Anna 1 and 2, to be shut down and to remain shut down until the licensee for this plant demonstrated to the NRC that no functional damage occurred to those features necessary for continued operation without undue risk to the health and safety of the public.

Following the earthquake, the NRC dispatched an augmented inspection team (AIT) to North Anna 1 and 2, to better understand the event and the licensee's response. The AIT's findings included the following: (1) operators responded to the event in accordance with established procedures and in a manner that protected public health and safety, (2) the ground motion from the earthquake exceeded the plant's licensed design basis, (3) no significant damage to the plant was identified, (4) safety system functions were maintained, and (5) some equipment issues were experienced. Overall, the AIT concluded that the event did not adversely impact the health and safety of the public. Safety limits were not approached and there was no measurable release of radioactivity associated with the event. The NRC staff published an inspection report summarizing the AIT findings October 31, 2011 (ADAMS Accession No. ML113040031).

To demonstrate that no functional damage occurred as a result of the earthquake and that it was safe to operate North Anna 1 and 2, without undue risk to the health and safety of the public, the licensee performed a number of inspections, tests, and analyses to address the requirements of Appendix A to 10 CFR Part 100. This demonstration also aligned with the guidance in the Electric Power Research Institute (EPRI) document NP-6695, “Guidelines for Nuclear Plant Response to an Earthquake.” In Regulatory Guide (RG) 1.167, “Restart of a Nuclear Power Plant Shut Down by a Seismic Event,” the NRC endorsed EPRI NP-6695, with exceptions, as an acceptable way of performing inspections and tests of nuclear power plant equipment and structures prior to restart of a plant that has been shut down by a seismic event. A letter from the licensee dated September 17, 2011 (ADAMS Accession No. ML11262A151), described the licensee’s activities in support of the restart of North Anna 1 and 2, after the

earthquake of August 23, 2011. In the letter, the licensee enclosed its Restart Readiness Determination Plan for North Anna 1 and 2. (The licensee later supplemented its plan numerous times in response to NRC requests for additional information (RAIs) issued to support the development of the NRC's independent technical evaluation).

To further ensure compliance with regulatory requirements, the NRC issued confirmatory action letter (CAL) No. 2-2011-001 to the licensee of North Anna 1 and 2, on September 30, 2011 (ADAMS Accession No. ML11273A078), which confirmed the licensee's commitment that the reactors at North Anna 1 and 2, would not be restarted until the NRC staff had completed its review of the licensee's demonstration to the Commission that no functional damage occurred to those features necessary for continued operation of North Anna 1 and 2, without undue risk to the health and safety of the public. In addition, the licensee performed other testing and inspections not included in the NP-6695 guidelines, some of which it performed as a result of questions raised by the NRC staff.

Following completion of the AIT inspection, the NRC sent another team of inspectors, the restart readiness inspection team (RRIT), to assess the licensee's inspection program and readiness for restarting North Anna 1 and 2. The RRIT began its inspection on October 5, 2011. The RRIT followed Inspection Procedure 92702, "Followup on Traditional Enforcement Actions Including Violations, Deviations, Confirmatory Action Letters, Confirmatory Orders, and Alternative Dispute Resolution Confirmatory Orders." The following sources provided supplemental guidance to this inspection procedure, EPRI NP-6695, NRC RG 1.166, "Pre-Earthquake Planning and Immediate Nuclear Power Plant Operator Post-Earthquake Actions," RG 1.167; the AIT inspection report dated October 31, 2011; and input from NRC subject-matter experts.

The objectives of the RRIT included the following: (1) assess the licensee's inspection process to ensure damage attributable to the event would be identified, (2) ensure the

underlying causes of the dual unit reactor trip and failure of the 2H diesel generator were properly identified and the appropriate corrective actions were assigned, (3) review how licensee-identified issues were evaluated and dispositioned, (4) observe and review licensee testing of plant systems and selected surveillance test data packages completed since the seismic event, (5) review the tracking and completion of the licensee's committed actions, and (6) support a final determination as to the overall condition of the plant to support restart.

The RRIT completed its onsite inspection activities on October 14, 2011. They observed some earthquake-related damage to nonsafety-related equipment at North Anna 1 and 2 (e.g., limited damage to main generator step-up transformer bushings); however, this damage was considered minor (i.e., it was not functional damage that would preclude safe operation of the facility). In addition, the inspections led to the identification of nonearthquake-related issues. The NRC reviewed these issues through established licensee and NRC processes to ensure they were adequately addressed without undue risk to the health and safety of the public.

The licensee and the NRC staff discussed the resolution of issues that the RRIT identified at an exit meeting held on November 7, 2011, that was documented in the RRIT's inspection report dated November 30, 2011 (ADAMS Accession No. ML113340345). The RRIT concluded that the licensee performed adequate inspections, walkdowns, and testing to ensure that the August 23, 2011, earthquake had not adversely affected safety-related structures, systems, and components (SSCs). The NRC’s independent inspection of plant equipment, observation of selected surveillance testing, and its review of completed test data, calculations, root cause evaluations, and other documents associated with the station’s corrective action process and work order programs confirmed the licensee’s process to properly evaluate the operability and functionality of the plant’s SSCs. The RRIT reviewed the unresolved items from the AIT and determined that the licensee had completed the corrective actions necessary to support the restart of North Anna 1 and 2.

