Susquehanna River Basin Commission

a water management agency serving the Susquehanna River Watershed

October 18, 2011

Mr. Terry L. Harpster
VP-Bell Bend Project-Development
PPL Bell Bend, LLC
38 Bomboy Lane, Suite 2
Berwick, PA 18603

Re: PPL Bell Bend Nuclear Power Plant;
Project Response Status and Filing of
Joint Permit Application – BNP-2011-126;
Salem Township, Luzerne County, Pennsylvania

Dear Mr. Harpster:

Susquehanna River Basin Commission (Commission) staff has reviewed the "Project Response Status and Filing of Joint Permit Application" for the Bell Bend Nuclear Power Plant (BBNPP) submitted in the referenced correspondence. Our comments below pertain to the Joint Permit Application (JPA) Binder 3, Appendix B, Section 7, Subsections 1, 2, and 7. We will respond to the remaining subsections under separate cover. Additionally, responses to other sections of Enclosure 1 to BNP-2011-126, Response Summary and JPA Cross-Reference, will be under separate cover.

1. In Section 1, the first question in the Summary is "What is the relationship between aquatic habitat and river flows . . . ?" The response was "PHABSIM analysis of aquatic habitat for eight fish species indicates that negative impacts on habitat due to the requested BBNPP water use are generally small and infrequent, and would not contribute to habitat-related population limitations." The Physical Habitat Simulation (PHABSIM) analysis is incomplete, as it does not focus on the area of the river where impacts to aquatic life are most likely to occur, specifically the island and riffle area between transects G2 and R1. The Commission requires additional PHABSIM analysis of this stretch of the river, similar to the analysis submitted in an e-mail from Gary Petrewski, dated May 19, 2011.

   Additionally, to more accurately assess the relationship between aquatic habitat and river flows, the study should focus on low flows in the range of Q7-10 and 20 percent average daily flow (ADF). Unlike most Instream Flow Incremental Methodology (IFIM) studies that typically analyze a broader range of flow regimes based on hydroelectric power operations, the purpose of the BBNPP study is to address impacts on aquatic life at low flows to determine an appropriate passby requirement,

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and it may provide information useful in establishing a requirement for mitigation makeup water for the consumptive water use at BBNPP.

Lastly, the Commission notes that several aquatic studies have not been completed, and studies that have been completed have not been reviewed and accepted by the Commission, which renders the statement, "negative impacts on habitat due to the requested BBNPP water use are small and infrequent . . .", premature and cannot be fully evaluated at this time. Comments on the studies that have been submitted must be resolved and other agreed upon studies, including the 2D flow analysis and Mussel Survey, need to be completed, reviewed, and accepted before valid conclusions about the impacts on aquatic life can be drawn.

2. In Section 1, the summary related to the impact of reduced river flow and stage on smallmouth bass indicates, "Once water temperatures consistently exceed 84-85°F, juveniles migrate from the shoreline backwater habitat into deeper river water." This statement is not supported by the study presented in Section 5. The study does not adequately evaluate if the juvenile bass are migrating at a smaller size due to water temperature, and if their natural preference would be to remain in these areas longer to achieve a larger size and thereby reduce predation pressure.

3. In Section 2, second paragraph, the conclusion that there is no negative impact on 7 of 23 species and life stage combinations may not be supported pending final review of the study. For example, historical flows in that section of the river have been considerably lower than the low flow of 800 cubic feet per second (cfs) in the study, and therefore, the conclusion cannot be made without some qualification. Absent an analysis on flows less than 800 cfs, the Commission could not support a passby flow requirement at less than this amount.

   On pages 12 and 13, a paragraph should be added to discuss the margin of error for this IFIM study. There are areas of statistical analysis within the study where errors may be introduced, particularly extrapolation of flows at BBNPP from the Wilkes-Barre stream gage and in the extrapolation of various flows at each transect from one set of flow measurements. Other parameters in the study may also generate a margin of error. A better understanding of the study results will be provided by generating an overall margin of error for the study.

4. Figure 2-1 depicting the "Generalized IFIM sequence" does not show steps for consultation with stakeholders to determine goals of the study, and does not include a step for stakeholders to reach a consensus regarding study conclusions. Due to time constraints and the way the IFIM study was conducted, some of the consultative steps were skipped and had to be retrofitted. In any case, the steps are essential to producing a viable IFIM study and should be included on Figure 2-1.

5. In Section 2.4, for the two transects that were added "during an agency visit," further explanation is needed to demonstrate what data were collected at what flow and how those data were extrapolated to other flows.

6. In Section 2.5, the daily discharge data from 1899 to 2010 cover too large a time frame and dampen impact from development in the watershed. We recommend a period from 1960 to 2008 to develop the time series of daily river flow. Additionally, to adequately analyze low flows, scenarios should be developed using time series of daily river flow experience from 1999 to 2002.

