May 12, 2004

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

SUBJECT: NORTH ANNA POWER STATION, UNITS 1 AND 2 - ISSUANCE OF AMENDMENTS RE: EXTENDED INVERTER ALLOWED OUTAGE TIME (TAC NOS. MB6957 AND MB6958)

Dear Mr. Christian:

The U.S. Nuclear Regulatory Commission (Commission) has issued the enclosed Amendment Nos. 235 and 217 to Renewed Facility Operating License Nos. NPF-4 and NPF-7, respectively, for the North Anna Power Station, Unit Nos. 1 and 2. The amendments change the Technical Specifications (TS) in response to your letter dated December 13, 2002, as supplemented by letters dated May 8, 2003, December 17, 2003, February 12, 2004, and March 9, 2004.

These amendments revise the completion time of Required Action A.1 of TS 3.8.7, "Inverters - Operating," from 24 hours to 7 days for an inoperable instrument bus inverter.

A copy of the Safety Evaluation is also enclosed. The Notice of Issuance will be included in the Commission's biweekly *Federal Register* notice.

Sincerely,

/RA/

Stephen Monarque, Project Manager, Section 1
Project Directorate II
Division of Licensing Project Management
Office of Nuclear Reactor Regulation

Docket Nos. 50-338 and 50-339

Attachments:
1. Amendment No. 235 to NPF-4
2. Amendment No. 217 to NPF-7
3. Safety Evaluation

cc w/encls: See next page

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These amendments revise the completion time of Required Action A.1 of TS 3.8.7, "Inverters - Operating," from 24 hours to 7 days for an inoperable instrument bus inverter.

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VIRGINIA ELECTRIC AND POWER COMPANY

DOCKET NO. 50-338

NORTH ANNA POWER STATION, UNIT NO. 1

AMENDMENT TO RENEWED FACILITY OPERATING LICENSE

Amendment No. 235
Renewed License No. NPF-4

1. The Nuclear Regulatory Commission (the Commission) has found that:

   A. The application for amendment by Virginia Electric and Power Company et al., (the licensee) dated December 13, 2002, as supplemented by letters dated May 8, 2003, December 17, 2003, February 12, 2004, and March 9, 2004, complies with the standards and requirements of the Atomic Energy Act of 1954, as amended (the Act), and the Commission's rules and regulations set forth in 10 CFR Chapter I;

   B. The facility will operate in conformity with the application, the provisions of the Act, and the rules and regulations of the Commission;

   C. There is reasonable assurance (i) that the activities authorized by this amendment can be conducted without endangering the health and safety of the public, and (ii) that such activities will be conducted in compliance with the Commission's regulations;

   D. The issuance of this amendment will not be inimical to the common defense and security or to the health and safety of the public; and

   E. The issuance of this amendment is in accordance with 10 CFR Part 51 of the Commission's regulations and all applicable requirements have been satisfied.

2. Accordingly, the license is amended by changes to the Technical Specifications as indicated in the attachment to this license amendment, and paragraph 2.C.(2) of Renewed Facility Operating License No. NPF-4 is hereby amended to read as follows:

(2) Technical Specifications

The Technical Specifications contained in Appendix A, as revised through Amendment No. 235, are hereby incorporated in the license. The licensee shall operate the facility in accordance with the Technical Specifications.

3. This license amendment is effective as of its date of issuance and shall be implemented within 90 days of issuance.

FOR THE NUCLEAR REGULATORY COMMISSION
/RA/

Stephanie M. Coffin, Acting Chief, Section 1
Project Directorate II
Division of Licensing Project Management
Office of Nuclear Reactor Regulation

Attachment:
Changes to the Technical Specifications

Date of Issuance: May 12, 2004

VIRGINIA ELECTRIC AND POWER COMPANY

DOCKET NO. 50-339

NORTH ANNA POWER STATION, UNIT NO. 2

AMENDMENT TO RENEWED FACILITY OPERATING LICENSE

Amendment No. 217
Renewed License No. NPF-7

1. The Nuclear Regulatory Commission (the Commission) has found that:

   A. The application for amendment by Virginia Electric and Power Company et al., (the licensee) dated December 13, 2002, as supplemented by letters dated May 8, 2003, December 17, 2003, February 12, 2004, and March 9, 2004, complies with the standards and requirements of the Atomic Energy Act of 1954, as amended (the Act), and the Commission's rules and regulations set forth in 10 CFR Chapter I;

   B. The facility will operate in conformity with the application, the provisions of the Act, and the rules and regulations of the Commission;

   C. There is reasonable assurance (i) that the activities authorized by this amendment can be conducted without endangering the health and safety of the public, and (ii) that such activities will be conducted in compliance with the Commission's regulations;

   D. The issuance of this amendment will not be inimical to the common defense and security or to the health and safety of the public; and

   E. The issuance of this amendment is in accordance with 10 CFR Part 51 of the Commission's regulations and all applicable requirements have been satisfied.

