



Tennessee Valley Authority, 1101 Market Street, Chattanooga, Tennessee 37402-2801

April 3, 2006

10 CFR 50.54(f)

U.S. Nuclear Regulatory Commission  
ATTN: Document Control Desk  
Washington, D.C. 20555

Gentlemen:

In the Matter of	)	Docket Nos. 50-259	50-260
Tennessee Valley Authority	)	50-296	50-327
		50-328	50-390

**BROWNS FERRY NUCLEAR PLANT (BFN) UNITS 1, 2 & 3, SEQUOYAH NUCLEAR PLANT (SQN) UNITS 1 & 2 AND WATTS BAR NUCLEAR PLANT (WBN) UNIT 1 - NUCLEAR REGULATORY COMMISSION (NRC) GENERIC LETTER (GL) 2006-02: GRID RELIABILITY AND THE IMPACT ON PLANT RISK AND THE OPERABILITY OF OFFSITE POWER - RESPONSE**

This letter provides TVA's 60-day response to GL 2006-02. TVA is an integrated Agency that has historically operated a highly reliable power system that has not experienced a Nuclear Power Plant (NPP) grid centered Loss of Offsite Power (LOOP) event. TVA's power system provides some of the most reliable electric power in North America. TVA's regional transmission grid spans portions of seven states. TVA's NPPs generate approximately 30 percent of TVA's net power. The remaining 70 percent of power generation comes from fossil and hydroelectric plants, pumped storage and green power.

TVA's hydroelectric plants reduce the risk of prolonged LOOP since TVA's three NPPs are located along the Tennessee River near hydroelectric stations. The fast start capability of hydroelectric, their locality, and TVA's vast reservoir system reduces the risk of prolonged LOOP since the hydroelectric plants can be isolated from the regional grid and aligned to TVA's NPPs. This capability provides a means for fast recovery from a grid blackout event.

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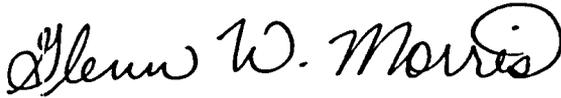
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Information requested in the subject Generic Letter is provided in the enclosure to this letter pursuant to 10 CFR 50.54(f).

There are no regulatory commitments made by this letter. Please direct any questions to Rob Brown at (423) 751-7228.

I declare under penalty of perjury that the foregoing is true and correct. Executed on the 3rd day of April, 2006.

Sincerely,

A handwritten signature in black ink that reads "Glenn W. Morris". The signature is written in a cursive style with a large, circular flourish at the end of the name.

Glenn W. Morris  
Manager, Corporate Nuclear Licensing  
and Industry Affairs

Enclosure  
cc: See page 3

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## ENCLOSURE

BROWNS FERRY NUCLEAR PLANT (BFN) UNITS 1, 2 & 3, SEQUOYAH NUCLEAR PLANT (SQN) UNITS 1 & 2 AND WATTS BAR NUCLEAR PLANT (WBN) UNIT 1 - NUCLEAR REGULATORY COMMISSION (NRC) GENERIC LETTER (GL) 2006-02: GRID RELIABILITY AND THE IMPACT ON PLANT RISK AND THE OPERABILITY OF OFFSITE POWER - RESPONSE

### Background

On February 1, 2006, the NRC issued Generic Letter 2006-02, "Grid Reliability and the Impact on Plant Risk and the Operability of Offsite Power." Responses to Generic Letter 2006-02 were required to be submitted within 60 days of the date of the letter.

The requested information is as follows:

### NRC Question 1 Topic

Use of protocols between the Nuclear Power Plant (NPP) licensee, and the Transmission System Operator (TSO), Independent System Operator (ISO), or Regional Control/Region Area (RC/RA) to assist the NPP licensee in monitoring grid conditions to determine the operability of offsite power systems under plant Technical Specifications (TS).

### Question 1(a)

Do you have a formal agreement or protocol with your TSO?

### Response to Question 1(a)

Yes, TVA Intergroup Agreement (IGA)-6 titled "Transmission/ Power Supply" is the business agreement that defines the interfaces and working relationships between TVA Nuclear Power (TVAN) and TVA's owner-operated grid operations known as TVA Power Systems Operations (PSO).

### Question 1(b)

Describe any grid conditions that would trigger a notification from the TSO to the NPP licensee and if there is a time period required for the notification.

