

Attachment 2

Response to RAI ENV-19 (Redacted)

**RAI ENV-19****Question EIS 5.2-6:**

The NRC staff must document its determination that the proposed project will be able to achieve its stated purpose of providing baseload electrical power over the period of the license. The proposed plant is designed to reject excess heat during operation by evaporative cooling using wet cooling towers, which results in a continuous consumption of water over the plant's license period. During low flow periods, the applicant and the Susquehanna River Basin Commission (SBRC) have informed the NRC staff that supplemental water would need to be obtained by the applicant to continue operation of the proposed plant. If supplemental water cannot be obtained, the applicant may not be able to achieve its stated purpose of providing baseload power over the period of the license. The applicant has not disclosed the exact manner in which supplemental water will be obtained and delivered to the Susquehanna River.

The NRC staff needs to understand how PPL meets the NRC Regulatory Guide (RG) 4.7 criterion of reasonable assurance that required permits could be obtained by SRBC for consumptive water use of 28 million gallons per day. This information is necessary for the staff to complete its evaluation of water-related impacts. Additionally, the SBRC has not completed rulemaking on mitigation requirements for consumptive use during periods of low flow. The staff must make a determination that it is reasonably foreseeable that the applicant would be able to operate the plant over the license period without having to derate or cease operation because of low water flow in the river. The staff must also make a determination that there is reasonable assurance that sufficient water in the basin is available and can be obtained by the applicant on a continuous basis to operate the plant while still protecting the environment. To make such a determination, the staff requires information on the options for flow supplementation that are or are not available to applicant. The staff also needs information on the likely frequency with which the applicant may need supplementation water and the amount of supplementation water that will likely be needed.

The staff has determined that the following information is required to continue its NEPA review:

1. Describe the process and schedule for resolving the issues stated by SBRC in its letter addressed to the applicant dated June 27, 2012 regarding the "pooled asset approach" to providing supplemental water.
2. Describe the options available for a source of the supplemental water and the options available for storage of the supplemental water is required. Include the location and type of each water supply (e.g.

storage in existing reservoir; mine water; reclaimed water; storage in a new reservoir, etc). The staff needs to establish that there is adequate water available to continuously operate the station, but it does not require the financial details of possible purchases or trading agreements.

3. Describe the expected frequency in which supplemental water may be needed and the amount of supplemental water required under current flow conditions to continuously operate the proposed plant, with the assumption that SRBC will require passby flow. (In its letter dated February 16, 2012, SRBC stated: "...should SRBC determine that the requested surface water withdrawal cannot be approved without a passby condition, water storage upstream of BBNPP would be needed to assure that all sections of the Susquehanna River are protected."). Document the technical basis for all estimates.

4. Describe the expected frequency in which supplemental water may be needed and the amount of supplemental water required under reasonably foreseeable flow conditions at the end of the license period to continuously operate the proposed plant. The staff considers the effects of climate change on hydrological conditions to be reasonably foreseeable. The staff considers population growth projections consistent with the applicant's Need for Power determination to be reasonably foreseeable. Document the technical basis for all estimates.

5. Describe the expected changes in water quality under reasonably foreseeable flow conditions at the end of the license period. Document the technical basis for all estimates.

6. Describe the expected changes in water demand (basin-wide withdrawal and consumptive use) under reasonably foreseeable flow conditions at the end of the license period. Provide the location and type of each use. The staff acknowledges the large number of independent small water users and accepts stratified random sampling or regression methods as a suitable basis for water demand estimation. Document the technical basis for all estimates.

**Response:**

1. While the possibility of temporary shutdown during low flow conditions if mitigation water were not provided is not inconsistent with the baseload purpose of this project (as shutdown during 7Q10 conditions would correspond to a forced outage rate bounded by anticipated operational conditions), PPL Bell Bend, LLC

(PPL) has revised its consumptive use mitigation plan to avoid this potential and is providing this response to document its plan (process and schedule) for staff review.

Recent PPL communications with the Susquehanna River Basin Commission (SRBC) have served to clarify that:

- The principal storage asset contained in our previously proposed “Storage Asset Pool” approach (Holtwood) cannot be considered as direct mitigation for Bell Bend Nuclear Power Plant (BBNPP), due to its location in the basin;
- BBNPP will be subject to a pass-by flow requirement that will be determined based on review of extensive environmental studies, and SRBC policy in effect at the time of the SRBC approval.
- Mitigation water to satisfy SRBC consumptive use regulations and/or to avoid plant shutdown under its pass-by flow policy must be provided upstream of BBNPP;
- SRBC will not approve permits for the project until specific mitigation water sources upstream of BBNPP can be identified and evaluated. However, to support development of the Environmental Impact Statement (EIS), the SRBC has agreed to quantify by year end 2012 the pass-by flow requirements (amount and duration) that BBNPP will ultimately be required to meet.