2. Accordingly, the license is amended by changes to the Technical Specifications as indicated in the attachment to this license amendment, and paragraph 2.C.(2) of Renewed Facility Operating License No. NPF-7 is hereby amended to read as follows:

(2) Technical Specifications

The Technical Specifications contained in Appendix A, as revised through Amendment No. 217, are hereby incorporated in the license. The licensee shall operate the facility in accordance with the Technical Specifications.

3. This license amendment is effective as of its date of issuance and shall be implemented within 90 days of issuance.

FOR THE NUCLEAR REGULATORY COMMISSION

/RA/

Stephanie M. Coffin, Acting Chief, Section 1
Project Directorate II
Division of Licensing Project Management
Office of Nuclear Reactor Regulation

Attachment:
Changes to the Technical Specifications

Date of Issuance: May 12, 2004

ATTACHMENT TO

LICENSE AMENDMENT NO. 235 TO

RENEWED FACILITY OPERATING LICENSE NO. NPF-4

LICENSE AMENDMENT NO. 217 TO

RENEWED FACILITY OPERATING LICENSE NO. NPF-7

DOCKET NOS. 50-338 AND 50-339

Replace the following page of the Appendix "A" Technical Specifications with the enclosed page as indicated. The revised page is identified by amendment number and contains a vertical line indicating the area of change.

Remove Page	Insert Page
3.8.7-1	3.8.7-1

SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION RELATED

TO AMENDMENT NO. 235 TO RENEWED FACILITY OPERATING LICENSE NO. NPF-4 AND

AMENDMENT NO. 217 TO RENEWED FACILITY OPERATING LICENSE NO. NPF-7

VIRGINIA ELECTRIC AND POWER COMPANY

NORTH ANNA POWER STATION, UNIT NOS. 1 AND 2

DOCKET NOS. 50-338 AND 50-339

1.0 INTRODUCTION

By application dated December 13, 2002, as supplemented by letters dated May 8, 2003, December 17, 2003, February 12, 2004, and March 9, 2004, Virginia Electric and Power Company (the licensee), requested changes to the Technical Specifications (TS) for North Anna Power Station, Units 1 and 2. The licensee's May 8, 2003, December 17, 2003, February 12, 2004, and March 9, 2004, supplemental letters provided clarifying information that did not expand the scope of the proposed amendment as described in the original notice of proposed action published in the *Federal Register* on April 15, 2003 (68 FR 18289) and did not change the initial proposed no significant hazards consideration determination.

The requested changes will revise the completion time (CT) of Required Action A.1 of TS Section 3.8.7, "Inverters - Operating," from the current 24 hours to 7 days for one inoperable instrument bus inverter. The licensee stated that the proposed change provides greater operational flexibility in the scheduling and performance of online maintenance of an instrument bus inverter. The licensee further stated that the proposed change would improve instrument bus availability during shutdown modes or conditions and possibly avert an unplanned shutdown in the event that an inoperable inverter needs a longer maintenance or repair interval than currently allowed by the TS for North Anna Power Station, Units 1 and 2.

2.0 REGULATORY EVALUATION

The NRC staff has identified the applicable regulatory requirements for which the NRC staff based its acceptance. The requirements that the staff considered in its review are listed below:

Section 50.36 of Title 10 of the *Code of Federal Regulations* (10 CFR) requires that all operating licenses for nuclear reactors must include the TS for the subject plant. Limiting conditions for operation (LCOs) along with required CTs are specified for each system that is included in the TS. The licensee submitted risk-informed information to support the proposed license amendment.

