BellBendCOLPEm Resource

From: Bhatia, Bhupendra
Sent: Tuesday, March 16, 2010 12:35 PM
To: BellBendCOL Resource
Cc: Johnson, Robert; Kang, Peter
Subject: FW: NUMARK Documents for the NRC Hearing File for TO #49, Bell Bend, Chapter #8- NON PUBLIC
Attachments: BBNPP 8.2 Draft 3-SCOL w RAIs.doc

From: Hearing File [mailto:HearingFile@numarkassoc.com]
Sent: Monday, March 15, 2010 10:17 AM
To: Bhatia, Bhupendra
Subject: NUMARK Documents for the NRC Hearing File for TO #49, Bell Bend, Chapter #8.

The attached information is being provided to you from Numark Associates, Inc pursuant to 10 CFR 2.1203(b) for inclusion in the NRC Hearing File.

Please contact Ms Karen Hall if you have any questions.

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-----Original Message-----
From: George Morris
Sent: Sunday, March 01, 2009 9:47 PM
To: Marty Bowling
Cc: Brian Grimes; Stan Kobylarz; Hearing File
Subject: Incorporation of PQOG comments into TER 8.2 for TO #49

Marty,

Attached is the revised file for TER 8.2 for TOs 49 and the Form 3 addressing the PQOG comments.

George Morris

Hearing Identifier: BellBend_COL_Public
Email Number: 505

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Subject: FW: NUMARK Documents for the NRC Hearing File for TO #49, Bell Bend, Chapter #8- NON PUBLIC
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From: Bhatia, Bhupendra

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Recipients:
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8.2 Offsite Power System

The BBNPP offsite power system is designed to provide reliable electric power from the transmission system to provide for safe shutdown of the reactor.

8.2.1 Introduction

The safety function of the offsite power system (assuming the onsite power system is not functioning) is to provide sufficient capacity and capability to ensure that the structures, systems, and components important to safety perform as intended. The objective of the staff review is to determine that the offsite power system satisfies the requirements of 10 CFR 50, Appendix A, General Design Criteria (GDC) 2, 4, 5, 17, and 18 and will perform its design function during all plant operating and accident conditions.

8.2.2 Summary of Application

Section 8.2 of the BBNPP FSAR incorporates by reference Section 8.2 of the U.S. EPR FSAR. (See section 1.1 of this SER.)

In addition, in FSAR Sections 8.2.1.1, 8.2.1.2, 8.2.2.4, 8.2.2.5, and 8.2.2.7, the applicant provided the following:

Interface Requirements:

Tier 1 Chapter 4, Section 2.5 of the U.S. EPR Application contains information related to the following plant interfaces that are required to be addressed in the COL designs:

- Off-site AC power transmission system connections to the switchyard and the connection to the plant power distribution system.

- Auxiliary power and generator transformer areas.

The BBNPP FSAR Section 8.2 addresses the transmission system, switchyard design and the auxiliary power and generator transformer areas as noted below.

Combined License Information Items:

The applicant provided additional site-specific information in Section 8.2.1.1 to address COL Information Item 8.2-1, the offsite transmission system and their connections to the station switchyard.

The applicant provided additional site-specific information in Section 8.2.1.1 to address COL Information Item 8.2-7:

> (a) A description of the communication agreements between the nuclear generator and the transmission entities, and

(b) A description of the analysis tools used by the transmission entities to determine the impact that the loss of transmission system elements will have on the capability of the offsite power supply to provide adequate post-trip voltage.

The applicant provided additional site-specific information in Section 8.2.1.2 to address COL Information Item 8.2-2, the switchyard layout design.

FSAR Figure 8.2-1 provided a switchyard single line diagram for Unit 2.

The applicant provided additional site-specific information in Section 8.2.1.2 to address COL Information Item 8.2-5, protective devices that control the switchyard breakers and other switchyard relay devices.

The applicant provided additional site-specific information in Section 8.2.1.2 to address COL Information Item 8.2-8, indication and control of switchyard components.

The applicant provided additional site-specific information in Section 8.2.2.4 to address COL Information Item 8.2-4, grid stability analysis.

The applicant provided additional site-specific information in Section 8.2.2.5 to address COL Information Item 8.2-6, switchyard equipment inspection and testing plan.

