

## BellBendCOLPEm Resource

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**From:** Bhatia, Bhupendra  
**Sent:** Tuesday, March 16, 2010 12:36 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 8.1\_Final\_R4 \_w\_Confirmatory and Open Items.doc

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**From:** Hearing File [<mailto:HearingFile@numarkassoc.com>]  
**Sent:** Monday, March 15, 2010 10:18 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:** Tuesday, January 12, 2010 6:50 PM  
**To:** Marty Bowling; Hearing File  
**Cc:** Stan Kobylarz; [gwm2@msn.com](mailto:gwm2@msn.com)  
**Subject:** TO 4149, BBNPP, Revision 4 to TER Section 8.1

Marty,

Attached is Revision 4 to TER Section 8.1 which incorporates the Applicants response to RAI 36, Question 08.02-1, as it relates to the schedule for completion of the transmission system modification required to support BBNPP. This response resolves our original RAI 08.01-1 which requested a schedule for the required transmission system modifications. This now becomes a Confirmatory Item.

George

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**From:** Bhatia, Bhupendra

**Created By:** bhfysp.bhfysp@nrc.gov

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## **8.0 Electric Power**

This chapter describes the NRC staff review of the Bell Bend Nuclear Power Plant (BBNPP) electric power systems, including the offsite power system, the onsite power system, and the alternate ac system. Chapter 8 of the BBNPP FSAR incorporates by reference Chapter 8 of the U.S. EPR FSAR with supplementary information provided in BBNPP FSAR Sections 8.1.1, Offsite Power Description; 8.1.3, Safety-Related Loads; 8.1.4, Design Bases; 8.2, Offsite Power System; 8.3.1, Alternating Current Power Systems; and 8.4, Station Blackout. The NRC staff's review confirmed that there is no additional, supplemental, or outstanding information, outside of the U.S. EPR DC FSAR, that is related to the other sections in Chapter 8.

### **8.1 Introduction**

#### **8.1.1 Introduction**

The BBNPP offsite and onsite power systems are designed to provide reliable electric power from the transmission system, the main generator, the onsite power source (emergency diesel generator (EDG)), and the alternate ac (AAC) supply to provide for safe shutdown of the reactor. This section of the BBNPP FSAR provides (a) a brief description of the utility grid and its interconnections to other grids and the nuclear unit, (b) a brief general description of the onsite alternating current and direct current power system, (c) a brief description of the AAC power source, and (d) the design criteria that have been implemented in the design of the electric power systems.

#### **8.1.2 Summary of Application**

Section 8.1 of the BBNPP FSAR incorporates by reference Section 8.1 of the U.S. EPR FSAR.

In addition, in BBNPP FSAR Section 8.1.1, 8.1.3, and 8.1.4, the applicant provided the following:

##### **COL Information Items**

The applicant provided additional information in Section 8.1 to address COL Information Item 8.1-1 from U.S. EPR FSAR Tier 2, Table 1.8-2 included under Section 8.1.1 from U.S. EPR FSAR Tier 2, Table 1.8-2 as follows:

A COL applicant that references the U.S. EPR design certification will provide site-specific information describing the interface between the offsite transmission system, and the nuclear unit, including switchyard interconnections.

The applicant provided additional information in Section 8.1 to address COL Information Item 8.1-2 from U.S. EPR FSAR Tier 2, Table 1.8-2 included under Section 8.1.1 from U.S. EPR FSAR Tier 2, Table 1.8-2 as follows:

A COL applicant that references the U.S. EPR design certification will identify site-specific loading differences that raise EDG or Class 1E battery loading, and

demonstrate the electrical distribution system is adequately sized for the additional load.

The applicant provided additional information in Section 8.1.4 indicating the information requested by Generic Letter 2006-02, Grid Reliability and the Impact on Plant Risk and Operability of Offsite Power, as indicated in U.S. EPR FSAR Section 8.2.1.1, is presented in Section 8.2.1.1 of the BBNPP FSAR.

### **Technical Specifications**

Site-specific technical specifications are addressed in Part 04 of the application. Refer to Chapter 16 subsection 3.8 of this DTER where these items are addressed.

### **ITAAC**

Site-specific inspections, tests, analyses, and acceptance criteria (ITAACs) are addressed in Part 10 of the application. Refer to subsections 8.2, 8.3 and 8.4 of this DTER where these items are addressed.

### **8.1.3 Regulatory Basis**

The regulatory basis of the information incorporated by reference is addressed within the FSER related to the U.S. EPR FSAR.

In addition, the relevant requirements of the Commission regulations for the supplemental information being reviewed and the associated acceptance criteria, are given in Section 8.1 of NUREG-0800.