PPL has provided all of its environmental studies supporting SRBC permitting activities to the NRC and the U.S. Army Corps of Engineers (ACOE). These studies provide substantial evidence of no significant adverse environmental impacts even absent expected SRBC required mitigation. The SRBC mitigation requirements are expected to impose a “no net reduction in flow” standard during designated low flow periods, which will further support a favorable National Environmental Policy Act (NEPA) conclusion.

The SRBC pass-by flow requirements to be determined by year end 2012, as described above, will be promptly provided to the NRC to support finalizing the draft EIS.

The process and schedule for ultimately satisfying the SRBC requirements and obtaining project approval from the SRBC will involve PPL defining in detail its plans for pass-by flow mitigation to the SRBC’s satisfaction, prior to initiating project construction. According to current project plans, final SRBC approval will likely not be sought until after receipt of the Combined License (COL).

2. PPL has identified a number of potential water sources that are located upstream of BBNPP and that either alone or in combination can meet the

anticipated SRBC mitigation requirements. PPL does not currently expect to procure the additional resources it needs to meet those requirements, until after a decision is made to proceed with the construction of BBNPP. Accordingly, this response describes PPL's Primary Plan for achieving compliance with SRBC requirements and creating no incremental environmental impact. Additionally, to strengthen the objective of satisfying the NRC's "reasonable assurance" criterion, a Secondary Option for mitigation is described herein, which PPL believes will also satisfy the SRBC requirements with minimal environmental impacts.

PPL's Primary Plan as well as the Secondary Option for consumptive use mitigation are delineated in Enclosure 1.

3. This response is contingent upon pending SRBC decisions regarding how much water and what, if any, pass-by flow requirement it will impose. PPL chose the options described in Enclosure 1 conservatively, and fully expects that either option will be able to satisfy the SRBC mitigation requirements. PPL will supplement this response upon receipt of the SRBC criteria by the end of this year. We understand that the NRC continues to develop the draft EIS for Bell Bend in the intervening period.

4. PPL believes that the frequency and amount of supplemental water at the end of the license period to meet bypass flow requirements will be unchanged or less than current conditions. This conclusion is based on projections regarding climate change impacts on water inputs to the basin as further discussed below, the expected retirement of coal generation units before 2060, and continued regulation of new consumptive uses in the basin by the SRBC.

U.S. Environmental Protection Agency (USEPA) has made the following predictions concerning the impact of climate change in the Northeast U.S.

**Key U.S. Projections** (*ref: <http://www.epa.gov/climatechange/>*)

- Northern areas are projected to become wetter, especially in the winter and spring. Southern areas, especially in the West, are projected to become drier.
- Heavy precipitation events will likely be more frequent. Heavy downpours that currently occur about once every 20 years are projected to occur about every four to 15 years by 2100, depending on location.
- More precipitation is expected to fall as rain rather than snow, particularly in some northern areas.
- The intensity of Atlantic hurricanes is likely to increase as the ocean warms. Climate models project that for each 1.8°F increase in tropical sea surface temperatures the rainfall rates of hurricanes could increase by 6-18% and the wind speeds of the strongest hurricanes could increase by

about 1-8%. There is less confidence in projections of the frequency of hurricanes, but the global frequency of tropical hurricanes is likely to decrease or remain essentially unchanged.

- Cold-season storm tracks are expected to continue to shift northward. The strongest cold-season storms are projected to become stronger and more frequent.
- Northern Hemisphere snow cover is expected to decrease by approximately 15% by 2100.
- Models project the snow season will continue to shorten, with snow accumulation beginning later and melting starting earlier. Snowpack is expected to decrease in many regions.

Over the last several decades, the Northeast has experienced noticeable changes in its climate. Since 1970, the average annual temperature rose by 2°F and the average winter temperature increased by 4°F. Heavy precipitation events increased in magnitude and frequency. For the region as a whole, the majority of winter precipitation now falls as rain, not snow. Climate scientists project that these trends will continue.

Overall, the amount of precipitation throughout the Northeast is projected to increase. Less winter precipitation falling as snow will likely increase the number and impact of flooding events.

Expected rainfall over the next 40 years based on climate change projections is expected to increase in the Northeast by 6% – 10%. This will result in increased storage and flow, and less drought conditions in the basin.