The applicant provided additional site-specific information in Section 8.2.2.7 to address COL Information Item 8.2-3, actions necessary to restore offsite power and use available nearby power sources when offsite power is unavailable.

ITAAC:

Site-specific inspections, tests, analyses and acceptance criteria (ITAACs) are given in Appendix B to Part 10 of the BBNPP application. No license conditions are proposed for this section. The staff reviewed the following ITAACs, listed in tabular form in the application, as applicable to this section:

Table 2.4-11, Grid Systems Control Building
Table 2.4-24, Offsite Power
Table 2.4-25, Power Generation

Technical Specifications:

The applicant did not incorporate by reference the U.S. EPR generic Technical Specifications and Bases. The applicant stated that they used the U.S. EPR generic Technical Specifications as a reference when developing the site specific Technical Specifications. The applicant included the site specific Technical Specifications in Part 4 of their COL application. The staff reviewed the technical specifications applicable to this section during the review of Chapter 16 and Part 4, Section 3.8, Electrical Systems, of the BBNPP application.

8.2.3 Regulatory Basis

The relevant requirements of the Commission regulations for this area of review, and the associated acceptance criteria, are given in Section 8.2 of NUREG-0800 and are summarized below. Review interfaces with other NUREG-0800 sections also can be found in Section 8.2 of NUREG-0800. The BBNPP application incorporated by reference (IBR) the EPR FSAR commitments to most of the requirements for this section found in NUREG-0800, Section 8.2.

1. GDC 17 as it relates to the preferred power system's (i) capacity and capability to permit functioning of structures, systems, and components important to safety; (ii) provisions to minimize the probability of losing electric power from any of the remaining supplies as a result of, or coincident with, the loss of power generated by the nuclear power unit, the loss of power from the transmission network, or the loss of power from the onsite electric power supplies; (iii) physical independence; (iv) availability; and (v) capability.

2. GDC 18 as it relates to the inspection and testing of the offsite electric power system.

3. 10 CFR 50.63 as it relates to an alternate AC (AAC) power source (as defined in 10 CFR 50.2) provided for safe shutdown in the event of a station blackout (non-design-basis accident (non-DBA)).

Acceptance criteria adequate to meet the above requirements include:

1. RG 1.32 (see also IEEE Std 308) as related to the availability and number of immediate access circuits from the transmission network.

2. Acceptance is based on meeting the guidelines of RG 1.155 as they relate to the adequacy of the AAC source and the independence of the AAC power source from the offsite and onsite power systems and sources. New applications must provide an adequate AAC source of diverse design (with respect to AC onsite emergency sources) that is consistent with the guidance in RG 1.155 and capable of powering at least one complete set of normal safe shutdown loads.

3. RG 1.206 as it relates to power system analytical studies and stability studies to verify the capability of the offsite power systems and their interfaces with the onsite power system.

4. SECY 91-078 as it relates to the interface between the onsite AC power system and the offsite power system.

8.2.4 Technical Evaluation

The NRC staff reviewed Section 8.2 of the BBNPP FSAR and considered the referenced U.S. EPR FSAR sections. The NRC staff's review confirmed that the information contained in the application and incorporated by reference addresses the relevant information related to this section.

The staff reviewed the information contained in Sections 8.2.1.1, 8.2.1.2, 8.2.2.4, 8.2.2.5, and 8.2.2.7 of the BBNPP FSAR:

Combined License Information Items:

The staff review of BBNPP FSAR Section 8.2.1.1 found the applicant provided sufficient site specific information regarding the offsite transmission system and their connections to the station switchyard to demonstrate the independence of the transmission lines feeding the BBNPP switchyard. (COL Information Item 8.2-1)

FSAR Figures 8.2-1and 8.2-1 show the new BBNPP switchyard is connected to BBNPP by means of six overhead lines. The BBNPP switchyard is connected to the PPL Electric Utilities Corporation (PPL EU) transmission system by two normally energized, physically independent, overhead 500 kV transmission lines.

FSAR Table 8.2-1 shows the 500 kV transmission lines are single circuits, each circuit having a thermal rating of 4260 MVA. One transmission line connects the BBNPP site to an expansion of the existing Susquehanna 500 kV Yard and the other transmission line connects the BBNPP site to the new Susquehanna 500 kV Yard 2. This arrangement provides two preferred sources of power for the reactor protection system and engineered safety features (ESFs) during normal, abnormal, and accident conditions.