### Response to Question 1(b)

The grid conditions (key parameters) that determine offsite power availability (e.g., lines and transformers in-service, system loading, and voltage levels) are monitored by TVA PSO. Programmed alarm points trigger prompt notification by TVA PSO to the affected TVAN site whenever grid conditions are such that offsite power adequacy cannot be guaranteed and cannot be corrected within 15 minutes. These notifications may be either due to an evaluation of the actual system conditions or triggered by system conditions being outside of analyzed boundaries.

TVA PSO issues System Alerts to all affected generators that are used to warn of unusual, impending emergency, and emergency conditions pertaining to power supply adequacy, transmission system integrity, grid reliability, and weather. However, these alerts do not necessarily affect operability of the NPP offsite power supply.

**Question 1(c)**

Describe any grid conditions that would cause the NPP licensee to contact the TSO. Describe the procedures associated with such a communication. If you do not have procedures, describe how you assess grid conditions that may cause the NPP licensee to contact the TSO.

**Response to Question 1(c)**

Grid conditions and status are the primary responsibility of TVA PSO. Only TVA PSO can determine if the grid has adequate capacity and capability to support the voltage criteria supplied by the NPP to meet General Design Criteria (GDC) -17 requirements and will notify the affected TVAN site when it does not. TVAN sites have procedures which direct the operators to contact TVA PSO dispatcher if indications of abnormal grid or switchyard conditions, such as low frequency or voltage, are identified.

**Question 1(d)**

Describe how NPP operators are trained and tested on the use of the procedures or assessing grid conditions in question 1(c).

**Response to Question 1(d)**

Licensed operators are trained and tested in accordance with the Systematic Approach to Training (SAT). Procedures and policies are routinely reviewed for training through this process for improvement of operator performance. Among the items considered for training include Technical Specifications, Annunciator Response Procedures, Abnormal Operating Procedures, and Emergency Operating Procedures that require interface with the TSO in accordance with the established protocol. These procedures may be utilized based on various grid, switchyard, or plant symptoms to assess, respond or mitigate off-normal plant and grid conditions. Additionally, Significant Operating Experience Report (SOER) 99-01, "Loss of Grid" and SOER 99-01, "Loss of Grid – Addendum", specifically, are captured in the Licensed Operator Requalification (LOR) Training Program. These topics, in varying detail based upon the SAT process, are reviewed periodically with TVAN operators.

Licensed operators are trained and evaluated on the tasks associated with Abnormal and Emergency procedures that refer to assessing grid conditions utilizing dynamic simulator scenarios. In addition, as part of initial and requalification training, licensed operators are subjected to written and dynamic simulator examinations, Job Performance Measures (JPMs), incorporating topics from these tasks. Testing is commensurate with the material presented and any performance issues are identified.

**Question 1(e)**

If you do not have a formal agreement or protocol with your TSO, describe why you believe you continue to comply with the provisions of GDC-17 as stated above, or describe what actions you intend to take to assure compliance with GDC-17.

**Response to Question 1(e)**

Not Applicable (N/A), TVAN and TVA PSO have such an agreement.

**Question 1(f)**

If you have an existing formal interconnection agreement or protocol that ensures adequate communication and coordination between the NPP licensee and the TSO, describe whether this agreement or protocol requires that you be promptly notified when the conditions of the surrounding grid could result in degraded voltage (i.e., below TS nominal trip setpoint value requirements, including NPP licensees using allowable value in its TSs) or LOOP after a trip of the reactor unit(s).

**Response to Question 1(f)**

As stated in the response to 1(b) above, the agreement between TVAN and TVA PSO requires the prompt notification of the affected TVAN site by TVA PSO whenever grid conditions cannot guarantee adequate offsite power and cannot be corrected within 15 minutes.

**Question 1(g)**

Describe the low switchyard voltage conditions that would initiate operation of plant degraded voltage protection.

**Response to Question 1(g)**

Degraded voltage protection actuates when safety-bus voltage goes below a certain level, which is different for each plant. Analyses performed by site engineering have determined the minimum switchyard voltages that would ensure adequate starting and running voltages to safety-related equipment during plant operation and shutdown and reset of the degraded voltage relays if actuated during motor starting.

Switchyard voltages less than those calculated could initiate the plant degraded voltage protection which would automatically disconnect the emergency buses from offsite power and align the loads to the on-site emergency power system.

**NRC Question 2 Topic**

Use of criteria and methodologies to assess whether the offsite power system will become inoperable as a result of a trip of your NPP.

**Question 2(a)**

Does your NPP's TSO use any analysis tools, an online analytical transmission system studies program, or other equivalent predictive methods to determine the grid conditions that would make the NPP offsite power system inoperable during various contingencies? If available to you, please provide a brief description of the analysis tool that is used by the TSO.