5. The Pennsylvania Department of Environmental Protection (PADEP) is responsible for regulating water quality in Pennsylvania. It continues to monitor water quality in the river and tributaries and establish National Pollutant Discharge Elimination System (NPDES) discharge limits so state water quality standards are met. Where water quality standards are not being met, the stream or stream segment is listed as impaired and Total Maximum Daily Loads (TMDLs) are established so water quality standards are met.

Many of the tributaries and sections of the main stem of the Susquehanna River have been affected by abandoned mine drainage (pH, iron, manganese, and aluminum), by atmospheric deposition (PCBs and nitrates), and by agricultural runoff (Biochemical Oxygen Demand (BOD), total suspended solids, nitrates, and phosphates). TMDL's have been developed to address these water quality issues and water quality has been improving in the Susquehanna River basin. Accordingly, water quality is expected to continue to improve throughout the license period.

## 6. Susquehanna River Basin Consumptive Use (CU)

YEAR	AVE CU (MGD)	PEAK CU (MGD)
1970	157.2	270.6
2006	278.0	456.0
2025 (SRBC projection)	356.2	641.7
2060 (PPL projection) <sup>1</sup>	808.6	1520.8

<sup>1</sup> Projection based on a linear estimated growth of average CU in the basin of 227% and peak CU of 237% by 2060 from 2025 levels

Under its project review regulations, the SRBC has the responsibility to assure that future projects in the basin do not impact downstream users and identify CU make-up water commensurate with their impacts. As a result, potential new basin consumptive uses are unlikely to alter flow conditions at the Bell Bend site during low flow periods of concern.

Major changes in basin-wide withdrawal and consumptive use are not expected during the license period.

1. PPL's projection of linear growth in consumptive use within the basin is very conservative. U.S. Census projections assume that population growth within 50 miles of the project between 2020 and 2060 will be 0.55% per year, while overall state growth is estimated to be -0.02% per year. (See ER Rev 3, Section 2.5).
2. While potable water use will increase with the modest population increase, industrial water use is expected to increase slowly, particularly as dry cooling technology continues to evolve and improve. Agricultural water use should remain constant or even decrease due to the increase in projected rainfall.
3. SRBC expects the Marcellus Shale consumptive use at full build out to be about 30 million gallons per day (mgd) (ref: [http://www.srbc.net/programs/natural\\_gas\\_development\\_faq.htm](http://www.srbc.net/programs/natural_gas_development_faq.htm)). This is essentially equivalent to one additional power plant in the basin.

4. There are very few remaining sites available for large generation facilities or large industrial plants.
5. Because of environmental regulations we expect further retirements of coal for power generation, which will result in a reduction in water use.

**Question EIS 5.2-7:**

Although the applicant will be required to obtain permits from SRBC and state agencies, the NRC staff does not presume that issuance of a permit by another agency alone guarantees that there would be no water-related impacts due to the construction or operation of the proposed plant. The NRC staff considers the permitting processes of other agencies; however, it is required to make an independent impact determination. The staff adopts a watershed perspective in consideration of water-related impacts. Therefore, the domain of consideration in this review is the entire Susquehanna River Basin.

The staff has determined that the following information on water quality is required for the staff to continue its evaluation of water-related impacts.

1. Describe the expected water quality of supplemental water. Describe any treatment required before discharging supplemental water to waterbodies. Describe any probable adverse impacts from discharging supplemental water into waters on the EPA 303(d) list.
2. Describe the expected changes in water quality under reasonably foreseeable flow conditions at the end of the license period. Document the technical basis for all estimates.

**Response:**

1. These impacts are discussed where appropriate in Enclosure 1.
2. See Question 5.2-6 Item 5 response.

**COLA Impact:**

PPL will provide a markup of the ER reflecting appropriate updates subsequent to receipt of the SRBC pass-by flow requirements, which are anticipated by the end of 2012.