In addition to the onsite inspection activities, the NRC performed an independent technical evaluation of the information submitted by the licensee to demonstrate that no functional damage occurred at North Anna 1 and 2, as a result of the August 23, 2011, earthquake. The regulatory requirements and guidance used in the NRC's independent technical evaluation of the licensee's restart readiness determination included the following: (1) Appendix A of 10 CFR Part 100, Section V(a)(2), (2) the North Anna 1 and 2, updated final safety analysis report (UFSAR), (3) RG 1.167, (4) RG 1.166, (5) NRC Generic Letter (GL) 88-20, Supplement 4, "Individual Plant Examination of External Events (IPEEE) for Severe Accident Vulnerabilities," along with the licensee's response to GL 88-20, Supplement 4, (6) International Atomic Energy Agency Safety Reports Series No. 66, "Earthquake Preparedness and Response for Nuclear Power Plants," and (7) NRC Inspection Manual, Part 9900, "Operability Determinations and Functionality Assessments for Resolution of Degraded or Nonconforming Conditions Adverse to Quality or Safety," and the associated NRC Regulatory Issue Summary (RIS) 2005-20, Revision 1, "Revision to NRC Inspection Manual Part 9900 Technical Guidance, 'Operability Determinations and Functionality Assessments for Resolution of Degraded or Nonconforming Conditions Adverse to Quality or Safety'." In the summary to the independent technical evaluation issued November 11, 2011 (ADAMS Accession No. ML11308B406), the NRC staff concluded that the licensee acceptably demonstrated that no functional damage occurred at North Anna 1 and 2, to those features necessary for continued operation and that North Anna 1 and 2, could be operated without undue risk to the health and safety of the public.

Although the NRC staff concluded that North Anna 1 and 2, could be safely restarted, the licensee identified several activities (inspections and tests) that would be performed as part of the restart process. The NRC monitored the startup of North Anna 1 and 2, to confirm that the plant would be safely operated (see inspection report at ADAMS Accession

No ML113540520). In addition to these startup activities, the licensee identified several long-term action items. These long-term action items include those identified in Section 6.3 of NP-6695 and include changes to the North Anna 1 and 2, UFSAR. The NRC-issued CAL No. NRR-2011-002 (ADAMS Accession No. ML11311A201), documents these actions, which are independent of the NRC's conclusion that the licensee demonstrated that no functional damage occurred to North Anna 1 and 2, and that the plant could be restarted safely.

Concerns Raised by the Petitioners and the Response by the NRC

The Petitioners raised a total of 16 concerns in the petition dated October 20, 2011, and in supplements to the original petition. Of these 16 concerns, 12 were accepted for review, although the NRC staff noted in its acceptance letter dated March 16, 2012, that six of these 12 concerns were undergoing NRC review as part of the lessons-learned from the Fukushima event in Japan. The NRC staff noted that this activity may take longer than the standard of 120 days for reaching a decision. The concerns that are deferred for consideration by this partial DD will remain open and the NRC staff will provide periodic updates on the status of their resolution.

This section discusses in detail the Petitioners' concerns and the NRC response to these concerns. Many of the concerns are addressed, either in full or in part, by the NRC inspections and technical evaluation that reviewed the licensee's actions after the earthquake of August 23, 2011, to support completion of its Restart Readiness Determination Plan to demonstrate that no functional damage occurred at North Anna 1 and 2, to those features necessary for continued operation and that the units could be operated without undue risk to the health and safety of the public. The petitioners' concerns and the NRC's resolution are described below:

(1) Prior to the approval of restart for North Anna 1 and 2, after the earthquake of August 23, 2011, Virginia Electric and Power Company (the licensee) should be required to obtain a license amendment from the NRC that reanalyzes and reevaluates the plant's design basis for earthquakes and for associated necessary retrofits.

The NRC staff has stated its position in RIS 2005-20, and in the accompanying revision to Inspection Manual Part 9900, that the licensee is permitted to start up from an outage as long as it can confirm operability of SSCs described in the technical specifications (TS) and demonstrate functionality for other safety-related and important-to-safety SSCs not described in the TS. As such, structures or components may exceed certain design-basis limits and still be considered acceptable for restart if the licensee can confirm that they are operable or functional. In the RRIT inspection report dated November 30, 2011, and in the NRC's technical evaluation dated November 11, 2011, the NRC found that the licensee properly confirmed the SSCs as operable or functional before plant startup. None of the inspections conducted indicated any significant damage that would render systems inoperable.

In addition, the provisions of 10 CFR Part 100, Appendix A, Section V(a)(2), require that "if vibratory ground motion exceeding that of the OBE occurs, shutdown of the nuclear power plant will be required." The licensee complied with that regulatory requirement on August 23, 2011. This regulation also states that "prior to resuming operations, the licensee will be required to demonstrate to the Commission that no functional damage has occurred to those features necessary for continued operation without undue risk to the health and safety of the public." As documented in its technical evaluation of November 11, 2011, and in its RRIT inspection report of November 30, 2011, the NRC staff determined through its independent evaluation that the licensee met that requirement. Although the NRC staff is monitoring and evaluating the licensee's update of current licensing basis documentation (scheduled to be complete by April 30, 2013) to ensure its adequacy in light of the earthquake of

August 23, 2011, there is no requirement for the licensee to submit a license amendment request following an earthquake that exceeds its DBE.

(2) Prior to the approval of restart for North Anna 1 and 2, after the earthquake of August 23, 2011, the licensee should be required to ensure that North Anna 1 and 2, are subjected to thorough inspections of the same level and rigor.