The two transmission lines and their associated structures interconnecting the BBNPP switchyard and the transmission system are designed and located to successfully withstand the loading requirements for postulated environmental conditions and for postulated line breaking and tower failures to minimize the possibility of their simultaneous failure.

The staff review of BBNPP FSAR Section 8.2.1.2 found the applicant provided sufficient site-specific information for the switchyard layout design to demonstrate the independence of the offsite power connection from the BBNPP switchyard to the BBNPP auxiliary transformers. (COL Information Item 8.2-2)

The new 500 kV Gas Insulated Switchyard (GIS) for BBNPP has been designed to accommodate the output of BBNPP. The switchyard is located on the BBNPP site approximately 150 ft east of BBNPP. The BBNPP switchyard includes six bays in a breaker-and-a-half / double breaker configuration.

The BBNPP switchyard circuit breakers and disconnect switches are sized in accordance with IEEE Standard C37.06 and the breakers are equipped with dual trip coils. The 500 kV circuit breakers in the switchyard are rated according to the following criteria.

- Continuous current.
- Interrupting duty.
- Momentary rating.
- Maximum expected operating voltage.

The staff review of BBNPP FSAR Section 8.2.2.7 found the applicant provided site-specific information for responding to a loss of Offsite Power. (COL Information Item 8.2-3)

The staff found that identifies BBNPP includes two redundant SBO diesel generators designed in accordance with 10 CFR 50.63 and Regulatory Guide 1.155. The staff agreed that reliance on additional off-site power sources as an alternate AC source was not required. The staff addressed actions necessary to restore off-site power are described in FSAR Section 8.4.2.6.4.

The staff review of BBNPP FSAR Section 8.2.2.4 found the applicant provided sufficient site-specific information regarding grid stability analysis. (COL Information Item 8.2-4)

Two PJM studies are relevant for BBNPP: The preliminary Susquehanna 1600 MW R01-R02 Impact Study Re-study (SIS) and the PJM Preliminary Stability Study for R01-R02, Bell Bend 500KV-1800MW (PSS). The SIS projects the impact that BBNPP will have on the network and the PSS shows that PJM Generator Interconnection for Bell Bend is stable for all tested conditions. The PSS analyzed transient stability for the addition of BBNPP, and was prepared using PJM's planning criteria against the 2012 summer peak conditions load and identified design requirements necessary to maintain the reliability of the transmission system. The criteria are based on PJM planning procedures, NERC Planning Standards, and RFC Regional Reliability Council planning criteria. For the stability analysis, light loading (50% of peak loading) is utilized with maximum generation.

The computer analysis was performed using the Siemens Power Technology International Software PSS/E. The analysis examined conditions involving loss of the largest generating unit, loss of the most critical transmission line, and multiple facility contingencies.

The results of the study conclude that with the additional generating capacity of BBNPP the transmission system remains stable under the analyzed conditions, preserving the grid connection, and supporting the normal and shutdown requirements of BBNPP.

A PJM System Voltage Study, using PSS/E software for load flow, was performed to determine the maximum and minimum voltage that the switchyard can maintain without any reactive support from BBNPP. The study used the same reliability planning criteria as was used on the SIS. Based on the results of the System Voltage Study, the grid will not be lost due to the loss of the largest generating unit (i.e., BBNPP), the loss of the most critical transmission line, or the loss of the largest load on the grid. The design of the on-load tap changers for each Emergency Auxiliary Transformer (EAT) ensures that the downstream EPSS 6.9 kV buses have sufficient voltage to preclude the degraded voltage protection scheme from separating the buses from the preferred power source.

The application also indicated that following recommended modifications to the renamed Susquehanna-Lackawanna 500 kV line the local transmission system would remain stable. Upon completion of these modifications and verification of the updated analysis

following those modifications, the staff believes BBNPP will satisfy the requirements of GDC 17, Section ii. **(RAI 8.2-1)**

The staff review of BBNPP FSAR Section 8.2.1.2 found the applicant provided adequate site-specific information for the protective devices that control the BBNPP switchyard breakers and other switchyard relay devices. (COL Information Item 8.2-5)

Electrical protection of circuits from the BBNPP switchyard is provided by a primary and secondary relaying scheme and a breaker failure scheme. The current input for the protective relaying schemes come from separate sets of circuit breaker bushing current transformers. Also, the control power for all primary and secondary relaying schemes is supplied from two switchyard 125 VDC battery systems located in the BBNPP 500 kV switchyard control house, separate from the battery systems within the BBNPP, which support the physical independence of the offsite power transmission sources required by GDC-17, Section iii.