Regulatory Guide (RG) 1.174, “An Approach for Using Probabilistic Risk Assessment in Risk-Informed Decisions on Plant-Specific Changes to the Licensing Basis,” dated November 2002, and RG 1.177, “An Approach for Plant-Specific, Risk-Informed Decisionmaking: Technical Specifications,” dated August 1998, provide specific guidance and acceptance criteria for assessing the nature and impact of licensing basis changes, including proposed permanent TS changes in allowed outage times (AOTs) or CTs, by considering engineering issues and applying risk insights. In addition, Chapter 16.1, “Risk-Informed Decisionmaking: Technical Specifications,” of the Nuclear Regulatory Commission (NRC, the Commission) Standard Review Plan (SRP), NUREG-0800, describes acceptable approaches and guidelines in reviewing proposed TS modifications, including CT changes, as part of risk-informed decisionmaking.

The Maintenance Rule, 10 CFR 50.65(a)(4), requires licensees to perform assessments before conducting maintenance activities on structures, systems, and components (SSCs) that are covered by the Maintenance Rule and to manage any increase in risk that may result from the proposed activities. RG 1.182, “Assessing and Managing Risk Before Maintenance Activities at Nuclear Power Plants,” dated May 2000, provides guidance on implementing the provisions of 10 CFR 50.65(a)(4). RG 1.174, Section 2.3, Element 3, “Define Implementation and Monitoring Program,” states that monitoring that is in conformance with the Maintenance Rule can be used to satisfy Element 3 when the monitoring performed under the Maintenance Rule is sufficient for the SSCs affected by the risk-informed application.

General Design Criterion (GDC) 17, "Electric power systems," of Appendix A, "General Design Criteria for Nuclear Power Plants," to 10 CFR Part 50 requires, in part, that nuclear power plants have onsite and offsite electric power systems to permit the functioning of SSCs that are important to safety. The onsite power system is required to have sufficient independence, redundancy, and testability to perform its safety function, assuming a single failure. The offsite power system is required to supply power to the onsite electric distribution system by two physically independent circuits that are designed and located so as to minimize, to the extent practical, the likelihood of their simultaneous failure under operating and postulated accident and environmental conditions. In addition, this criterion requires provisions to minimize the probability of losing electric power from the remaining electric power supplies as a result of loss of power from the unit, the offsite transmission network, or the onsite power supplies.

GDC-18, “Inspection and testing of electric power systems,” requires that electric power systems that are important to safety must be designed to permit appropriate periodic inspection and testing.

The TS for North Anna Power Station, Units 1 and 2, currently require that an inoperable inverter must be restored within a CT of 24 hours (TS 3.8.7, “Inverters - Operating”). The proposed license amendment would change the CT for restoring an inoperable inverter from 24 hours to 7 days.

3.0 TECHNICAL EVALUATION

3.1 Proposed TS Changes

The specific changes requested by the licensee would revise the CT of Required Action A.1 of TS 3.8.7, “Inverters-Operating,” from the current 24 hours to 7 days for one inoperable instrument bus inverter.

3.2 Deterministic Evaluation

The purpose of the vital AC power system at North Anna Power Station, Units 1 and 2, is to provide a highly reliable source of 120 VAC power for safety-related instruments and equipment. Each unit is equipped with four AC instrument buses, which are independently fed from an associated 125 VDC to 120 VAC single-phase AC static inverter. The inverters are normally powered from the stationary battery chargers via the 125 VDC system. Should the 4.16 kV safety buses de-energize, the inverter would be automatically fed from its associated station battery, which provides an uninterruptible power source for the AC instrument buses. The AC instrument bus inverters are the preferred source of power for the AC instrument buses because of the stability and reliability they provide to safety-related loads.

In addition, each instrument bus has a dedicated voltage regulating transformer (VRT) that is fed from the 480 VAC engineered safety feature (ESF) bus that supplies power to the instrument bus in the event that an inverter fails or is down for maintenance. Upon loss of an inverter, the instrument bus is manually transferred to its VRT (inverters 2-I and 2-II are capable of automatically transferring to the VRT), which is an interruptible source of power. The 2-I and 2-II inverters and associated VRTs were replaced with safety-related Class 1E equipment during the 2002 refueling outage at North Anna, Unit 2. When the AC instrument bus is powered from its VRT, the bus and associated instrumentation and controls for the reactor protection system (RPS) and engineered safety feature actuation system (ESFAS) rely on interruptible AC electrical sources (either offsite or onsite). A loss of offsite power (LOOP) with an inoperable instrument bus inverter (i.e., instrument bus being powered by its VRT) will result in a loss of power to the associated instrument bus. The VRT is powered from a 480 VAC ESF bus. Therefore, upon a LOOP with an inoperable instrument bus inverter, power would be restored to the affected instrument bus once the associated emergency diesel generator (EDG) re-energized the 480 VAC ESF bus (10 seconds). In order for the instrument bus to remain de-energized, the associated EDG would have to fail, there would have to be a failure to re-energize the 480 VAC ESF bus powering the VRT, or the VRT would have to fail to energize the instrument bus. A complete LOOP would result in a shutdown of both units due to a loss of secondary plant equipment and power to the reactor coolant pumps (RCPs).