To demonstrate that no functional damage occurred as a result of the earthquake and that it was safe to operate North Anna 1 and 2, without undue risk to the health and safety of the public, the licensee performed detailed walkdowns of all the major systems at North Anna 1 and 2, and focused inspections of selected structures and components. In addition, NRC inspectors from the AIT and RRIT, NRC fuel experts, and the North Anna 1 and 2, NRC resident inspectors performed independent inspections and walkdowns. Nuclear industry seismic experts and nuclear systems personnel from another utility also conducted independent inspections and walkdowns of limited scope. These inspections sought to identify any physical damage or deformation that could potentially impact the operability or functionality of station SSCs.

Following each of the walkdowns and inspections performed by licensee, industry, and NRC personnel, the licensee reviewed any issues identified to determine if they were seismically-related. If so, the licensee entered them into the corrective action program (CAP) for evaluation to determine if they had been seismically-induced and if so, what additional inspections or testing were required to ensure operability or functionality. Before the station's staff conducted the walkdowns, the licensee provided training to each engineer who took part in the inspection teams to ensure that they used a consistent approach in the walkdowns.

There were some differences in the exact number and level of inspections conducted at North Anna 1 in comparison with North Anna 2 based on plant status (e.g., the licensee was already performing inspections for the North Anna 2 refueling outage and it took credit, where

appropriate, for the scope of these inspections when they also addressed readiness for restart). The licensee identified more than 400 surveillance procedures to be performed before declaring North Anna 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 UFSAR and TS. For North Anna 2 to achieve this demonstration, the licensee identified more than 150 surveillance procedures for performance, in addition to those already scheduled to support the refueling outage before restarting the unit. While there were differences in the inspections conducted at each unit, the licensee defined a methodology to be used in its walkdowns and communicated this methodology to the engineers involved in the inspection effort through a training module to ensure consistent performance of the procedures. In instances in which the level of inspection differed between the two units (e.g., the North Anna 2 reactor core was inspected, while the North Anna 1 reactor core was not), the licensee provided an adequate rationale for the differences.

The RRIT concluded that the licensee’s staff adequately inspected plant SSCs to ensure that any damage from the August 23, 2011, seismic event was identified and, if found, was properly evaluated and corrected before initiating restart activities. As a result of the inspections performed by licensee, industry, and NRC personnel, no significant seismically induced damage was identified that could affect the operability or functionality of plant SSCs. Only some instances of lesser issues were identified during these inspections, as described in the RRIT’s inspection report, dated November 30, 2011. Based on the results of its inspections, the RRIT concluded that the licensee’s staff adequately inspected plant SSCs to ensure that any damage from the August 23, 2011, seismic event was identified and if found, was properly evaluated and corrected prior to initiating restart activities.

(3) The licensee should be required to reanalyze and reevaluate the North Anna Independent Spent Fuel Storage Installation (ISFSI) because of damage caused by the

earthquake of August 23, 2011, and ensure that no threat is posed to public health and safety by its operation.

The licensee has taken action to assess the structural integrity and radiation shielding capability of both the TN-32 cask and NUHOMS HD dry cask storage systems after the earthquake of August 23, 2011. The licensee reviewed this event for reportability under 10 CFR 72.75, "Reporting requirements for significant events and conditions" (significant reduction in effectiveness of any spent fuel storage cask confinement system), and determined that the TN-32 displacement and the damage to the NUHOMS HD 32PTH caused by the earthquake of August 23, 2011, were not reportable. In addition, the licensee completed an extensive operability evaluation and determined that the dry storage systems continue to perform their design safety functions.

The operability evaluation included extensive walkdowns to determine the condition of the spent fuel dry storage systems, ISFSI pads, and auxiliary equipment for the ISFSIs. The operability evaluation determined that: (a) ISFSI pads did not reveal any cracking or damage; (b) 25 of 27 TN-32 casks moved slightly, with one moving by as much as 4.5 inches; (c) visual inspections of the casks did not reveal any damage; (d) spalling damage to the horizontal storage modules (HSMs) was minimal and did not impact the structural integrity or radiation shielding capability of the HSMs; (e) no movement occurred at the bases of the loaded HSMs (spacing between several HSM roofs indicated some very slight movement); (Later surveys, conducted after the operability evaluation, indicated that all but one of the loaded HSMs exhibited a slight (less than 1 inch) sideways shift); (f) inlet and outlet vents were inspected and no abnormal blockage was found; (g) thermal performance measurements for all loaded HSM's were performed and no abnormal temperature differences were found; and (h) radiological surveys of both pads (Pad 1 supporting 27 TN-32 casks, Pad 2 supporting 26 TN NUHOMS-HD 32PTH HSMs) indicated no changes to cask surface dose. Postseismic

inspection results concluded that the NUHOMS HD 32PTH HSMs and TN-32 casks remain operable and continue to perform their intended design and safety functions.

The NRC staff did not discover any significant safety issues at the North Anna ISFSI. This is based on (1) initial AIT confirmatory inspections to assess the condition of the ISFSIs, which concluded that there are no immediate safety issues associated with the movement of the vertical casks and horizontal storage ISFSI systems, and (2) the licensee's actions to ensure that regulatory requirements continue to be met. In addition, radiological conditions at the ISFSI remain normal and monitoring systems are functional.