In FSAR Section 8.2.2.5, the applicant provided adequate site-specific information for the station switchyard equipment inspection and testing plan. (COL Information Item 8.2-6)

The applicant referred to a future interface agreement between BBNPP and PJM that would address the inspection and maintenance of the transmission components of the offsite power system. **(Post COL ITEM 8.2-2)**

In FSAR Section 8.2.1.1 the applicant provided site specific information regarding future communication agreements and protocols between the station and the transmission system operator, independent system operator, or reliability coordinator/authority. (COL Information Item 8.2-7)

In FSAR Section 8.2.1.1, the applicant stated PJM, PPL EU and the BBNPP operator would have formal agreements and protocols in place to provide safe and reliable operation of the transmission system and equipment at BBNPP. These agreements would ensure Nuclear Plant Licensing Requirements will be monitored and maintained to ensure compliance with GDC 17 and GDC 18.

The applicant indicated in FSAR Section 8.2.1.1 that during plant operation, BBNPP would rely on PPL EU and PJM (through PJM's Energy Management System (EMS) program) to continuously monitor real-time power flows and assesses contingency impacts. Operational planning studies would also be performed using offline power flow study tools to assess near term operating conditions under varying load, generation, and transmission topology patterns to ensure compliance with GDC 17.

The BBNPP FSAR did not address the North American Electric Reliability Corporation reliability standard NUC-001-1, Nuclear Plant Interface, which formalizes agreements between the nuclear plant operator and the transmission entities for the purpose of ensuring nuclear plant safe operation and shutdown. **(RAI 8.2-2)**

The staff review of BBNPP FSAR Section 8.2.1.2 found the applicant provided adequate site-specific information regarding indication and control of switchyard components. (COL Information Item 8.2-8)

Control power for switchyard breakers required for BBNPP offsite power from the transmission system is provided by a dual set of batteries located inside the switchyard control house in the switchyard. A switchyard DC system undervoltage condition is alarmed in the main control room.

Administrative control of switchyard breakers is shared between BBNPP and PJM. The switchyard breakers connecting the Main Step-Up transformers and the auxiliary transformers are controlled by BBNPP and the breakers associated with the offsite connecting transmission lines is delegated to the transmission system owner (PPL EU). Local tripping control is also provided at the circuit breakers. Disconnect switches are provided to individually isolate each circuit breaker from the switchyard bus and associated lines. This ensures compliance to GDC-17 Sections ii, iv and v.

The staff addressed 10 CFR 50.63 as it relates to an alternate AC (AAC) power source as part of their review of FSAR Section 8.4.

ITAAC:

Site-specific inspections, tests, analyses and acceptance criteria for the site-specific supplemental information for the offsite power system are given in the BBNPP application Part 10. No license conditions are proposed for this section. Site specific ITAACs are presented in Appendix B to Part 10 of the application. The staff reviewed the site-specific ITAACs, and found them adequate to address the required site specific inspections, tests, analyses and acceptance criteria for the offsite power system. The results of the following off-site power system inspections, tests, or analyses are required for post COL review:

- Verify the as-built Load Flow and Voltage studies **(RAI 8.2-3)**

- Verify that modifications required to ensure the stability of the transmission system required by the PSS, and other modifications identified in subsequent studies **(RAI 8.2-1)**

- Verify the conclusions of the Load Flow and Voltage Regulation studies (by measurement) to demonstrate transmission system capability to provide adequate voltage to the Class 1E loads during static and dynamic conditions. **(RAI 8.2-4)**

Technical Specifications:

The staff review of BBNPP FSAR Section 16 and Part 4 of the BBNPP application for the offsite power system and found the applicant provided adequate site-specific Technical Specifications except as noted below.