**Response to Question 2(a)**

Yes, the TVA PSO uses the Siemens Power Technology, Incorporated, (PTI) Power System Simulator for Engineering (PSS/e) software package to perform a bounding analyses to evaluate the ability of the system to ensure adequate offsite power under a range of system conditions and contingencies.

Offsite power sources are declared inoperable if the ability to maintain adequate post-trip voltage cannot be guaranteed for a trip of the nuclear unit with a postulated Design Basis Event (DBE).

**Question 2(b)**

Does your NPP's TSO use an analysis tool as the basis for notifying the NPP licensee when such a condition is identified? If not, how does the TSO determine if conditions on the grid warrant NPP licensee notification?

**Response to Question 2(b)**

Yes, the analysis tool described in the response to 2(a) is used to identify system conditions that would render the grid unable to ensure offsite power adequacy. These parameters are incorporated into grid operating procedures and programmed into alarms that trigger TVA PSO recognition of problem conditions, either due to an evaluation of the actual system conditions or triggered by system conditions being outside of analyzed boundaries, and subsequent prompt notification to the affected TVAN site.

**Question 2(c)**

If your TSO uses an analysis tool, would the analysis tool identify a condition in which a trip of the NPP would result in switchyard voltages (immediate and/or long-term) falling below TS nominal trip setpoint value requirements (including NPP licensees using allowable value in its TSs) and consequent actuation of plant degraded voltage protection? If not, discuss how such a condition would be identified on the grid.

**Response to Question 2(c)**

Yes, each TVAN site has provided TVA PSO with minimum switchyard voltages and maximum voltage drops that will ensure adequate voltages to the in-plant safety-related system for plant operating and shutdown conditions (see response to 1(g) above). The offsite power grid analysis, performed by TVA PSO, evaluates a range of grid conditions and identifies bounding parameters (e.g., lines and transformers in

service, system loading, and voltage levels) that will ensure the ability of the grid to meet the minimum switchyard voltage requirements during a unit trip with a postulated DBE. These parameters are incorporated into grid operating procedures and programmed into alarms that trigger TVA PSO recognition of problem conditions and subsequent prompt notification to the affected TVAN site.

**Question 2(d)**

If your TSO uses an analysis tool, how frequently does the analysis tool program update?

**Response to Question 2(d)**

TVA PSO continually monitors the real-time condition of the key parameters referred to in 2(b) and (c) that determine offsite power adequacy. As required by the TVAN/TVA PSO intergroup agreement (IGA-6), the model conditions used in the analyses are reviewed any time plant or grid modifications are made that could affect the analyses. Applicable operating procedures and alarms are revised as necessary based on these reviews. The Supervisory Control and Data Acquisition (SCADA) system used for monitoring key system parameters refreshes every few seconds.

**Question 2(e)**

Provide details of analysis tool-identified contingency conditions that would trigger an NPP licensee notification from the TSO.

**Response to Question 2(e)**

Actual grid conditions, including any current transmission line, transformer, or generation outages, are evaluated to determine if each TVAN site would maintain its required minimum switchyard voltage assuming a trip of the nuclear unit in conjunction with a postulated DBE. If a situation arises such that TVA PSO determines that the grid cannot ensure adequate offsite power under these limitations, TVA PSO will promptly notify the affected TVAN site that off-site power operability is no longer guaranteed.

**Question 2(f)**

If an interface agreement exists between the TSO and the NPP licensee, does it require that the NPP licensee be notified of periods when the TSO is unable to determine if offsite power voltage and capacity could be inadequate? If so, how does the NPP licensee determine that the offsite power would remain operable when such a notification is received?

**Response to Question 2(f)**

Yes, TVA PSO notifies the affected TVAN site whenever adequate offsite power cannot be ensured, which may be due to either actual system conditions or grid parameter(s) being outside the bounds of the analysis, or loss of relevant system monitoring capability. Upon notification by the TVA PSO that the offsite power supply

operability/adequacy cannot be ensured or determined, site procedures require declaring the offsite power sources inoperable.

**Question 2(g)**

After an unscheduled inadvertent trip of the NPP, are the resultant switchyard voltages verified by procedure to be bounded by the voltages predicted by the analysis tool?

**Response to Question 2(g)**

No, there is no procedure requirement for post-event analysis to check accuracy of transmission system modeling.

**Question 2(h)**

If an analysis tool is not available to the NPP licensee's TSO, do you know if there are any plans for the TSO to obtain one? If so, when?