Licensee actions are underway to evaluate and repair, as necessary, the ISFSI dry cask storage systems and components. In response to the NRC staff's request, the licensee has submitted an action plan that includes completion target dates for its evaluations and HSM repairs. Some actions identified in this plan have been completed (i.e., detailed visual inspections and HSM concrete repairs), while others remain ongoing. Ongoing actions include translation of seismic parameters from the plant's power block to the ISFSI and analysis of the seismic event (using the resulting seismic acceleration response spectra), including an analysis of both systems (on Pads 1 and 2). These ongoing actions also include resolution of generic issues, such as seismic instrumentation and locations, pressure monitoring systems, and radiological surveys.

The NRC is monitoring and independently assessing the licensee's analyses and corrective actions described in the action plan to ensure that the licensee adequately addresses short- and long-term ISFSI issues. As part of this effort, the NRC staff conducted an inspection of the ISFSI on January 19, 2012 (inspection report at ADAMS Accession No. ML12062A012). The NRC inspection report identified no findings. The NRC inspection team concluded that the licensee's staff adequately inspected the plant's ISFSI, including associated SSCs, to ensure that any damage from the August 23, 2011, seismic event was identified and was being properly

evaluated and corrected prior to initiating the next fuel loading campaign. The NRC inspectors did not identify any significant seismically-induced damage. The inspectors also noted that items had been entered into the corrective action or work control programs as required; that required root cause evaluations had been, or were being, conducted following the seismic event; and that the action plan established by the licensee's staff was adequate and would be completed prior to introducing additional spent fuel into the ISFSI. The NRC staff will continue to monitor the licensee's progress in completing its action plan.

(4) The licensee should ensure the reliability and accuracy of the seismic instrumentation at North Anna 1 and 2.

The NRC staff and the licensee have evaluated the reliability and accuracy of the seismic instrumentation at North Anna 1 and 2, and the licensee has taken a number of actions to address this issue. The AIT inspection report identified an unresolved issue (URI), URI 05000338, 339/2011011-06, "Seismic Alarm Panel," and this URI was later documented as a Green inspection finding (see inspection report at ADAMS Accession No. ML12131A545), although the finding did not involve a violation of NRC requirements. Following the seismic event, the licensee installed a temporary uninterruptible power supply (UPS) to ensure that the seismic monitoring panel and its associated alarms, which are used to determine if an emergency plan entry is required, will remain operable during periods when power is being transferred between the normal supply and the emergency power supply. 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 evaluating ways to upgrade the existing seismic monitoring system as a long-term option. The RRIT inspectors determined that the licensee had taken appropriate actions to address the issue and documented it in its CAP. Therefore, the RRIT identified no restart concerns.

In Section 2.3, “Seismic Instrumentation,” of the NRC staff’s technical evaluation dated November 11, 2011, the NRC staff evaluated a number of issues associated with the seismic instrumentation at North Anna 1 and 2. As described in this report, there are two types of seismometers, Engdahl and Kinemetrics, located at different elevation levels of the North Anna 1 containment and auxiliary buildings (as indicated in Figure 5 of the NRC staff technical evaluation dated November 11, 2011). The seismic monitors for both types of equipment at the North Anna 1 basemat were connected to the seismic instrumentation panel located in the control room with indication of OBE exceedance. During the earthquake, the annunciation panel lost power for about 8 seconds. Therefore, the licensee’s plant operators were not informed about the occurrence or magnitude of the earthquake through the panel annunciator.

Several issues raised in the AIT inspection report about the seismometers and annunciation panel in the main control room (MCR) led the NRC staff to develop an RAI regarding the licensee’s plans for modernization of the seismic instrumentation at both North Anna 1 and 2, for both rock- and soil-supported structures, to provide a reliable system and to accommodate onsite data interpretation. The licensee’s response indicated that the plan for modernization of the seismic instrumentation at North Anna 1 and 2, consists of completed and scheduled work. First, the licensee seismically qualified and installed a UPS in the control room in September 2011. This UPS provides backup power to the Kinemetrics equipment and Engdahl peak shock alarms in the control room. The seismic switch event alarm and peak shock alarms provide control room operators with immediate feedback on whether the OBE has been exceeded. Second, the licensee installed an autonomous, temporary free-field seismic monitor within the North Anna 1 and 2, owner-controlled area, east of the training building, in September 2011. In addition, the licensee updated the station abnormal procedure for seismic events to include reference to, and use of, the free-field monitor. Also, it put in place a procedure for obtaining and evaluating free-field seismic data as it relates to cumulative average

velocity (CAV) and an OBE or DBE exceedance determination. Although the licensee has not formally adopted RG 1.166 into its licensing basis, both of these actions facilitate the licensee's ability to assess earthquake data within 4 hours of an earthquake as described in RG 1.166.

The licensee also has initiated a project to replace the existing seismic equipment and MCR indication with more modern equipment. Permanent, free-field seismic equipment will be installed to facilitate the performance of CAV calculations. The upgrade will include installation of seismic recording instrumentation at the station's ISFSI pad. The licensee completed the first phase of equipment installation during the North Anna 1 spring 2012 refueling outage and is scheduled to complete the final phase by December 31, 2012.

As described in the AIT inspection report dated October 31, 2011, the NRC staff found that Engdahl seismometers at North Anna 1 and 2, are less reliable than Kinemetrics. The licensee installed the free-surface and free-field seismometer with temporary settings. While this does not have the direct connection to the MCR instrument panel to alert plant operators immediately during an earthquake event, the plant operator still can make an appropriate operating and reporting decision within the 4-hour limit. Therefore, with the combination of Kinemetrics and free-field seismometer, the NRC staff considered the licensee response acceptable. In addition, the licensee had connected the MCR instrument panel with a noninterruptible seismically-qualified backup power; therefore, power disruption is not expected in a future earthquake event.