Surveillance Requirement 3.8.1.1 verifies Offsite Power Operability by solely using circuit breaker alignment. General Design Criteria 17 requires that the design minimize the potential of loosing offsite power following a trip of the nuclear unit. Generic Letter 2006-02, Grid Reliability and the Impact on Plant Risk and the Operability of Offsite Power, demonstrated that circuit breaker alignment is insufficient, by itself, to confirm that the Offsite Power System has the capacity and capability to provide sufficient voltage and frequency to power the required safe shutdown loads following a trip of the

nuclear unit. The COL applicant must demonstrate that the Offsite Power System has the capacity and capability to provide sufficient voltage and frequency to power the required safe shutdown loads following a trip of the nuclear unit on a real time basis. **(RAI 8.2-5)**

8.2.5 Post Combined License Activities

There are no post COL activities related to this section.

8.2.6 CONCLUSION

The staff is reviewing the information for the U.S EPR on Docket No. 52-020. The results of the NRC staff's technical evaluation of the information related to this section to be incorporated by reference in the BBNPP FSAR will be documented in the staff's safety evaluation report on the design certification application for the U.S EPR. The SER for the U.S. EPR is not yet complete, and this is being tracked as part of Open Item 1-1. The staff will update Section 8.2 of this SER to reflect the final disposition of the design certification application for the U.S EPR.

As the bases for evaluating the adequacy of the design of the Offsite Power System to accomplish the plant's safety-related functions as presented in the U.S. EPR Design Control Document (DCD) Tier 2, Chapter 8, "Electric Power," the U.S. Nuclear Regulatory Commission (the staff) used the acceptance criteria and guidelines for electric power systems contained in Chapter 8, "Electric Power," of NUREG-0800, "Standard Review Plan for the Review of Safety Analysis Reports for Nuclear Power Plants—LWR Edition" (SRP); Regulatory Guide (RG) 1.153, "Criteria for Safety Systems"; RG 1.155, "Station Blackout"; and Section 50.63 of Title 10 of the Code of Federal Regulations (CFR), "Loss of All Alternating Current Power."

With respect to the supplemental information presented in the BBNPP application, the staff concluded that the supplemental information adequately addressed the acceptance criteria contained in the bases documents, with the exceptions noted below.

In conclusion, the applicant has provided sufficient information for satisfying the following applicable regulations:

1 GDC 17 as it relates to the Offsite Power System except as noted above in the Technical Evaluation.

   a. capacity and capability to permit functioning of structures, systems, and components important to safety; **(RAI 8.2-1 through RAI 8.2-4)**
   b provisions to minimize the probability of losing electric power from any of the remaining supplies as a result of, or coincident with, the loss of power generated by the nuclear power unit or loss of power from the onsite electric power supplies; **(RAI 8.2-2)**
   c physical independence; and
   d availability. **(RAI 8.2.2)**

2 GDC 18 Inspection and testing of the offsite power systems. **(RAI 8.2.2)**

3 10 CFR 50.63 An AAC power source provided for safe shutdown (non-design-basis accident) in the event of a station blackout. (See the staff review of FSAR Section 8.4)

4 10 CFR 50.65(a)(4) Assessment and management of the increase in risk that may result from proposed maintenance activities before performing the maintenance activities. These activities include, but are not limited to, surveillances, post-maintenance testing, and corrective and preventive maintenance. **(RAI 8.2-2)**

5 Regulatory Guide (RG) 1.155 Adequacy of the AAC source and the independence of the AAC power source from the offsite power system and onsite power system and sources. (See the staff review of FSAR Section 8.4)

6 RG 1.160, Effectiveness of maintenance activities for onsite emergency AC power sources including grid-risk-sensitive maintenance activities (i.e., activities that tend to increase the likelihood of a plant trip, increase loss of onsite power (LOOP) frequency, or reduce the capability to cope with a LOOP or station blackout (SBO)). **(RAI 8.2-2)**

As a result of RAIs 8.2-1 and RAI 16.3.8.1-1, the staff is unable to finalize its conclusions on the capability and availability of the offsite power system in accordance with the requirements of the following NRC regulations:

1 GDC 17 as it relates to the Offsite Power System's capacity and capability to power the required BBNPP loads. **(RAI 8.2-1 through RAI 8.2-4)**

2 GDC 17 as it relates to the Offsite Power System's provisions to minimize the probability of losing electric power as a result of, or coincident with, the loss of power generated by the nuclear power unit; **(RAI 8.2-2)**