For the case of a partial LOOP to an emergency bus, the following statement describes the major impact on plant operations. If vital bus 1-I, 1-III, 2-I, or 2-III is supplied from a VRT, the momentary interruption in power will impact the operation of numerous trip valves, equipment controllers, and indications. For vital bus I, the major impact on the unit will be a loss of condenser vacuum and a loss of cooling water to the RCPs. When the EDG restores power, equipment can be realigned using operating procedures without resulting in a unit shutdown. For vital bus III, the temporary loss of power impacts the operation of numerous trip valves and causes a main feed regulating valve controller to receive a close signal. Cooling to the RCPs will be lost, but this function can be restored. The licensee contends that the operators will not likely be able to restore steam generator water level to the affected generator in time to prevent an automatic reactor shutdown. For vital buses II and IV, the temporary loss of power impacts the operation of numerous trip valves, and this causes the affected buses for the main feed regulating valve controller to receive a close signal that results in a response similar to vital bus III.

Typically RPS and ESFAS equipment are designed to actuate when de-energized. Thus the momentary interruption in power to the vital bus will cause these channels to actuate. The containment depressurization actuation logic and the refueling water storage tank low-level

switchover to the containment sump logic will go from two-out-of-four to two-out-of-three, since they must energize to actuate. There are several low-power reactor trip functions that are in place during startup and shutdown that will actuate on one-out-of-two RPS logic. A reactor trip will occur with a momentary loss of power to certain vital buses (i.e., 1-I, 1-II, 2-I, and 2-II) when the plant is in low-power conditions. The licensee contends that the consequences of momentary interruption in power and the systems, as described above, will permit the plant to be maintained in a safe condition and the defense-in-depth features will be maintained during the proposed extended inverter AOT.

The initial conditions of the design-basis accident and transient analyses in North Anna Power Station, Units 1 and 2, Updated Final Safety Analysis Report (UFSAR), Chapter 6, “Engineered Safety Features,” and Chapter 15, “Accident Analyses,” assume ESF systems are operable. The AC instrument bus inverters are designed to provide the required capacity, capability, redundancy, and reliability to ensure the availability of necessary power to the RPS and ESFAS instrumentation and controls so that the fuel, reactor coolant system, and containment design limits are not exceeded.

The operability of the AC instrument bus inverters is consistent with the initial assumptions of the accident analyses and is based on meeting the design basis of the plants. This includes maintaining required AC instrument buses to be operable during accident conditions in the event of an assumed loss of all offsite AC power or all onsite AC power sources and a worst-case single failure.

Operable AC instrument bus inverters require the associated instrument bus to be powered by the instrument bus inverter with output voltage within tolerances and the associated 125 VDC battery to provide power input to the instrument bus. The power supply may be from an AC source via rectifier as long as the battery is connected as the uninterruptible power supply.

The NRC staff finds that there is reasonable assurance that the AC instrument bus will remain energized when an instrument bus inverter is removed from service, provided the two compensatory measures, as described below, are implemented when the instrument bus inverter is out of service. The compensatory measures arise from the NRC staff’s concern that with an inverter unavailable and the instrument bus being powered from the VRT, instrument power from that train would be dependent on power from the EDG following a LOOP event. Entry into the extended inverter CT concurrent with EDG routine maintenance could have an impact on plant safety following a LOOP event, in that a LOOP event could leave the instrument bus without power. In addition, an entry into the extended inverter CT, concurrent with planned maintenance on another RPS/ESFAS channel, could potentially result in that channel being in a tripped condition.

Because of those concerns, the NRC staff requested the licensee to provide a description of compensatory measures that would be taken before the instrument bus inverter is taken out of service. In response to the NRC staff’s request, the licensee, in its letter dated February 12, 2004, stated that the following compensatory measures will be implemented when an instrument bus inverter is unavailable:

1. Entry into the extended inverter CT will not be planned concurrent with EDG maintenance.

2. Entry into the extended inverter CT will not be planned concurrent with planned maintenance on another RPS/ESFAS channel that results in that channel being in a tripped condition.