**Response to Question 2(h)**

N/A, TVA PSO already has analysis tools in use.

**Question 2(i)**

If an analysis tool is not available, does your TSO perform periodic studies to verify that adequate offsite power capability, including adequate NPP post-trip switchyard voltages (immediate and/or long-term), will be available to the NPP licensee over the projected timeframe of the study?

- (a) Are the key assumptions and parameters of these periodic studies translated into TSO guidance to ensure that the transmission system is operated within the bounds of the analyses?
- (b) If the bounds of the analyses are exceeded, does this condition trigger the notification provisions discussed in question 1 above?

**Response to Question 2(i)**

TVA uses analysis tools to perform periodic bounding studies that assess a comprehensive set of bounding grid conditions. Grid operating guides are written that (1) identify key parameters required to assure offsite power adequacy, (2) identify when grid conditions are outside the bounds of the analysis, and (3) direct prompt notification to the affected TVAN site when offsite power adequacy cannot be assured.

**Question 2(j)**

If your TSO does not use, or you do not have access to the results of an analysis tool, or your TSO does not perform and make available to you periodic studies that determine the adequacy of offsite power capability, please describe why you believe

you comply with the provisions of GDC 17 as stated above, or describe what compensatory actions you intend to take to ensure that the offsite power system will be sufficiently reliable and remain operable with high probability following a trip of your NPP.

Response to Question 2(j)

N/A, in accordance with the TVAN/TVA PSO intergroup agreement (IGA-6), TVA PSO makes available the transmission system studies and operating guides that determine the adequacy of offsite power.

NRC Question 3 Topic

Use of criteria and methodologies to assess whether the NPP's offsite power system and safety-related components will remain operable when switchyard voltages are inadequate.

Question 3(a)

If the TSO notifies the NPP operator that a trip of the NPP, or the loss of the most critical transmission line or the largest supply to the grid would result in switchyard voltages (immediate and/or long-term) below TS nominal trip setpoint value requirements (including NPP licensees using allowable value in its TSs) and would actuate plant degraded voltage protection, is the NPP offsite power system declared inoperable under the plant TSs? If not, why not?

Response to Question 3(a)

A trip of the NPP with a postulated design bases event is the only contingency considered in the offsite power adequacy studies performed by TVA PSO. Other postulated contingencies, such as loss of the most critical transmission line or largest supply to the grid, have been shown in TVA PSO Planning studies not to cause a trip of the unit and therefore are not used as a basis for operability determination.

If TVA PSO notifies the affected TVAN site(s) that the grid conditions are such that offsite power adequacy cannot be ensured due to an evaluation of the actual system conditions or triggered by system conditions being outside of analyzed boundaries, then License Condition for Operation (LCO) action statements would be entered as applicable in accordance with site operating procedures.

Question 3(b)

If onsite safety-related equipment (e.g., emergency diesel generators or safety-related motors) is lost when subjected to a double sequencing Loss of Coolant Accident (LOCA) with delayed Loss of Offsite Power (LOOP) event) as a result of the anticipated system performance and is incapable of performing its safety functions as a result of responding to an emergency actuation signal during this condition, is the equipment considered inoperable? If not, why not?

Response to Question 3(b)

N/A, TVA's design basis is for simultaneous events (i.e., LOOP/LOCA) and has not evaluated the effects on emergency diesel generators or safety-related motors for a delayed LOOP event.

Question 3(c)

Describe your evaluation of onsite safety-related equipment to determine whether it will operate as designed during the condition described in question 3(b).

Response to Question 3(c)

N/A, TVA's design basis is for simultaneous events (i.e., LOOP/LOCA) and has not evaluated the effects on emergency diesel generators or safety-related motors for a delayed LOOP event.

Question 3(d)

If the NPP licensee is notified by the TSO of other grid conditions that may impair the capability or availability of offsite power, are any plant TS action statements entered? If so, please identify them.

Response to Question 3(d)

No, see the response to 3(a) above. Other grid conditions that might occur, such as weather, system loading, etc., are not used as a basis for operability determination and LCO action statements would not be entered. A trip of the NPP with a postulated design bases event is the only contingency considered in the offsite power adequacy studies performed by the TVA PSO.

Question 3(e)

If you believe your plant TSs do not require you to declare your offsite power system or safety-related equipment inoperable in any of these circumstances, explain why you believe you comply with the provisions of GDC-17 and your plant TSs, or describe what compensatory actions you intend to take to ensure that the offsite power system and safety-related components will remain operable when switchyard voltages are inadequate.