3 GDC 17 as it relates to the availability of the Offsite Power System and 10 CFR 50.65(a)(4) (and RG 1.160) as it relates to the assessment and management of the increase in risk that may result from maintenance activities on the transmission system affecting the nuclear unit; **(RAI 8.2-2 and RAI 8.2-5)**

FSAR Section 8.2

RAI 8.2-1 Transmission System Modifications

GDC 17 requires that the Offsite Power System have the capacity and capability to provide sufficient power to allow the safety-related loads to perform their safety function

FSAR Section 8.2.1.1 and 8.2.2.4 indicate there are a number of modifications required to permit the Bell Bend plant to be connected to the transmission. Verify that modifications to the breakers at both ends of the renamed Susquehanna-Lackawanna 500 kV transmission line, and other recommendations related to stability, have been completed prior to initial fuel loading. Add this verification to the FSAR as a Post COL Activity and/or as an ITAAC activity.

A response to this RAI is required to clarify how the interface agreements contribute to the assurance of the availability and capability of the offsite power system as required by GDC 17 and the testing requirements of GDC 18.

RAI 8.2-2 Conformance to NERC Reliability Standards

GDC 17 requires the preferred power system (i) have the capacity and capability to permit functioning of structures, systems, and components important to safety; (ii) be physically independent; (iii) be availability and (iv) have provisions to minimize the probability of losing electric power from any of the remaining supplies as a result of, or coincident with, the loss of power generated by the nuclear power unit or loss of power from the onsite electric power supplies.

GDC 18 requires the capability for inspection and testing of the offsite electric power system.

10 CFR 50.63 requires an alternate AC (AAC) power source (as defined in 10 CFR 50.2) be provided for safe shutdown in the event of a station blackout.

10 CFR 50.65(a)(4) requires the assessment and management of the increase in risk that may result from proposed maintenance activities before performing the maintenance activities. These activities include, but are not limited to, surveillances, post-maintenance testing, and corrective and preventive maintenance in the interface between the nuclear generator and the transmission entity.

FSAR Section 8.2.1.1 states the frequency and type of studies to be performed, as well as the required transmission system operation criteria are outlined in the agreements and are in accordance with Federal Energy Regulatory Commission (FERC) reliability standards, PJM and PPL EU standards, regional practices and the Bell Bend Transmission Owner Agreement. The applicant failed to mention the Reliability

Standards of the NorthAmerican Reliability Corporation (NERC), and in particular, NERC Reliability Standard NUC-001-1, Nuclear Plant Interface.

FSAR Sections 8.2.1.1 and 8.2.2.4 state a system impact study was performed for the addition of Bell Bend based upon Regional Reliability criteria. The applicant again failed to mention the Reliability Standards of the NorthAmerican Reliability Corporation (NERC), and in particular, NERC Reliability Standard NUC-001-1, Nuclear Plant Interface.

FSAR Section 8.2.2.5 states maintenance, testing, calibration and inspection, PPL EU follows its own field test manuals, vendor manuals and drawings, industry's maintenance practices and observes (FERC) requirements. The applicant again failed to mention the Reliability Standards of the NorthAmerican Reliability Corporation (NERC), and in particular, NERC Reliability Standard NUC-001-1, Nuclear Plant Interface.

FSAR Section 8.2.2.8 indicates no departures were taken from the U.S. EPR approach for 10 CFR 50.65 (a)(4) regarding assessment of risk.

FERC has endorsed the NorthAmerican Reliability Corporation (NERC) Reliability Standard NUC-001-01, Nuclear Plant Interface. The interface between the generator and the transmission system should be governed by NERC Reliability Standard NUC-001-01. FSAR Section 8.2.1.1, 8.2.2.5, 8.2.2.7 and Section 8.2.2.8 failed to address this NERC reliability standard on Nuclear Plant Interface. This interface standard addresses communication protocols to assure the offsite power system has the capacity and capability to minimize the probability of losing electric power from any of the remaining supplies as a result of, or coincident with, the loss of power generated by the nuclear power unit or loss of power from the onsite electric power supplies.

NERC Reliability Standard NUC-001-01 interface requirements also address GDC 17, as it relates to the availability of the offsite power system and provisions to minimize the probability of losing electric power from the offsite power system upon loss of the generating unit, and 10 CFR 50.65(a)(4), as it relates to the assessment and management of the increase in risk that may result from proposed maintenance activities before performing the maintenance activities. Conformance to this reliability standard will increase the assure maintenance at either the nuclear generating unit or the transmission system is coordinated to reduce risk and control availability of the offsite power supply.