The applicable regulatory requirements for [information being reviewed in the COL] are as follows:

1. General Design Criterion (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; (iv) availability.

### **8.1.4 Technical Evaluation**

The NRC staff reviewed Section 8.1 of the BBNPP FSAR and checked the referenced U.S. EPR FSAR to ensure that the combination of the information in the U.S. EPR FSAR and the information in the BBNPP FSAR represent the complete scope of information relating to this review topic. The NRC staff's review confirmed that the information contained in the application and incorporated by reference addresses the required information relating to this section. Section 8.1 of the U.S. EPR FSAR is being reviewed by the staff under docket number 52-020. The NRC staff's technical evaluation of the information incorporated by reference related to electric power will be documented in the staff safety evaluation report on the design certification application for the U.S.

EPR.

The staff reviewed the information contained in Sections 8.1.1, 8.1.3, and 8.1.4, of the BBNPP FSAR. With respect to the supplemental information contained in the BBNPP application, the staff determined:

**Combined License Information Items:**

The applicant provided additional information in Section 8.1.1 to address FSAR Table 1.8-2, COL Information Item 8.1-1. The staff confirmed the COL applicant adequately described, for this section, the attributes of the existing and new transmission system and the connections to the BBNPP switchyard.

The staff confirmed, as shown in FSAR Figure 8.1-1, BBNPP Site 500 kV Circuit Corridors, BBNPP is connected to the existing and new transmission system via two independent 500 kV circuits, each of which has the capacity to provide offsite power to BBNPP. One circuit connects the BBNPP site to the existing Susquehanna 500 kV Yard via a 500 kV, 4260 MVA line, and one circuit connects the BBNPP site to the Susquehanna 500 kV Yard 2 via a 500 kV, 4260 MVA line. Each circuit is on individual towers. The BBNPP is connected to the BBNPP switchyard by means of six overhead lines.

The staff determined the BBNPP proposed design provides adequate connection to the transmission system to address the capacity, capability, physical independence, and availability of the offsite power system requirements of GDC 17. However, the staff was unable to finalize its conclusions without a description and schedule for the new transmission system modifications. In RAI 36, Question 08.02-1, the staff requested additional information on the new 500 kV switchyard and supporting transmission system. On December 9, 2009, the applicant stated that the Susquehanna-Roseland 500 kV line is planned to be completed and in service during 2012. **This is Confirmatory Item 08.01-1.**

In RAI 2687, Question 08.01-1, the staff asked the applicant to supplement the description of the interface with the transmission system operator (TSO) in the areas of communications, and training and testing of BBNPP operators and maintenance. On August 21, 2009, the applicant responded with supplemental information on communication between the TSO and the BBNPP which also addressed training and testing of the BBNPP operators on the BBNPP protocols but failed to address training and testing of maintenance personnel. Also the supplemental response indicated that training and testing of BBNPP personnel would not include the associated TSO protocols. This information was included in draft supplemental which would be added to a future revision of the COL. Accordingly, the staff finds that the applicant adequately addressed the issue of communications between the BBNPP and the TSO and adequately addressed testing and training of BBNPP operating personnel. However, applicant's response failed to address training of maintenance personnel as indicated in the guidance found in Generic Letter 2006-02 and referenced in RG 1.206. Therefore, the staff can not consider this issue resolved until the applicant addresses the training and testing of maintenance personnel involved with the interface with the TSO and the revised supplemental information has been included in the COL. **RAI 2687, Question 08.01-1, which is associated with the above request, is being tracked as**

**an open item. (OPEN ITEM 8.1-1)**

The applicant provided adequate additional information in Section 8.1.3 and Tables 8.1-1 through 8.1-4 to address COL Information Item 8.1-2. In response to this item, the COL applicant provided tables which list additional site-specific loads which are powered from the station EDGs in addition to the loads specified in the U.S. EPR FSAR Tier 2. The applicant stated that the total loads, including the site-specific loads, are within the design margin of the EDGs. However, the staff noticed that the ESWEMS pumphouse heating load rating is greater than the cooling load as shown on Tables 8.1-1, Table 8.1-2, Table 8.1-3, and Table 8.1-4. The staff confirmed that the nominal sizing of the EDGs per the U.S.EPR application includes a design margin of 10%, or 950 kW, which is sufficient to accommodate the difference. The staff determined the BBNPP proposed design provides adequate overview information to address the capacity and capability of the on-site power system requirements of GDC 17 as required for Section 8.1 of the SRP, NUREG-0800.

