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March 12, 2012

ATTN: Document Control Desk
U.S. Nuclear Regulatory Commission
Washington, DC20555-0001

BELL BEND NUCLEAR POWER PLANT
RESPONSE TO RAI NO. 95 QUESTION 10.04.05-2
BNP-2012-067 Docket No. 52-039

References: 1) M. Canova (NRC) to R. Sgarro (PPL Bell Bend, LLC), Bell Bend COLA – Request for Information No. 95 (RAI No. 95) – SBPB4711, email dated August 2, 2010

2) BNP-2012-037, R. R. Sgarro (PPL Bell Bend, LLC) to U.S. NRC, "Schedule Information for RAI No. 93 Question 02.03.01-2, FSAR Chapter 2 and RAI No. 95 Question 10.04.05-2, FSAR Chapter 10," dated February 1, 2012

The purpose of this letter is to respond to the request for additional information (RAI) identified in reference 1. In reference 2, PPL Bell Bend, LLC (PPL) indicated that PPL would provide a response to Request for Additional Information (RAI) No. 95 Question 10.04.05-2, on or before March 31, 2012. This RAI addresses the Circulating Water System as discussed in Section 10.4.5 of the Final Safety Analysis Report (FSAR), as submitted in Part 2 of the Bell Bend Nuclear Power Plant Combined License Application (COLA)

The enclosure provides our response to RAI No. 95, which includes revised COLA content. The revised COLA content will be included in a future revision of the BBNPP COLA. The future revision of the COLA is the only new regulatory commitment in this letter.

Should you have questions, please contact the undersigned at 610.774.7552.

I declare under penalty of perjury that the foregoing is true and correct.

Executed on March 12, 2012

Respectfully,

Rocco R. Sgarro

RRS/kw

Enclosure: As stated

D102
NRO

cc: (w/ Enclosure)

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Enclosure

Response to NRC Request for Additional Information No. 95 Question 10.04.05-2
Bell Bend Nuclear Power Plant

RAI 95

Question 10.04.05-2

The staff reviewed the BBNPP COLA and found that additional information is needed to confirm CWS compliance with General Design Criteria (GDC) 4. Specifically the staff requests information on the flow paths that the internal flood water would use, in the event of a CWS failure, to exit the turbine building before the water level would rise to unsafe levels. In Section 10.4.5.3 of the COLA, it is stated that: "Flooding exiting the Turbine Building at grade is directed away from structures that house safety-related SSCs by site grading, so external flooding resulting from a failure in the CWS does not adversely affect safety related SSCs." To verify this statement, the locations of the water exiting the turbine building are needed. The staff requests the applicant to provide additional details on the specific design features (i.e. blowout panels) used to allow the flood water from a CWS system failure to exit the turbine building, including the locations of these design features and the flowpath of the water after exiting the building to ensure that this water won't adversely affect safety related structures and components. In addition, since the CWS is conceptual design information in the EPR design certification (DC) and was not included in the flood analysis described in Section 3.4.1 of the EPR DC, the staff requests the COLA applicant to provide a reference to Section 10.4.5 in Section 3.4.1 of the COLA FSAR regarding the site specific CWS flooding information. Also, provide a FSAR markup to include information from the response to this RAI.

Response

A flood analysis was performed to assess the effect of a flood resulting from a postulated Circulating Water System (CWS) pipe failure inside the Turbine Building and exiting to the yard area.

The CWS consists of two supply and two return 132-inch pipelines that circulate cooling water between the cooling tower and the condenser located inside the Turbine Building. The supply and return CWS pipes are buried between the cooling tower and the Turbine Building. The system is designed to have four vertical CWS pumps feeding into two supply pipes. Downstream of the cooling water intake, there is a common header that connects the four CWS supply pipes.