The licensee indicated that the Kinemetrics seismometers at the plant did not have accurate timing for the recorded time history because the start time of seismic data is estimated. The NRC staff asked the licensee to address how this potential uncertainty impacts the use of the seismic time history when matching it to other recorded events (e.g., the nuclear instrumentation signal changes) for the reactor shutdown root cause analysis. In evaluating this issue, the NRC staff had asked the licensee to discuss any plans to update seismic

instrumentation at the plant to provide better ground motion recordings for any future earthquake events.

Furthermore, the NRC staff asked the licensee to confirm the operability and reliability of the seismic instrumentation (specifically, channel orientation, sensor calibration, and sensitivity test implementation) and alarming systems to ensure they accurately record earthquake ground motion and provide real-time alarm notifications to the plant operators during any earthquake events.

The licensee responded that the applicable Technical Requirements Manual (TRM) TS-required surveillances have been completed satisfactorily for the seismic instrumentation and alarming systems following the earthquake. These include channel functional testing and channel checks of installed instrumentation for functionality. This also included channel calibrations of all peak acceleration and response spectrum recorders and the associated control room alarm indications. Channel calibrations were completed for the time-history accelerographs and the seismic switch control room alarm indications. The licensee identified a channel orientation issue for the time-history accelerographs whereby the horizontal sensors were 90 degrees off specified orientation. The licensee entered this discrepancy into the CAP for resolution; however, there is no issue with either affected channel's functionality or the ability to record an earthquake event. Further investigation found no identifiable issues of a vertical recording channel interchanged for a horizontal recording channel for any of the installed systems.

Based on completed inspections and testing following the August 23, 2011, earthquake, the NRC staff presently has no concerns with the functionality or reliability of the installed seismic instrumentation at North Anna 1 and 2. In addition, the licensee indicated in its response dated October 10, 2011 (ADAMS Accession No. ML11286A019), that the seismic instrumentation at North Anna 1 and 2, will be upgraded to enhance the station's ability to

monitor and assess seismic events. The NRC staff agrees with the licensee's short-term transitional usage of the current seismic instrumentation.

(5) The NRC staff made hasty decisions about the restart of North Anna 1 and 2, and gave priority to economic considerations. The long-term action plan was not even complete before the NRC staff gave authorization to restart.

As discussed above, the licensee based its schedule for restart of North Anna 1 and 2, after the August 23, 2011, earthquake on completion of all activities necessary to demonstrate to the NRC that no functional damage had occurred to those features necessary for continued operation of North Anna 1 and 2, without undue risk to the health and safety of the public. In both the RRIT's inspection report dated November 30, 2011, and the technical evaluation by the NRC staff dated November 11, 2011, the NRC staff found that the licensee had performed the actions necessary to demonstrate meeting this standard. The purpose of the CAL dated November 11, 2011, was to respond to the earthquake of August 23, 2011, with a set of actions above and beyond those needed to ensure the safe startup and operation of North Anna 1 and 2.

(6) Regulatory commitments are an inadequate regulatory tool for ensuring that the critical long-term tasks identified in the NRC staff's confirmatory action letter dated November 11, 2011, are completed.

The licensee identified several actions for completion in a letter dated November 7, 2011 (ADAMS Accession No. ML11314A069). These commitments are documented in the NRC-issued CAL No. NRR-2011-002, and are unrelated to the NRC's conclusion that the licensee demonstrated that no functional damage occurred to the North Anna 1 and 2, and that the plant could be safely restarted. The CAL lists a series of commitments with milestones ranging from December 31, 2011, to April 30, 2013.

As per the NRC's Enforcement Manual (ADAMS Accession No. ML102630150), CALs are letters that the NRC staff issues to licensees or vendors to emphasize and confirm a licensee's or vendor's agreement to take certain actions in response to specific issues. Furthermore, the NRC expects licensees and vendors to adhere to any obligations and commitments addressed in a CAL. In the process of issuing CAL No. NRR-2011-002, the NRC staff determined that the actions in it are consistent with the NRC Enforcement Policy and Enforcement Manual.

(7) The licensee needs to address the possibility of both boildown and rapid draindown events at the North Anna 1 and 2, spent fuel pool.

Concern 7 of this petition will be addressed by the scope of Recommendation 7 of the Near Term Task Force (NTTF) report dated July 12, 2011 (ADAMS Package No. ML11186A950). At the time of this partial DD, the NRC staff is still in the process of reaching a decision on this concern and resolution of this issue is forthcoming. The NRC staff will provide periodic status updates to the petitioners concerning progress on its resolution. The most recent status report on Recommendation 7 of the NTTF may be found in SECY-12-0095 dated July 13, 2012 (ADAMS Accession No. ML12208A210).

(8) The long-term storage of spent fuel in the spent fuel pool at North Anna 1 and 2, and at the North Anna ISFSI poses challenges to the public health and safety.

Concern 8 of this petition is addressed by the scope of Recommendation 7 of the Near Term Task Force (NTTF) report and by Additional Recommendation 5, "Program Plan for Transfer of Spent Fuel to Dry Cask Storage," of SECY-11-0037. A description of Additional Recommendation 5 and its status can be found in Enclosure 3 to SECY-12-0095. At the time of this partial DD, the NRC staff is still in the process of reaching a decision on this concern and resolution of this issue is forthcoming. The NRC staff will provide periodic status updates to the petitioners concerning progress on its resolution.