Response to Question 3(e)

LCO actions are not entered for grid conditions that might occur. A trip of the NPP with a postulated design bases event is the only contingency considered in the offsite power adequacy studies performed by the TVA PSO. Other postulated contingencies, such as loss of the most critical transmission line or largest supply to the grid or other grid conditions, such as weather, system loading, etc. are not used as a basis for operability determination.

Postulated contingencies on the transmission grid are not used as a basis for functionality determinations since:

- such events are only postulated and have not actually occurred,
- the offsite power circuits remain capable of effecting a safe shutdown and mitigating the effects of an accident, and
- the GDC-17 criterion discussed in the Generic Letter is still met, i.e., loss of power from the transmission network would not occur as a result of loss of power generated by the nuclear power unit.

### **Question 3(f)**

Describe if and how NPP operators are trained and tested on the compensatory actions mentioned in your answers to questions 3(a) through (e).

### **Response to Question 3(f)**

Requirements for off-site power operability and actions for inoperable offsite power sources are addressed as part of the routine continuing licensed operator requalification training (see response to 1(d)). If off-site power inoperability occurs, compliance with the TS will occur. No compensatory actions are taken.

### **NRC Question 4 Topic**

Use of criteria and methodologies to assess whether the offsite power system will remain operable following a trip of your NPP.

### **Question 4(a)**

Do the NPP operators have any guidance or procedures in plant TS bases sections, the final safety analysis report, or plant procedures regarding situations in which the condition of plant-controlled or -monitored equipment (e.g., voltage regulators, auto tap changing transformers, capacitors, static VAR compensators, main generator voltage regulators) can adversely affect the operability of the NPP offsite power system? If so, describe how the operators are trained and tested on the guidance and procedures.

### **Response to Question 4(a)**

Yes, TVAN site operating procedures provide guidance for the operators to notify TVA PSO anytime equipment such as generator voltage regulators, capacitor banks, etc., are out-of-service that have the potential to affect off-site power operability. TVA PSO will perform an evaluation and determination of offsite power operability based on current system configuration.

Operator training and testing is described in response to 1(d).

#### **Question 4(b)**

If your TS bases sections, the final safety analysis report, and plant procedures do not provide guidance regarding situations in which the condition of plant-controlled or monitored equipment can adversely affect the operability of the NPP offsite power system, explain why you believe you comply with the provisions of GDC-17 and the plant TSs, or describe what actions you intend to take to provide such guidance or procedures.

#### **Response to Question 4(b)**

N/A, see 4(a) above.

#### **NRC Question 5 Topic**

Performance of grid reliability evaluations as part of the maintenance risk assessments required by 10 CFR 50.65(a)(4).

#### **Question 5(a)**

Is a quantitative or qualitative grid reliability evaluation performed at your NPP as part of the maintenance risk assessment required by 10 CFR 50.65(a)(4) before performing grid-risk-sensitive maintenance activities? This includes surveillances, post-maintenance testing, and preventive and corrective maintenance that could increase the probability of a plant trip or LOOP or impact LOOP or SBO coping capability, for example, before taking a risk-significant piece of equipment (such as an EDG, a battery, a steam-driven pump, an alternate AC power source) out-of-service?

#### **Response to Question 5(a)**

TVAN sites use a combination of Technical Instructions, procedures, computer tools, such as Sentinel, and Business Practices to identify grid-risk-sensitive-maintenance activities, evaluate the Probabilistic Safety Analysis/Incremental Core Damage Frequency (PSA/ICDF) risk impact of planned maintenance activities for those identified components, and determine the resultant plant risk category. All of these are qualitative assessments.

This guidance helps ensure that generation capability is not interrupted at a peak load time and that risk associated with grid reliability challenges for mitigating "loss of off site power / station black out" conditions on the grid or at the site is managed.

Appendix G of Standard Process Procedures (SPP) - 7.1, "On-Line Work Management," addresses plant risk when the plant is operating. SPP-7.2, "Outage Management" addresses plant risk when the plant is shut down.

#### **Question 5(b)**

Is grid status monitored by some means for the duration of the grid-risk-sensitive maintenance to confirm the continued validity of the risk assessment and is risk reassessed when warranted? If not, how is the risk assessed during grid-risk-sensitive maintenance?

#### Response to Question 5(b)

Yes, TVA PSO has developed an internal website that identifies each plant's anticipated offsite power status as green (no offsite power risks), yellow (offsite power vulnerable), or red (offsite power disqualified). These predicted conditions are included in evaluation of risk for planned activities.