The design flow for each CWS pump is approximately 180,000 gpm. The maximum pump run out flow is assumed to be approximately 25% higher than the design flow, with each pump supplying approximately 225,000 gpm. The flooding analysis conservatively assumes the rupture of one CWS pipe inside the Turbine Building with all four CWS pumps operating at runout condition, thus delivering the maximum potential flood flow of 900,000 gpm. Because the water available in the cooling tower basin and CWS piping is finite, the maximum flow through the rupture will be sustained for a limited duration and the CWS pumps will eventually shut down.

The Turbine Building has an approximate length of 380 feet and an approximate width of 180 feet, with the finish floor elevation at Elevation 720'-0". The hinged relief siding will be installed on the eastern side of the south wall (~ 144 ft) of the Turbine Building and on the entire east wall (~ 169 ft) of the Turbine Building.

These panels swing open as needed if flooding occurs. Water from a CWS pipeline failure in the Turbine Building exits through hinged relief panels provided on the east and south sides of the building. Flow exiting through relief panels on the south side of the building will flow primarily to the south. Flow exiting through relief panels on the east side will be diverted to the north and south by the transformer barrier walls located east of the Turbine Building.

Water exiting through the eastern relief panels that is diverted to the north will flow along the transformer barrier walls, over the perimeter road on the north side of the powerblock area without affecting any safety-related SSCs since there are no safety-related SSCs in the vicinity. Beyond the north perimeter road, this flood water will drain east, down to the teardrop wetland, where it will eventually discharge to the wetlands south of the plant area. Water draining from the teardrop wetland will flow along the west side of the Essential Service Water Emergency Makeup System (ESWEMS) pond, but will be conveyed at an elevation low enough to not affect the ESWEMS pond and pump structure.

Water exiting through the eastern relief panels that is diverted to the south will combine with the flood water from the relief panels on the south side of the Turbine Building. This flood water will flow south through the powerblock area between the transformers on the east and the Essential Service Water (ESW) Cooling Towers on the west. To prevent flood water from flowing west to the safety-related plant buildings, the finished grade between the Turbine Building and the ESW Cooling Tower will be raised locally to form a gently-sloping berm. Flood water will flow south over the perimeter road on the south side of the powerblock area, eventually down to the wetlands south of the plant area. Conservatively, the flood water is considered to flow primarily in the southern direction; however, downstream of the transformer barrier walls the flood water may spread to the east, which would produce a lower flood level at the Turbine Building.

Flood water directed to the north does not pose a flooding risk to safety-related SSCs. Also, the analysis performed to estimate flood water levels for the southern flow path demonstrates that the CWS flood water will not affect safety-related SSCs. The ESW Cooling Towers on the southwest side of the Turbine Building are not affected by the CWS flood water because the openings are 14 feet above finished grade. The locally raised grade between the Turbine Building and the ESW Cooling Tower prevents the CWS flood water from reaching safety-related plant buildings west of the Turbine Building. Therefore, the flood water from a CWS pipe failure in the Turbine Building will flow overland from the powerblock area and will not create a flood hazard to safety-related SSCs.

COLA Impact

FSAR Section 3.4.3.12 is being added as follows:

3.4.3.11 Permanent Dewatering System

The U.S. EPR FSAR includes the following COL Item in Section 3.4.3.11:

> A COL applicant that references the U.S. EPR design certification will define the need for a site-specific permanent dewatering system.

This COL Item is addressed as follows:

{As described in Section 2.4.12.5, based on the groundwater evaluation of post-construction water table elevations, a permanent groundwater dewatering system is not required for BBNPP.}

3.4.3.12 Turbine Building Flooding Analysis

Potential flooding of the yard area south of the Turbine Building due to CWS pipe failure inside the building is addressed in Section 10.4.5.3.}

FSAR Section 10.4.5.3 is being revised as follows:

10.4.5.3 Safety Evaluation

The U.S. EPR FSAR includes the following COL Item and conceptual design information in Section 10.4.5.3:

> A COL applicant that references the U.S. EPR design certification will provide information to address the potential for flooding of safety-related equipment due to failure of the site-specific CWS.
>
> [[Means are provided to prevent or detect and control flooding of safety-related areas so that the intended safety function of a system or component will not be diminished due to leakage from the CWS.]]
>
> [[Malfunction or failure of a component or piping in the CWS, including an expansion joint, will not produce unacceptable adverse effects on the functional performance capabilities of safety-related systems or components.]]