In order to provide appropriate regulatory control over these compensatory measures, the amendment requires the licensee to describe these two compensatory measures in the UFSAR. It also requires that these actions will be reflected in the next update of the UFSAR submitted to the NRC pursuant to 10 CFR 50.71(e). As a consequence, should the licensee seek to change these compensatory measures, the licensee would be required to evaluate the proposed changes in accordance with 10 CFR 50.59. The provisions of Section 50.59 provide adequate regulatory control over these two compensatory measures.

RG 1.177, "An Approach for Plant-Specific, Risk-Informed Decisionmaking: Technical Specifications," states, in part, that "the change may be requested to reduce the unnecessary burdens in complying with current TS requirements, based on the operating history of the plant or industry in general." Historically, once every refueling outage the inverters at North Anna Power Station, Units 1 and 2, have been out of service for approximately 24 hours for maintenance activities. The normal preventative maintenance that occurs every six refueling outages can typically be performed within 48 hours. The licensee also indicated that during power operation the replacement of a failed constant voltage transformer, which is a component of the inverter, would take 5 to 7 days. In its original submittal dated December 13, 2002, the licensee requested the NRC staff's approval to increase the CT for an inoperable instrument bus inverter to 14 days. The NRC staff raised concerns regarding the requested 14-day CT. Specifically, the NRC staff expressed concerns about the basis and need for having an inverter inoperable for 14 days, which represented a reduction in defense in depth. Furthermore, industry operating experience did not support the justification for having a 14-day CT. Following a number of discussions with the NRC staff, the licensee determined that increasing the CT required for Action A.1 of TS 3.8.7 to 7 days would address the needs for North Anna Power Station, Units 1 and 2. As such, in its submittal dated December 17, 2003, the licensee revised the initial request to increase the CT from the current 24 hours to 7 days.

3.2.1 Summary

The NRC staff examined the information provided by the licensee and the basis used to establish the current 24-hour limit for the completion time for repairing an inverter given the additional risk to which the unit is exposed because of the inverter operability. As discussed above, the licensee is requesting additional time in order to perform predictive and preventive maintenance activities during power operation. Industry operating experience supports the proposed change to a 7-day AOT for an inoperable instrument bus inverter. Therefore, the 7-day AOT reflects a reasonable time to restore an instrument bus inverter to operable status. Based on these considerations and the compensatory measures proposed in the licensee's submittal dated February 12, 2003, the NRC staff concludes that an AOT extension from 24 hours to 7 days for an inoperable instrument bus inverter is acceptable.

3.3 Probabilistic Evaluation

The NRC staff reviewed the submittal using the three-tiered approach referenced in RG 1.174, RG 1.177, and SRP Chapter 16.1. The first tier of the three-tiered approach includes assessing the risk impact of the proposed change in accordance with acceptance guidelines consistent with the Commission's Safety Goal Policy Statement, as documented in RG 1.174 and

RG 1.177. Under the first tier, the NRC staff assesses the impact on operational plant risk on the basis of the change in core damage frequency (ΔCDF) and change in large early release frequency (ΔLERF). In addition, under the first tier, the NRC staff evaluates plant risk while equipment covered by the proposed CT is out of service, as represented by the incremental conditional core damage probability (ICCDP) and incremental conditional large early release probability (ICLERP). Additionally, the NRC staff pursuant to tier 1 should establish that the quality of the probabilistic risk assessment (PRA) is compatible with the safety implications of the proposed TS change and that the scope and level of the PRA are adequate to fully support the evaluation of the TS change. Cumulative risk of the requested TS change in light of past applications or additional applications under review are also considered along with uncertainty and sensitivity analysis with respect to the assumptions related to the proposed TS change.

The second tier involves identifying potential high-risk configurations that may exist if other equipment or systems (in addition to the equipment associated with the proposed change) were also taken out of service simultaneously or subjected to concurrent testing. The purpose of the tier 2 evaluation is to ensure that appropriate restrictions will be in place to prevent the occurrence of such high-risk configurations.

The third tier establishes a risk management program for the overall configuration and confirms that risk insights are incorporated into the decisionmaking process before taking equipment out of service prior to or during the CT. The third tier provides additional assurance over the second tier by identifying risk-significant configurations that may be encountered over extended periods of plant operation. Licensees can implement the overall configuration risk management program (as referenced in RG 1.177) through application of 10 CFR 50.65(a)(4). Specifically, the rule requires that before performing any maintenance activity, the licensee must assess and manage the potential risk increase that may result from a proposed maintenance activity. The following subsections describe each tier and the associated reviews.