Grid condition is assessed as part of the 12 week scheduling process and at the beginning of each day. If conditions change and the reliability of an offsite source is in question, the TVA PSO Operator would inform the affected TVAN site(s).

Upon notification by the TVA PSO, site operating procedures provide the guidance necessary to identify immediate corrective actions to resolve emergent plant issues that may include degrading grid conditions. This may require the site to review the current risk assessment and reassess the plant risk as applicable.

Additionally, TVA PSO issues System Alerts that are used to warn of unusual, impending emergency, and emergency conditions pertaining to power supply adequacy, transmission system integrity, grid reliability, and weather. Upon receipt of a system alert, the site will take actions as defined in SPP-7.1 Appendix G.

#### Question 5(c)

Is there a significant variation in the stress on the grid in the vicinity of your NPP site caused by seasonal loads or maintenance activities associated with critical transmission elements? Is there a seasonal variation (or the potential for a seasonal variation) in the LOOP frequency in the local transmission region? If the answer to either question is yes, discuss the time of year when the variations occur and their magnitude.

#### Response to Question 5(c)

No. Grid stress and predicted LOOP frequency at the three TVAN sites do not significantly correlate to seasonal time periods. TVA operates a very robust grid and has never experienced a stressed grid, as defined in this GL, or a grid-centered LOOP event. While peak system loads occur in Summer and Winter and the bulk of TVA's generation and transmission maintenance outages are scheduled for Spring and Fall, these events are planned and managed carefully to avoid causing grid stress or placing an NPP at risk for LOOP.

#### Question 5(d)

Are known time-related variations in the probability of a LOOP at your plant site considered in the grid-risk-sensitive maintenance evaluation? If not, what is your basis for not considering them?

#### Response to Question 5(d)

No. There are no time-related variations in the probability of a LOOP at the three TVA nuclear sites and are therefore not considered in the grid-risk-sensitive maintenance evaluation. See response to 5(c).

**Question 5(e)**

Do you have contacts with the TSO to determine current and anticipated grid conditions as part of the grid reliability evaluation performed before conducting grid-risk-sensitive maintenance activities?

**Response to Question 5(e)**

Yes, see response to 5(b) above. The points of contact in TVA PSO that the site would contact to determine current or anticipated grid conditions are either the On-Site PSO Transmission Manager (responsible for the site switchyard maintenance) or the PSO Transmission Operator or Operations Duty Specialist (responsible for operation of the grid). The TVA PSO internal website that identifies anticipated grid condition is also used to determine status.

**Question 5(f)**

Describe any formal agreement or protocol that you have with your TSO to assure that you are promptly alerted to a worsening grid condition that may emerge during a maintenance activity.

**Response to Question 5(f)**

The interface agreement (IGA-6) between TVAN and TVA PSO requires routine communication with the site shift management on any pertinent transmission matters. TVA PSO promptly notifies site shift management at any time when the grid cannot assure adequate offsite power and cannot be corrected within 15 minutes. TVA PSO also issues System Alerts that are used to warn of unusual, impending emergency, and emergency conditions pertaining to power supply adequacy, transmission system integrity, grid reliability, and weather. These notifications occur whether or not a specific maintenance activity is in progress at the TVAN site.

**Question 5(g)**

Do you contact your TSO periodically for the duration of the grid-risk-sensitive maintenance activities?

**Response to Question 5(g)**

No, grid-risk-sensitive activities are generally scheduled when there are no anticipated challenges for transmission system support of offsite power. Therefore, there are no additional actions required by TVA PSO. In the event that there is a change in grid status, the affected TVAN site would be notified by TVA PSO and the grid-risk-sensitive activities and current risk assessment would be evaluated and the plant risk re-assessed as applicable.

The online PSO NUCLEAR GRID COLOR STATUS is checked periodically to verify acceptable grid conditions when scheduling grid-risk-sensitive maintenance activities.

TVAN procedure SPP-7.1, Appendix G, requires notification to the TVA PSO of risk changes that emerge during ongoing maintenance.

**Question 5(h)**

If you have a formal agreement or protocol with your TSO, describe how NPP operators and maintenance personnel are trained and tested on this formal agreement or protocol.

**Response to Question 5(h)**

TVAN procedure SPP-7.1 and SPP-7.2 are used by work control/scheduling personnel to evaluate work performance at the TVAN sites. Site scheduling personnel are trained on SPP-7.1 and SPP-7.2 by self-study reading and sign-off of completion.