The above COL Item is addressed and the conceptual design information is replaced with site-specific information as follows:

{Internal flooding of the Turbine Building due to an unisolable break or crack in a Circulating Water System pipe or failure of a CWS component, including expansion joints, does not result in damage to safety-related SSCs. Below the main steam piping penetrations, no direct pathway through which flooding could spread exists between the Turbine Building and adjacent structures that house safety-related SSCs. No safety-related SSCs reside in the Turbine Building. ~~Flooding exiting the Turbine Building at grade is directed away from structures that house safety-related SSCs by site grading, so external flooding resulting from a failure in the CWS does not adversely affect safety-related SSCs.~~

Flood waters resulting from a CWS pipe failure inside the Turbine Building would exit through hinged relief siding installed in the building. Hinged relief siding is installed on approximately 144 feet of the southeast wall and on approximately

169 feet of the east wall to allow flood water to exit the Turbine Building, at grade, as needed, in the event of a rupture in the CWS piping.

As shown in Figure 2.1-1, the yard area south of the Turbine Building is surrounded by roads on the west, south, and east sides. The general grading near the Turbine Building is arranged in such a way that flood water exiting the relief siding on the southern side of the building will flow primarily in a southerly direction. To direct the flood flow away from the safety SSCs, and to avoid flood water from flowing toward the west where the Reactor Building is located, the finish grade elevation between the south wall of the Turbine Building and the northeast corner of the Essential Service Water (ESW) Cooling Tower is raised locally in the form of a berm, in addition to other minor local grading in the yard area. The flood flow exiting the east side of the Turbine Building will be diverted in two directions: to the north; and, to the south by the barrier wall of the transformers located east of the Turbine Building. These flow paths are farther away from the safety SSCs and have less flooding impact. For added conservatism, the flood analysis assumes that all flood flow will exit through the south side of the Turbine Building.

As the flood water flows southward from the Turbine Building, it will be confined by the two ESW buildings, the road immediately west of the Turbine Building, and the berm along the west side. On the east side, the flow will follow the topography between the east road and the transformer area.

The flood analysis indicates that the postulated CWS piping rupture in the Turbine Building will not impact any safety-related SSCs. The safety-related SSCs in the Nuclear Island are protected by the berm between the Turbine Building and ESW Cooling Tower 3URB. The two safety-related ESW Cooling Towers on the south side of the Turbine Building are not affected by flood flow because their entrance opening is 14.0 feet above finish grade. Therefore, the flood water from a postulated break of a CWS pipe in the Turbine Building, conservatively evaluated as exiting toward the yard area on the south side of the building, will not create a flood hazard to safety-related SSCs.

A failure in the CWS Makeup Water supply line does not result in damage to safety-related SSCs. This is due to the design of the site grading and drainage. Buildings that house safety-related SSCs are constructed with ground floor slabs elevated above grade and intervening topography and site drainage configuration would direct released water away from areas where it might otherwise cause damage. In addition, in the event of a CWS Makeup Water supply line failure, the CWS Makeup pumps could be shut-off, the MOVs could be closed, and the isolation valves at the plant site could be closed.

The CWS design includes two natural draft cooling towers with heights of 475 ft (145 m) and diameters of 350 ft (107 m) at the base, as described in Section 10.4.5.2.2. The closer of the two is located at a distance of 462 ft (141 m) from the nearest safety-related structure. Based on historic data from the collapse of multiple cooling towers at Ferrybridge, U.K. in 1965, structural failures are concentrated at the throat of a tower (Sachs, 1972). The collapse of a large hyperbolic cooling tower is understood to fall no farther than its height from the centerline of the cooling tower. This distance from the cooling tower would be 300 ft (92 m), which is 162 ft (50 m) from the nearest safety-related SSC.}