Tier 1 - PRA Capability and Insights

PRA Quality

The objective of the PRA quality review is to determine whether the PRAs for North Anna Power Station, Units 1 and 2, that were used in evaluating the proposed instrument bus inverter CT extension were of sufficient scope and detail.

The North Anna PRA model underwent an industry peer review certification process in July 2001. The peer review used the review process developed by the Westinghouse Owners Group. The licensee provided a summary of the peer review findings related to the proposed inverter CTs. The peer review findings were either addressed by updates to the model, were not applicable, or were shown to have minimal impact on the proposal to extend the inverter CTs. Therefore, the NRC staff finds that none of the findings adversely affected the implementation of the proposed vital bus inverter CT of 7 days.

A single PRA model was developed for North Anna. The licensee stated that there are no major design differences between units and none of the design differences impact the modeling of accident mitigating systems. The North Anna PRA model was last updated in May of 2002 and included plant-specific unavailability data, although the failure rates used for the inverters were based on generic plant data. The licensee stated that the North Anna PRA used to evaluate the proposed inverter CT reflects the as-built, as-operated condition of the plant. The

PRA models the inverters, voltage-regulating transformers, and the 120 VAC vital buses. System dependencies affecting the 120 VAC vital buses and systems dependent on the 120 VAC vital bus supplies, that impact accident-mitigating functions, are explicitly included in the model.

The licensee has procedures in place for the maintenance and updating of the PRA model. The procedures establish the update frequency and time limits for the incorporation of updated PRA information and include controls for PRA software and model configuration.

Cumulative Risk

The licensee stated that the only prior risk-informed TS amendment was the 14-day EDG AOT implemented in 1998, and that there are no pending risk-informed TS amendments for North Anna. In addition, the average CDF and LERF estimated for the proposed inverter CT reflect the TS amendment that extended the CT for the EDGs to 14 days.

PRA Results

The licensee evaluated the inverters (1-I, 1-II, 1-III, and 1-IV) associated with emergency trains H and J to determine the importance of the inverters in the overall model. The licensee determined that inverter 1-I had the highest importance measures both for risk achievement worth (RAW) and Fussell-Vesely. The licensee then evaluated the proposed CT using the guidance of RGs 1.174 and 1.177. The licensee's results show that for inverter 1-I the RG 1.177 ICCDP and ICLERP acceptance guidelines of 5E-7 and 5E-8, respectively, are met for the licensee's proposed inverter CT extension to 7 days. In addition, the results also show that the increases in CDF and LERF are within the acceptance guidelines given in RG 1.174 of a ΔCDF of 1E-6/yr and a ΔLERF of 1E-7/yr.

The licensee also evaluated a LOOP with an inverter unavailable. With a LOOP and inverter unavailable, the increase in CDF was estimated to be 5.3E-7/year. The ICCDP was found to be 2.0E-8, which is the ICCDP estimated for all initiating events. Therefore, the risk impact of an unavailable inverter is essentially due to LOOP events.

With respect to external events, the licensee performed a qualitative assessment of the risk impact of inverter unavailability on seismic, fire, floods, and other external events. The Electric Power Research Institute seismic margin method was used at North Anna to evaluate severe accident vulnerabilities from seismic events. The 2-I and 2-II inverters and associated VRTs were replaced with safety-related Class IE equipment during the 2002 refueling outage at North Anna, Unit 2. The remaining VRTs are non-safety-related, non-Class IE equipment, and although restrained to prevent damage to other safety-related equipment during a seismic event, the transformers themselves are not seismically qualified. The licensee's seismic margin method screens out components having a seismic capacity greater than 0.3g based on the seismic hazard for North Anna. The VRTs were evaluated and screened out of the analysis based on having a high confidence of low probability of failure greater than 0.3g. A review of the North Anna Power Station, Units 1 and 2, individual plant examination of external events (IPEEE) did not reveal any unresolved issues related to seismic adequacy of the inverters or VRTs. A review of the IPEEE fire analysis did not identify any issues associated with the inverters. Similarly, a review of the high winds/external floods IPEEE analysis did not indicate

any issues related to the inverters or vital bus power supply. The licensee stated that the overall consequence of inverter unavailability with an external initiating event is adequately covered by the internal events LOOP analysis.