   In addition, known upstream consumptive use should be used in the flow scenarios. For example, the Susquehanna Steam Electric Station (SSES) consumptive use is permitted at 48.000 million gallons per day (mgd). Another flow scenario should be developed subtracting the maximum daily BBNPP consumptive use and all the upstream consumptive use to the Wilkes-Barre gage, including the maximum SSES consumptive use less mitigation releases from Cowanesque Reservoir, from the adjusted flow at the Wilkes-Barre gage.

   In footnote 3 on page 21, what is the rationale for stating that these figures are conservative?

7. In Section 2.6, in addition to the data provided, a graphic of the Weighted Usable Area (WUA) results over time would add another level of analysis to help visualize the change in WUA during the course of the year and where problem areas could occur. This graphic should include current conditions and then the various scenarios.

   In the second paragraph, we agree that the slope of the curve is critical and the focus of the study is to analyze flows in consideration of a passby flow requirement. Accordingly, the x-axis on Figure 2-6 should display lower flows in the Q7-10 to 20 percent ADF range. This will provide better visualization of WUA at the lower flows. In addition, timing and duration of low flows are also critical and, as requested above, WUA plotted against time for each species and life stage would provide data for more specific analysis.

   On page 24, first full paragraph, the Commission regards the relationship between WUA and higher flows to be irrelevant for the purpose of analyzing the need for a passby flow requirement and/or mitigation of the BBNPP consumptive use of water. Although the PHABSIM model shows reduced WUA at higher flows, other factors such as water temperature and dissolved oxygen levels are less critical to aquatic life at high flows. The high flows may temporarily displace some species as they seek more suitable habitat; however, any mortality due to temporary loss of habitat is natural and cannot be attributed to consumptive use of water by BBNPP. At low flows, the consumptive use of water by BBNPP does negatively impact WUA, as well as water temperature and dissolved oxygen, which is the rationale for the study

to focus on low river flows. The above statement also applies to the second to last paragraph of page 29.

In addition, the fifth sentence of the first full paragraph on page 24, the statement that, ". . . any flow reduction due to BBNPP consumptive use can never have a negative effect on the available suitable habitat" cannot be supported because flows less than 800 cfs were not evaluated. Absent analysis focused on flows less than 800 cfs, the Commission will follow established policy and require a passby flow at the Q7-10 river flow or higher.

8. In Section 2.7, the riffle areas within the study area are the areas of most concern, and an analysis of WUA for those areas is essential to fully evaluate any potential effects due to consumptive use at BBNPP. The PHABSIM analysis is incomplete and does not include an analysis on the area of the river where impacts to aquatic life are most likely to occur: the island and riffle area between transects G2 and R1. Further analysis is required that provides the proper focus on this reach of the river. The agreed upon 2D analysis may provide a better understanding of the dynamics of the river in this area.

   In the first paragraph of Section 2.7 on page 25, linear extrapolation to estimate daily WUA for flow values less than 800 cfs is inappropriate because at flows that low, the relationship between WUA and flow is curvilinear. A best-fit curvilinear formula should be used to extrapolate WUA values at flows less than 800 cfs.

   The depiction of WUA versus flow was normalized (nWUA); however, the Commission requires the raw numbers for each species and life stage to assess potential bottlenecks and overall scale of changes in an area for each species.

   In the second paragraph on page 28, the Commission acknowledges that the negative impact to WUA occurs primarily at low flows that may not occur frequently, and this is the relationship portrayed in the WUA versus percent time graphs. For some species and life stages like juvenile smallmouth bass, the low flows are coincident with higher temperatures and low dissolved oxygen. These conditions have been observed to cause mortality of juvenile smallmouth bass. In this case, the percent of time is not relevant; however, the length of time and magnitude of the negative impact on WUA is critical to the survival of the juvenile smallmouth bass. As requested above, a graph of WUA versus time would provide data for a more in-depth analysis.

   In the last paragraph on page 28, the Commission does not agree with the stated conclusion that there is no substantial difference in habitat availability when flows are reduced by BBNPP consumptive water use. Based on comments above, the analysis must be focused on low flows, appropriate sections of the river, and time of the year before reaching this conclusion.

On page 29, first full paragraph, a more robust assessment of WUA should be conducted in conjunction with seasonality constraints. The timing of the low flows makes a difference and analysis should be focused on each species and life cycle that coincides with low flow events.

9. In Section 2.8, conclusions resulting from the PHABSIM study are premature pending resolution of the above comments. The focus of the study should be on low flows, particularly in the riffle area of the river. Additionally, conclusions from the PHABSIM analysis should be integrated with the results of other studies on this section of the river. For example, analyses from Sections 4.0 and 5.0 should be incorporated to more fully assess potential changes in water temperature and dissolved oxygen levels and effects on fish species, especially those dependent on shallow water areas during the summer. Finally, two studies were not included in the JPA submission, the 2D analysis of the riffle area of the river and the Mussel Survey. The results of these studies also need to be integrated into conclusions of the impact of BBNPP on aquatic life.

   The above comment also applies to Section 7.0.

If you have any questions regarding the above, please contact Paula Ballaron at (717) 238-0423, extension 222.

Sincerely yours,

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Director, Technical Programs

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