(9) "Hardened on-site storage" strategies for spent fuel should be used at North Anna 1 and 2.

Concern 9 of this petition will be addressed substantially by Additional Recommendation 5 of SECY-11-0037. A description of Additional Recommendation 5 and its status can be found in Enclosure 3 to SECY-12-0095. At the time of this partial DD, the NRC staff is still in the process of reaching a decision on this concern and resolution of this issue is forthcoming. The NRC staff will provide periodic status updates to the petitioners concerning progress on its resolution.

Concern 9 also has been addressed by the NRC staff's consideration of a petition for rulemaking (PRM) regarding hardened on-site storage, PRM 72-6, "Petition for Rulemaking Submitted by C–10 Research and Education Foundation, Inc." (The NRC's evaluation of Petitioner Request 11 of PRM 72-6, in particular, addresses hardened on-site storage). The status of the NRC's consideration of Petitioner Request 11 of PRM 72-6 can be found in the *Federal Register* notice dated October 16, 2012 (77 FR 63254).

(10) Concerns exist about the response of North Anna 1 and 2, to a prolonged station blackout (SBO).

At the time of the proposed partial DD, the NRC staff had issued an advanced notice of proposed rulemaking (ANPR) dated March 20, 2012 (77 FR 16175), which addressed the substance of this concern. The NRC issued this ANPR to begin the process of considering amendments of its regulations that address a condition known as SBO, which involves the loss of all onsite and offsite AC power at a nuclear power plant. Since the issuance of the proposed partial DD, the public comment period for this ANPR has ended and the NRC staff may consider potential rulemaking regarding SBO in the future.

(11) The current emergency evacuation plans for North Anna 1 and 2, need to be revised to reflect the possible need to evacuate a larger area than that identified in the current emergency planning zone.

Concern 9 of this petition will be addressed by the scope of SECY-11-0137, Additional Recommendation 3, "Program Plan for Basis of Emergency Planning Zone Size," described in Enclosure 3 of SECY-12-0095 dated July 13, 2012. At the time of this partial DD, the NRC staff is still in the process of reaching a decision on this concern and resolution of this issue is forthcoming. The NRC staff will provide periodic status updates to the petitioners concerning progress on its resolution.

(12) Concerns exist about damage to the structural integrity of the spent fuel pool structure at North Anna 1 and 2, as represented on pages 41 and 42 of the NRC staff's technical evaluation for the restart of North Anna 1 and 2, dated November 11, 2011.

Although Concern 12 was addressed by the technical evaluation for the restart of North Anna 1 and 2, dated November 11, 2011, Concern 12 also is addressed by the evaluation of spent fuel pool integrity required by Order EA-12-049 (ADAMS Accession No. ML12054A736) and the associated request for information (ADAMS Accession No. ML12073A348), dated March 12, 2012. In particular, Enclosure 1, "Recommendation 2.1: Seismic," to the request for information (ADAMS Accession No. ML12056A047) requires a detailed evaluation of the licensee's spent fuel pool integrity.

Enforcement Actions Requested by the Petitioners and the Response by the NRC

The NRC staff has evaluated the petitioners' request to take escalated enforcement action against the licensee and suspend the operating licenses for North Anna 1 and 2, until the completion of a set of activities described in the petition. With respect to the petitioners' request

for enforcement action, the NRC staff concludes that it has partially granted this request in that the NRC issued CAL No. 2-2011-001 dated September 30, 2011, which stated the following:

> This Confirmatory Action Letter (CAL) confirms that NAPS [North Anna Power Station] Units 1 and 2, will not enter Modes 1-4 (as defined in the technical specifications), until the Commission has completed its review of your information, performed confirmatory inspections, and completed its safety evaluation review. The permission to resume operations will be formally communicated to Virginia Electric and Power Company (VEPCO) in a written correspondence.
>
> VEPCO shall submit to the NRC all documentation requested by the NRC as being necessary to demonstrate that NAPS Units 1 and 2, can be operated safely following the seismic event that exceeded the safe shutdown event analyzed in the current revision of the UFSAR.
>
> This CAL will remain in effect until the NRC has (1) reviewed your information, including responses to staff's questions and the results of your evaluations, and (2) the staff communicates to you in written correspondence that it has concluded that NAPS can be operated without undue risk to the health and safety of the public or the environment.

This CAL, therefore, confirmed the licensee's understanding that North Anna 1 and 2, could not be restarted unless and until the licensee had demonstrated to the NRC staff's satisfaction that "… no functional damage has occurred to those features necessary for continued operation without undue risk to the health and safety of the public," consistent with the requirements of 10 CFR Part 100, Appendix A, Section V(a)(2). Restart was contingent upon the licensee addressing a number of issues before startup, many of which were identified in whole or in part as concerns in the petition.

Issues in the petition, identified and discussed above as concerns 1, 2, 3, 4, and 5, were discussed and substantially addressed, either in the inspection reports issued October 31, 2011, and November 30, 2011, or in the NRC technical evaluation dated November 11, 2011. The NRC staff completed its activities before restart to ensure that, before resuming operations, the licensee had demonstrated that no functional damage had occurred to those features at North Anna 1 and 2, necessary for continued operation without undue risk to the health and safety of the public. In that respect, these concerns described in the petition as requiring completion before the restart of North Anna 1 and 2, have been addressed before restart.

The NRC staff evaluated the issue in the petition, identified and discussed above as concern 6. Disposition of this concern by the NRC staff differs from the course of action requested in the petition. In that respect, this aspect of the petition is denied for the reasons discussed above.