The FSAR Section 8.1.3 description of the site-specific direct current (dc) loads indicated minimal control power to the 6.9 kV breakers that supply electrical power to the 6.9-0.48 kV Essential Service Water Emergency Makeup System (ESWEMS) transformers. The staff confirmed the site-specific Class 1E control power demand is within the design margin of the Class 1E uninterruptible power supply (EUPS) battery and does not change the dc load requirements specified in the U.S. EPR FSAR.

The staff determined the BBNPP proposed design, as briefly described in Section 8.1, provides adequate information to address the capacity and capability of the on-site power system requirements of GDC 17. Detailed review of the on-site power system is found in Section 8.3.

The COL applicant indicated the information requested by Generic Letter 2006-02 is provided in Section 8.2.1.1 of the BBNPP FSAR. The staff's detailed evaluation of this item can be found in Section 8.2.

### **8.1.5 Post Combined License Activities**

There are no post COL activities related to this section.

### **8.1.6 Conclusions**

The NRC staff reviewed the application and checked the referenced U.S. EPR FSAR. The NRC staff's review confirmed that the applicant addressed the required information relating to electric power and there is no outstanding information expected to be addressed in the BBNPP FSAR related to this section.

The NRC 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 is being tracked as part of Open Item 1-1. The staff will update Section 8.1 of this SER to reflect the final disposition of the design certification application.

However, as a result of the open item, the staff is unable to finalize its conclusions in accordance with the requirements of GDC 17.

As the bases for evaluating the adequacy of the design of the offsite power system, the Class 1E emergency diesel generators, and the Class 1E dc batteries and their inverters, to accomplish the plant's safety-related functions as presented in the U.S. EPR FSAR Tier 2, Chapter 8, "Electric Power," the U.S. Nuclear Regulatory Commission (the NRC or 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).

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.

- 1 GDC 17 as it relates to the preferred power system's physical independence of the two transmission circuits servicing the BBNPP switchyard.

Open Items: The following are the remaining open items resulting from the technical review:

- 1 GDC 17 as it relates to the preferred power system's capacity, capability, independence, availability of the offsite power system and 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. (**Confirmatory Item 8.1-1 and Open Item 8.1-1**)

Confirmatory Item 8.1-1, Required Modifications to the Offsite Power System

Open Item 8.1-1, Training and Testing for Maintenance Personnel associated with the offsite power interface with the nuclear unit.

Pending resolution of **RAI 2687, Question 08.01-1, which is being tracked as an open item**, no further conclusion can be rendered on this subsection.



## **BBNPP REQUESTS for ADDITIONAL INFORMATION**

FSAR Section 8.1

### **Confirmatory Item 8.1-1**

#### **Required Modifications to the Offsite Power System**

GDC 17 requires the preferred power system have:

- a. capacity and capability to permit functioning of structures, systems, and components important to safety;
- 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;
- c. physical independence; and
- d. availability.

Standard Review Plan, NUREG 0800, Chapter 8, Section 8.1, Introduction, Part III, Review Procedures, Item 1, provides the following guidance. "The staff will establish that the utility grid is adequately described, and that the interconnections between the nuclear unit, the utility grid, and other grids are clearly defined. The descriptions should state whether facilities are existing or planned; if planned, the respective completion dates should be provided."

The FSAR Section 8.1.1 indicated the transmission system required modification be made to accept the BBNPP addition to the system. In RAI 36, Question 08.02-1, the staff requested additional information on the new 500 kV switchyard and supporting transmission system. On December 9, 2009, the applicant stated that the Susquehanna-Roseland 500 kV line is planned to be completed and in service during 2012. Confirmation of this item is required to assure the capacity, capability, availability and the probability of not losing the offsite power system following trip of the nuclear unit.

### **OPEN ITEM 8.1-1**

#### **Training and Testing for Maintenance Personnel Associated with the Offsite Power Interface with the Nuclear Unit**

GDC 17 requires the preferred power system have:

- e. capacity and capability to permit functioning of structures, systems, and components important to safety;

- f. 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;
- g. physical independence; and
- h. availability.

NRC Generic Letter 2006-02, "Grid Reliability and the Impact on Plant Risk and the Operability of Offsite Power," February 1, 2006, requested information regarding the training and testing of personnel associated with the offsite power system-nuclear plant interface. In RAI 2687, Question 08.01-1, the staff asked the applicant to supplement the description of the interface with the transmission system operator (TSO) in the areas of communications, and training and testing of BBNPP operations and maintenance staff. On August 21, 2009, the applicant's response dated August 29, 2009, failed to address maintenance personnel. A statement regarding training and testing of maintenance personnel engaged in work associated with the offsite power system-nuclear plant interface is required to address the concern raised in GL 2006-02.