PRA Uncertainty

As discussed in RG 1.174 and NUREG/CR-6141, "Handbook of Methods for Risk-Based Analyses of Technical Specifications," the licensee can perform sensitivity studies to provide additional insights into the uncertainties related to the proposed CT extension and demonstrate compliance with the guidelines and evaluate uncertainties related to modeling and completeness issues. RG 1.174 states that, in general, the results of the sensitivity studies should confirm that the guidelines are met even under alternative assumptions. The licensee evaluated four separate sensitivity cases: increasing the probability of all post-initiator human error events by a factor of 10, increasing the failure rates for the VRTs by a factor of 10, increasing the LOOP frequency by a factor of 10, and increasing the failure probability of the remaining inverters to a value of 0.05 to address potential common cause failures during the outage of inverter 1-I due to corrective maintenance. For all the cases evaluated for inverter 1-I, the results met the acceptance guidelines for ΔCDF, ΔLERF, ICCDP, and ICLERP given in RGs 1.174 and 1.177.

Tier 2 - Avoidance of Risk-Significant Plant Configurations

To evaluate whether risk-significant outages could occur when an inverter is out of service for the proposed 7-day inverter CT, the licensee compared the basic risk assessment worth (RAW) when the highest importance inverter is available to the case where the highest importance inverter is unavailable. The licensee's criteria indicated that if components associated with RAW greater than 2 show a significant increase (greater than 10 percent), then the component could potentially contribute to a risk-significant configuration. From the previous analysis, the licensee confirmed inverter 1-I as having the largest risk importance of the four inverters. The licensee's evaluation showed that no single components taken out of service concurrent with the inverter and consistent with the TS would result in a significant change in risk (RAW increase greater than 10 percent) for components with a RAW greater than 2.

The licensee review did identify five components whose RAW values were less than 2 for the base case, but increased to greater than 2 (with an increase greater than 10 percent) with an inverter unavailable. These components included the 1H EDG, 1J EDG, 1H EDG output circuit breaker, the 1J EDG output circuit breaker, and the 1-III station battery. However, an evaluation of each component out of service with an inverter out of service resulted in single CT risk below the tier 1 ICCDP acceptance criterion. RG 1.177 states that an evaluation of such combinations of equipment out of service against the Tier 1 ICCDP acceptance guideline could be one appropriate method of identifying risk-significant configurations. Based on the results obtained by the licensee, no tier 2 issues were identified with the proposed inverter CT change to 7 days.

Tier 3 - Risk-Informed Configuration Risk Management

RG 1.177 states that a licensee should develop a program that ensures that the risk impact of out-of-service equipment is appropriately evaluated before maintenance activity is performed.

Scheduling of maintenance and surveillance testing, with an inverter out of service and its associated vital bus powered from the VRT, will be evaluated and controlled in accordance with the Maintenance Rule, 10 CFR 50.65(a)(4).

The licensee's program requires a PRA analysis of all planned maintenance configurations at power done in advance using the Scientech Safety Monitor. The inverters are included in the scope of 10 CFR 50.65(a)(4), and the removal of the inverters is monitored, evaluated, and managed using the safety monitor tool. The licensee also stated that possible LOOP events, including grid-related, switchyard, electrical maintenance events, and external events such as severe weather, are accounted for in the North Anna 10 CFR50.65 (a)(4) program. The licensee's configuration risk management program was previously evaluated by the NRC staff during the review of the extended 14-day EDG CTs for North Anna and are found acceptable.

The NRC staff finds that the licensee's program to control risk is capable of adequately assessing the activities being performed to ensure that high-risk plant configurations do not occur and/or compensatory measures are implemented if a high-risk plant configuration or condition should occur. As such, the licensee's program meets RG 1.177.

3.3.1 Summary

The licensee originally requested a 14-day CT for the inverters out of service at North Anna Power Station, Units 1 and 2, and prepared its PRA based on a 14-day CT. While the licensee later revised its request to provide for a 7-day CT, there was no need to revise the PRA as the original analysis was conservative with respect to a 7-day CT. The NRC staff, therefore, has applied the risk insights for a 14-day CT, which are summarized below, to a 7-day CT.