Six of the issues in the petition, identified and discussed above as concerns 7, 8, 9, 10, 11, and 12, were accepted for review by the NRC staff and were initially identified as concerns that may take longer than the target timeframe for reaching a decision on a petition based on the fact that these concerns were undergoing NRC review as part of the agency's response to the Fukushima event in Japan. After reviewing the NRC's progress in responding to the Fukushima event since acceptance of the petition for review, the NRC staff has determined that concerns 10 and 12 have been addressed by NRC activities associated with the NTTF. Concerns 7, 8, 9, and 11 are still identified as concerns that will take longer than the target timeframe for reaching a decision. The NRC staff commits to providing periodic status updates to the petitioners on the resolution of these concerns. Concerns 7, 8, 9, and 11 are not fully addressed in the DD. Therefore, this DD is partial.

III. Conclusion

Based on the above, the Office of Nuclear Reactor Regulation has decided to partially grant the petitioners' request. As provided in 10 CFR 2.206(c), a copy of this partial DD will be filed with the Secretary of the Commission for the Commission to review. As provided for by this regulation, the Decision will constitute the final action of the Commission 25 days after the date of the Decision unless the Commission, on its own motion, institutes a review of the Decision within that time.

Dated at Rockville, Maryland, this 19 day of October 2012.

FOR THE NUCLEAR REGULATORY COMMISSION

/RA/

Eric J. Leeds, Director
Office of Nuclear Reactor Regulation

RESOLUTION OF COMMENTS ON THE PROPOSED PARTIAL
DIRECTOR'S DECISION ISSUED JULY 10, 2012

By letter dated July 10, 2012 (Agencywide Documents Access and Management System (ADAMS) Package No. ML12165A205), the staff of the U.S. Nuclear Regulatory Commission (NRC) issued a proposed partial Director's Decision (DD) regarding a petition submitted by letter dated October 20, 2011 (ADAMS Accession No. ML11293A116), as supplemented November 2, 2011 (ADAMS Accession No. ML11308A027), December 12, 2011 (ADAMS Accession No. ML12033A025), December 15, 2011 (ADAMS Accession No. ML12060A197), and February 2, 2012 (ADAMS Accession No. ML12047A240).

The NRC staff sent a copy of the proposed partial DD to the petitioners and to the licensee for comment on July 10, 2012 (ADAMS Accession Nos. ML12165A208 and ML12165A209, respectively). By letter dated July 30, 2012 (ADAMS Accession No. ML12219A120), the licensee indicated that it had no comments. By electronic mail dated July 31, 2012 (ADAMS No. ML12261A228) Paul Gunter and Kevin Kamps of Beyond Nuclear, one of the parties to the petition, sent comments on the proposed partial DD. By electronic mail dated July 31, 2012 (ADAMS Accession No. ML12261A227), Scott Price of the Alliance for Progressive Values (APV), another party to the petition, indicated that the comments submitted by Beyond Nuclear "accurately describes APV's concerns as well" and restated the comments contained in the letter by Beyond Nuclear. The comments by the petitioners and the NRC staff's response to them are discussed below.

(Note: The comments and NRC responses are divided into sections to more clearly organize and address the comments. These divisions were not in the original letter by the petitioners.

Comment 1:

Beyond Nuclear takes this opportunity to identify two ongoing federal actions that pertain to the onsite storage of high level nuclear waste at the seismically active North Anna nuclear power station.

1) The NRC Japan Lessons Learned Directorate Compliance with NRC Order [EA-]2012-049 [ADAMS Accession No. ML12054A736] Modifying Licenses with Regard to Requirements for Mitigating Strategies broadly addresses strategies for developing, implementing and maintaining reactor core cooling, containment and spent fuel pool cooling in a three phase approach basically; 1) using installed equipment, 2) bringing in portable equipment and; 3) indefinite sustainment using off site resources.

Specific to the spent fuel pool issue, EA-12-049 at 4.0 lays out the "Spent Fuel Pool Cooling Strategies."

Beyond Nuclear notes that the focus of this action is to increase the reliability to utilize existing fire protection equipment rather than enhancing and maintaining emergency back-up power (AC [alternating current] and DC [direct current) as a Class E-1 system for maintaining reliable spent fuel pool cooling during sustained station blackout conditions. Beyond Nuclear maintains that allowing the spent fuel pool to boil off cooling water inventory and falling back to providing

reliable make up water capability still introduces potential unintended consequences from the condensation of water in the boil off process. These unintended consequences can include the precipitation leading to the failure of electrical circuits, sump clogging and other adverse impacts.

Beyond Nuclear further notes that none of these actions involve Dominion Nuclear reconfiguring the current high-density storage irradiated fuel inventories of [North Anna Power Station (North Anna)] Units 1 and 2 to open frame, low density storage by accelerating the transfer of irradiated fuel > 5 years to independent dry storage casks in Hardened On-Site Storage (HOSS) configurations also described as "Robust Storage of Spent Nuclear Fuel" which Beyond Nuclear continues to strive for.

Thus, EA-2012-049 fails to address the more fundamental problem and substantial risk from overcrowded high-density storage of high level radioactive waste in the spent fuel pools.

2) The Japan Lessons Learned Directorate Compliance with Order EA-2012-051 [ADAMS Accession No. ML12233A698] Spent Fuel Pool Cooling focuses on simply enhancing spent fuel pool monitoring instrumentation and similarly fails to address the much more significant and fundamental problem of over crowed high density storage of high level radioactive waste in the Unit 1 and 2 spent fuel pools.