Confirm the interface agreements between the generator (BBNPP) and the transmission system entities (PJM and PPL EU) that are in place are governed by the North American Reliability Corporation, Reliability Standard NUC-001-1, Nuclear Plant Interface Coordination. This standard requires coordination between Nuclear Plant Generator Operators and Transmission Entities for the purpose of ensuring nuclear plant safe operation and shutdown.

A response to this RAI is required to assure the provisions are in place to (1) Minimize the probability of losing electric power from any of the remaining supplies as a result of, or coincident with, the loss of power generated by the nuclear power unit or loss of power from the onsite electric power supplies as required by GDC 17; (2) assure communication protocols address GDC 18 and 10 CFR 50.65 as they relate to the maintenance and testing of interface components; and, (3) agreements are in place that

address 10 CFR 50.65 as it relates to operating procedures between the transmission system entities and the nuclear unit to restore offsite power following a loss of offsite power.

RAI 8.2-3 Incorporate Results of Load Flow and Voltage Regulation Studies into Interface Agreement

GDC 17 as it relates to the preferred power system's (i) capacity and capability to permit functioning of structures, systems, and components important to safety; (ii) provisions to minimize the probability of losing electric power from any of the remaining supplies as a result of, or coincident with, the loss of power generated by the nuclear power unit or loss of power from the onsite electric power supplies; (iii) physical independence; and (iv) availability.

FSAR Section 8.2.2.4 describes the load flow and voltage studies that were performed as part of the PPL studies for the inclusion of the BBNPP onto the PPL EU system. These studies were performed to establish the minimum switchyard voltage that would result in adequate voltage at the Class 1E loads. Confirm (1) this information is included in the interface agreements with the transmission entities, and (2) confirm that the final studies will be performed with as-built data prior to fuel loading at BBNPP.

Include this commitment in the FSAR as a Post COL Activity and an ITAAC item, “Verify the as-built Load Flow and Voltage studies have been performed to establish the minimum voltage required at the switchyard to ensure adequate voltage at the Class 1E loads and the results have been transmitted to the transmission entities”.

RAI 8.2-4 Verify Results of Load Flow and Voltage Studies by Site-specific Field Measurements

GDC 17 as it relates to the preferred power system's (i) capacity and capability to permit functioning of structures, systems, and components important to safety; (ii) provisions to minimize the probability of losing electric power from any of the remaining supplies as a result of, or coincident with, the loss of power generated by the nuclear power unit or loss of power from the onsite electric power supplies; (iii) physical independence; and (iv) availability.

FSAR Section 8.2.2.4 describes the load flow and voltage studies that were performed as part of the PJM studies for the inclusion of the BBNPP onto the PPL EU system. Confirm the results of the load flow and voltage regulation studies will be verified by actual measurement at the BBNPP interface.

Include this commitment in the FSAR as a Post COL Activity and an ITAAC item, “Verify the conclusions of the Load Flow and Voltage studies (by measurement) to demonstrate transmission system capability to provide adequate voltage to the Class 1E loads during static and dynamic conditions following a Unit 2 plant trip during startup testing”.

RAI 8.2-5 Ability to Determine Offsite Power Operability

GDC 17 requires that the offsite power system have the availability to perform its safety function as required by GDC 17 and the capacity and capability to satisfy the last paragraph of GDC 17.

Surveillance Requirement 3.8.1.1 verifies Offsite Power Operability by solely using circuit breaker alignment. General Design Criteria 17 requires that the design minimize the potential of loosing offsite power following a trip of the nuclear unit. Generic Letter 2006-02, Grid Reliability and the Impact on Plant Risk and the Operability of Offsite Power, demonstrated that circuit breaker alignment is insufficient, by itself, to confirm that the Offsite Power System has the capacity and capability to provide sufficient voltage and frequency to power the required safe shutdown loads following a trip of the nuclear unit. State how the COL applicant will demonstrate that the Offsite Power System is available with the capacity and capability to provide sufficient voltage and frequency to power the required safe shutdown loads following a trip of the nuclear unit on a real time basis.

Response to this RAI is required to assure the Offsite Power System has the availability to perform its safety function as required by GDC 17 and the capacity and capability to satisfy the last paragraph of GDC 17.