Familiarity with these documents is a basic skill that each scheduling manager must possess.

Operator training and testing is described in response to 1(d).

**Question 5(i)**

If your grid reliability evaluation, performed as part of the maintenance risk assessment required by 10 CFR 50.65(a)(4), does not consider or rely on some arrangement for communication with the TSO, explain why you believe you comply with 10 CFR 50.65(a)(4).

**Response to Question 5(i)**

N/A, TVAN's NPPs have procedures that require grid reliability be evaluated as part of the maintenance risk assessments (see responses to 5(e), 5(f), and 5(g)).

**Question 5(j)**

If risk is not assessed (when warranted) based on continuing communication with the TSO throughout the duration of grid-risk-sensitive maintenance activities, explain why you believe you have effectively implemented the relevant provisions of the endorsed industry guidance associated with the maintenance rule.

**Response to Question 5(j)**

N/A, see the response to 5(i) above

**Question 5(k)**

With respect to questions 5(i) and 5(j), you may, as an alternative, describe what actions you intend to take to ensure that the increase in risk that may result from proposed grid-risk-sensitive activities is assessed before and during grid-risk-sensitive maintenance activities, respectively.

**Response to Question 5(k)**

N/A, no alternative actions are necessary.

### **NRC Question 6 Topic**

Use of risk assessment results, including the results of grid reliability evaluations, in managing maintenance risk, as required by 10 CFR 50.65(a)(4).

#### **Question 6(a)**

Does the TSO coordinate transmission system maintenance activities that can have an impact on the NPP operation with the NPP operator?

#### **Response to Question 6(a)**

Yes, routine transmission system maintenance activities performed at TVAN sites are scheduled and reviewed in accordance with TVAN processes and are included in that site's daily schedule. Activities that are performed offsite are reviewed for impact on the transmission system's ability to provide offsite power. The respective TVAN site is notified by TVA PSO of any offsite power issues that develop during these reviews. Emergent issues that impact a TVAN site are communicated by the TVA PSO to the site's Operations Shift Manager.

#### **Question 6(b)**

Do you coordinate NPP maintenance activities that can have an impact on the transmission system with the TSO?

#### **Response to Question 6(b)**

Yes, TVAN unit down-powers that are made in support of maintenance activities and maintenance outages are scheduled and coordinated with TVA PSO. Notifications of changes to equipment can have an impact on the transmission system such as a generator voltage regulator placed in manual.

Local switchyard maintenance activities are under the control of TVA PSO.

#### **Question 6(c)**

Do you consider and implement, if warranted, the rescheduling of grid-risk-sensitive maintenance activities (activities that could (i) increase the likelihood of a plant trip, (ii) increase LOOP probability, or (iii) reduce LOOP or SBO coping capability) under existing, imminent, or worsening degraded grid reliability conditions?

#### **Response to Question 6(c)**

Yes, work activities that have nuclear safety or generation risk implications are always carefully reviewed prior to commencing the work, and discretionary activities are considered for postponement if off-normal grid conditions (e.g., especially high system load or unavailability of a key transmission line) make it prudent to do so. In the event that such an activity must be performed, consideration of alternate equipment protection measures and compensatory actions are taken to minimize additional challenges. Guidance is provided in TVAN procedure SPP-7.1 Appendix G.

**Question 6(d)**

If there is an overriding need to perform grid-risk-sensitive maintenance activities under existing or imminent conditions of degraded grid reliability, or continue grid-risk-sensitive maintenance when grid conditions worsen, do you implement appropriate risk management actions? If so, describe the actions that you would take. (These actions could include alternate equipment protection and compensatory measures to limit or minimize risk.)

**Response to Question 6(d)**

Yes, examples of risk-management actions which might be taken are included in TVAN procedure SPP-7.1, Section 3.5.2. It should be noted that situations of actual degraded grid reliability are rarely, if ever, seen at TVAN sites, so such work activities and any risk-management actions are handled on a case-by-case basis.

**Question 6(e)**

Describe the actions associated with questions 6(a) through 6(d) above that would be taken, state whether each action is governed by documented procedures and identify the procedures, and explain why these actions are effective and will be consistently accomplished.

**Response to Question 6(e)**

Each TVAN site uses a proceduralized process; therefore, no individual action results from each risk assessment. The assessments may lead to actions such as compensatory plans or barriers that are put in place to support a specific activity when other systems are out-of-service.

**Question 6(f)**

Describe how NPP operators and maintenance personnel are trained and tested to assure they can accomplish the actions described in your answers to question 6(e).