The risk impact of the proposed 14-day CT for the inverters at North Anna Power Station, Units 1 and 2, as estimated by ΔCDF, ΔLERF, ICCDP, and ICLERP, is consistent with the acceptance guidelines specified in RG 1.174, RG 1.177, and NRC staff guidance outlined in Chapter 16.1, "Risk-Informed Decisionmaking: Technical Specifications," of NUREG-0800. The NRC staff finds that the risk analysis methodology and approach used by the licensee to estimate the risk impacts were reasonable and of sufficient quality. The Tier 2 evaluation did not identify any risk-significant plant equipment outage configurations needing TS, procedure, or compensatory measures, although the NRC staff's deterministic evaluation indicated the need for limits on work on the EDGs and RPS/ESFAS channels when inverter maintenance is scheduled. The licensee's configuration risk management program under 10 CFR 50.65(a)(4) manages plant risk when an instrument bus inverter is taken out of service. Instrument bus inverter reliability and availability will also be monitored and assessed under the Maintenance Rule to confirm that performance continues to be consistent with the assumptions used in the analysis for extended inverter CTs.

Risk-informed license amendment requests are evaluated by the NRC staff using traditional engineering analyses (deterministic approach) as well as consideration of the risk associated with any proposed change (PRA). The use of PRA technology should be used in a manner that complements the NRC's deterministic approach and supports the NRC's traditional defense-in-depth philosophy. The results of the PRA support the NRC staff's deterministic evaluation of the requested 7-day inverter CT.

For the reasons set forth above, an increase in the CT for an inoperable instrument inverter from 24 hours to 7 days is acceptable.

4.0 STATE CONSULTATION

In accordance with the Commission's regulations, the Virginia State official was notified of the proposed issuance of the amendments. The State official had no comments.

5.0 ENVIRONMENTAL CONSIDERATION

The amendments change a requirement with respect to installation or use of a facility component located within the restricted area as defined in 10 CFR Part 20. The NRC staff has determined that the amendments involve no significant increase in the amounts, and no significant change in the types, of any effluents that may be released offsite, and that there is no significant increase in individual or cumulative occupational radiation exposure. The Commission has previously issued a proposed finding that the amendments involve no significant hazards consideration, and there has been no public comment on such finding (68 FR 18289). Accordingly, the amendments meet the eligibility criteria for categorical exclusion set forth in 10 CFR 51.22(c)(9). Pursuant to 10 CFR 51.22(b), no environmental impact statement or environmental assessment need be prepared in connection with the issuance of the amendments.

6.0 CONCLUSION

The Commission has concluded, based on the considerations discussed above, that (1) there is reasonable assurance that the health and safety of the public will not be endangered by operation in the proposed manner, (2) such activities will be conducted in compliance with the Commission's regulations, and (3) the issuance of the amendments will not be inimical to the common defense and security or to the health and safety of the public.

7.0 REFERENCES

1. Letter from L. Hartz (Virginia Electric and Power Company) to U.S. NRC Document Control Desk, "Virginia Electric and Power Company, North Anna Power Station Units 1 and 2, Proposed Risk-Informed Technical Specifications Change, Extended Inverter Allowed Outage Time," dated December 13, 2002. Adams Accession Number ML023600217

2. Letter from L. Hartz (Virginia Electric and Power Company) to U.S. NRC Document Control Desk, "Virginia Electric and Power Company, North Anna Power Station Units 1 and 2, Request for Additional Information, Proposed Risk-Informed Technical Specifications Change, Extended Inverter Allowed Outage Time," dated May 8, 2003. Adams Accession Number ML031400019

3. Letter from L. Hartz (Virginia Electric and Power Company) to U.S. NRC Document Control Desk, "Virginia Electric and Power Company (DOMINION), North Anna Power Station Units 1 and 2, Revised Required Action Completion Time for Proposed Risk-Informed Technical Specification Change, Extended Inverter Allowed Outage Time," dated December 17, 2003. Adams Accession Number ML031400019

4. Letter from L. Hartz (Virginia Electric and Power Company) to U.S. NRC Document Control Desk, “Virginia Electric and Power Company (DOMINION), North Anna Power Station Units 1 and 2, Revised Compensatory Measures, Extended Inverted Allowed Outage Time, Proposed Risk-Informed Technical Specifications Change,” dated February 12, 2004. Adams Accession Number ML040550548

5. Letter from L. Hartz (Virginia Electric and Power Company) to U.S. NRC Document Control Desk, “Virginia Electric and Power Company (DOMINION), North Anna Power Station Units 1 and 2, Extended Inverter Allowed Outage Time, Revised Required Action Completion Time for Proposed Risk-Informed Technical Specifications Change,” dated March 9, 2004. Adams Accession Number ML040700512

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