These Orders constitute the NRC and industry actions (including Dominion) and commitments and simply focus on make-up water capability and enhancing spent fuel pool instrumentation.

Beyond Nuclear finds these Orders fundamentally defective and, as such, do not constitute sufficient and adequate enforcement action as requested by Beyond Nuclear and joint petitioners in their October 20, 2011 as supplemented.

Response to Comment 1:

The proposed partial DD is not based on either order EA-12-049 or EA-12-051, with the exception of concern 12, where it stated that EA-12-049 and a related request for information dated March 12, 2012, addressed the substance of this concern.

The proposed partial DD deferred decisions on concern 7, related to spent fuel pool boil off, and concern 9, related to hardened onsite storage, in part because these concerns were not fully addressed by the scope of these current orders. The NRC staff is not crediting EA-12-049 to address concern 7 or concern 9. It is anticipated that these concerns will be addressed by ongoing efforts by the NRC staff associated with the lessons-learned from the Fukushima event.

The NRC did not modify the partial DD as a result of this comment.

Comment 2:

Irradiated fuel pools containing high-level radioactive waste in nuclear power reactors were designed for temporary storage only and to store only a small fraction of the inventories they currently hold. The failure to establish a scientifically accepted and licensed nuclear waste management strategy has resulted in North Anna 1 and 2, as at other U.S. plants containing several times as much spent fuel as the one at Fukushima's Unit 4, and stored in a densely

packed configuration that would be harder to cool in the event of a rapid loss of pool water. The emergency enforcement action sought by the petitioner(s) is that the spent fuel pool hazard be decreased by accelerating the transfer of irradiated fuel > 5 years out of the reactor into Hardened On-Site Storage in qualified and robust dry casks, thereby reducing the density of the fuel remaining in the pools and segregating the hazardous material into smaller inventories. To the contrary, NRC has instead assigned accelerated transfer of spent fuel to dry storage issues to Tier 3 - effectively placing it at the agency's lowest priority. Moreover, the [NRC] staff has determined that the current regulatory approaches to these issues are acceptable (including maintaining high-density storage in spent fuel pools) only to "review" new information as it becomes available as a result of specific ongoing activities to confirm this conclusion and gain additional insights.

In fact, the Orders do not demonstrate what effectively can be done if the newly ordered irradiated fuel pool monitors show that the level is not adequate to support operation of the normal fuel pool cooling system, the level is not adequate to provide substantial radiation shielding for a person standing on the spent fuel pool operating deck, and the level where the fuel remains covered and actions to implement make-up water addition should not longer be deferred." (Order, Appendix 2)

Beyond Nuclear maintains that jury-rigged systems do not provide reasonably adequate protection and can therefore fail to maintain and add water to an affected pool in sufficient quantity to prevent a pool fire under certain circumstances. Therefore, reducing the probability of a pool fire should be NRC's top priority by maintaining reliable cooling functions. Beyond Nuclear supports and maintains the argument that the most reasonable, effective and reliable measure to prevent a high-level radioactive waste storage pool fire would be to reconfigure and re-equip the pool with low-density, open-frame racks with the transfer to Hardened On Site Storage casks.

Response to Comment 2:

Issues regarding hardened onsite storage, concern 9 of the petition, are being addressed as part of ongoing efforts by the NRC staff associated with the lessons-learned from the Fukushima event and by the NRC's evaluation of a petition for rulemaking. By letter dated December 15, 2011 (ADAMS Accession No. ML113490055), the NRC Commissioners issued a memorandum regarding NRC staff requirements associated with SECY-11-0137, which provided a prioritization of recommended action to be taken in response to Fukushima lessons learned (e.g. according to tier). The current approach to resolution of concern 9 outlined in the Partial DD is consistent with current NRC policy as expressed in the NRC staff requirements memorandum dated December 15, 2011.

The NRC did not modify the partial DD as a result of this comment.

Comment 3:

Therefore, Beyond Nuclear submits that NRC's assumptions about North Anna's operator's (as generically applicable to all US reactor operators') capability to mitigate an accident as presented in EA-2012-049 and EA-2012-051 are unrealistically optimistic and unreliable. The operator's ability to carry out mitigative measures can be severely degraded in an accident environment involving fuel damage. Therefore, Beyond Nuclear maintains the argument that

the aforementioned Orders as referenced must be supplemented as part of a Tier 1 strategy to include a requirement for open-frame, low-density pool storage and place assemblies > 5 years out of the reactor in dry casks.

Therefore, Beyond Nuclear does not find the NRC proposed partial DD of July 10, 2012 to adequately or acceptably address its request for emergency enforcement action at the North Anna Nuclear Generating Station as pertains to high-level nuclear waste storage pools on a seismically active site.

Response to Comment 3:

With respect to safe operation of North Anna 1 and 2, the NRC staff has evaluated the licensee's ability to safely operate North Anna 1 and 2, in the inspection reports issued October 31, 2011 (ADAMS Accession No. ML113040031), and November 30, 2011 (ADAMS Accession No. ML113340345), and in the NRC technical evaluation dated November 11, 2011 (ADAMS Accession No. ML11308B406). These activities by the NRC staff were completed before restart to ensure that, before resuming operations, the licensee had demonstrated no functional damage had occurred to those features at North Anna 1 and 2, necessary for continued operation without undue risk to the health and safety of the public.

The NRC did not modify the partial DD as a result of this comment.