**Response to Question 6(f)**

See the response to 5(h) above. 10 CFR 50.65(a)(4) is implemented through the use of SPP-7.1 risk-management practices and application of each site's Technical Specifications for off-site power requirements.

**Question 6(g)**

If there is no effective coordination between the NPP operator and the TSO regarding transmission system maintenance or NPP maintenance activities, please explain why you believe you comply with the provisions of 10 CFR 50.65(a)(4).

**Response to Question 6(g)**

N/A, coordination between the TVAN sites and TVA PSO is effective.

**Question 6(h)**

If you do not consider and effectively implement appropriate risk management actions during the conditions described above, explain why you believe you effectively addressed the relevant provisions of the associated NRC-endorsed industry guidance.

**Response to Question 6(h)**

N/A, appropriate risk management actions are taken at the three TVAN sites.

**Question 6(i)**

You may, as an alternative to questions 6(g) and 6(h) describe what actions you intend to take to ensure that the increase in risk that may result from grid-risk-sensitive maintenance activities is managed in accordance with 10 CFR 50.65(a)(4).

**Response to Question 6(i)**

No alternative actions are required.

**NRC Question 7 Topic**

Procedures for identifying local power sources that could be made available to resupply your plant following a LOOP event.

**Question 7(a)**

Briefly describe any agreement made with the TSO to identify local power sources that could be made available to resupply power to your plant following a LOOP event.

**Response to Question 7(a)**

TVAN and TVA PSO have formal agreements (IGA-6) which establish protocols (communication and coordination) for restoration of an external power supply (not necessarily a GDC-17 qualified offsite power source) to the TVAN sites on a priority basis following the plants' separation from the grid due to plant or grid conditions. These protocols are referred to as "black start" procedures.

TVA PSO has specific black start procedures for each TVAN site which lists the priority and alternate black start sources and the resources necessary for the connections.

Each TVAN site is located near a TVA owned and operated hydro-electric facility.

**Question 7(b)**

Are your NPP operators trained and tested on identifying and using local power sources to resupply your plant following a LOOP event? If so, describe how.

Response to Question 7(b)

Should off-site power be lost to a TVAN site, each site has a procedure for restoration of power when off-site power again becomes available.

Operator training and testing is described in response to 1(d).

Question 7(c)

If you have not established an agreement with your plant's TSO to identify local power sources that could be made available to resupply power to your plant following a LOOP event, explain why you believe you comply with the provisions of 10 CFR 50.63, or describe what actions you intend to take to establish compliance.

Response to Question 7(c)

N/A, see 7(a) above.

NRC Question 8 Topic

Maintaining SBO coping capabilities in accordance with 10 CFR 50.63.

Question 8(a)

Has your NPP experienced a total LOOP caused by grid failure since the plant's coping duration was initially determined under 10 CFR 50.63?

Response to Question 8(a)

No, TVAN sites have not experienced a grid-centered LOOP event since the (SBO) rule under 10CFR 50.63 was adopted.

Although not grid centered, WBN had a switchyard event that resulted in a LOOP as reported in LER 2002-005, "Loss of Offsite Power Due to a Fire at the WBN Hydroelectric Generating Plant," dated November 26, 2002.

Question 8(b)

If so, have you reevaluated the NPP using the guidance in Table 4 of RG 1.155 to determine if your NPP should be assigned to the P3 offsite power design characteristic group?

Response to Question 8(b)

N/A

Question 8(c)

If so, what were the results of this reevaluation, and did the initially determined coping duration for the NPP need to be adjusted?

Response to Question 8(c)

N/A

Question 8(d)

If your NPP has experienced a total LOOP caused by grid failure since the plant's coping duration was initially determined under 10 CFR 50.63 and has not been reevaluated using the guidance in Table 4 of RG 1.155, explain why you believe you comply with the provisions of 10 CFR 50.63 as stated above, or describe what actions you intend to take to ensure that the NPP maintains its SBO coping capabilities in accordance with 10 CFR 50.63.

Response to Question 8(d)

N/A

Not applicable, see response to Question 8(a).

Question 9

If you determine that any action is warranted to bring your NPP into compliance with NRC regulatory requirements, including TSs, GDC 17, 10 CFR 50.65(a)(4), 10 CFR 50.63, 10 CFR 55.59 or 10 CFR 50.120, describe the schedule for implementing it.

Response to Question 9

N/A, based upon the above responses, no additional action is required to bring TVA into compliance with regulatory requirements regarding the topics included in this generic letter.