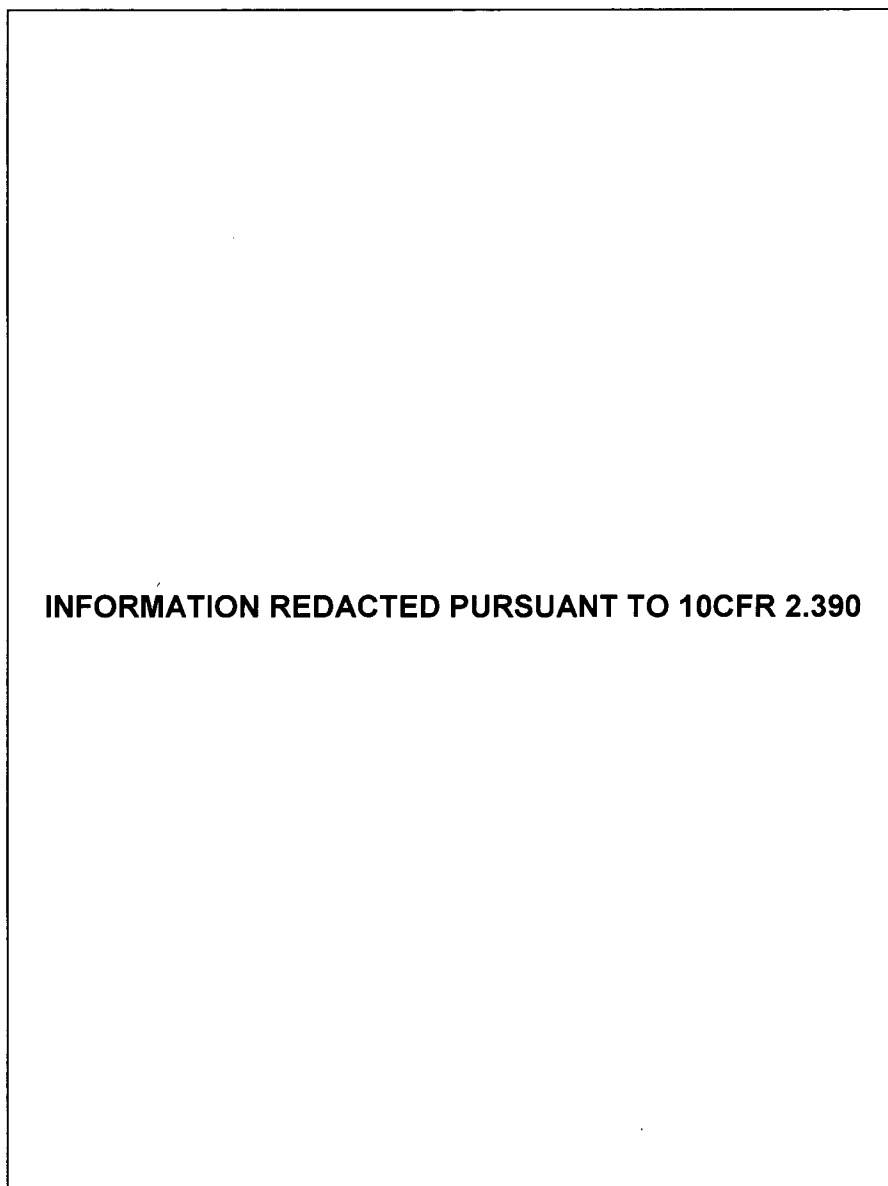


**Enclosure 1: Consumptive Use Mitigation Plan**

**Primary Plan**

**Note:** Cited mgd estimates are based on current SRBC policy or existing permit requirements.

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Mitigation from Rushton Mine

Rushton Mine is owned by Pennsylvania Mines, LLC, an affiliate of PPL Bell Bend, LLC. The mine is located in Clearfield and Centre counties in Pennsylvania approximately two miles southeast of the Borough of Philipsburg. The mine water treatment plant and discharge point are located in Centre County. The mine pool is currently controlled through a pumping and treatment operation with its discharge to Moshannon Creek, which is a tributary to the West Branch of the Susquehanna River. The existing discharge is regulated under an NPDES permit. Current operations serve to limit the elevation of the mine pool to less than elevation 1,420 feet MSL to prevent uncontrolled mine seeps to receiving streams.

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The current net maximum daily discharge to Moshannon Creek is estimated to be 6.9 mgd with 0.7 mgd returned to the mine with sludge from the existing NPDES regulated mine water treatment process. The treated mine water is discharged to Moshannon Creek which is designated as both a Trout Stocked Fishery and a Migratory Fishery in 25 Pa Code Chapter 93.9l. Moshannon Creek is currently listed as an impaired stream due to elevated metals (Iron, Aluminum, and Manganese) from abandoned mine discharges upstream of the Rushton Mine discharge. (Ref: DEP eMap PA, non-attainment streams) The net result of existing Rushton Mine water treatment discharge is an improvement to Moshannon Creek water quality.

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The development plan would include new pumps and the construction of a water treatment plant that would discharge to Moshannon Creek via an existing outfall channel. No new stream encroachments requiring either federal or state permitting are anticipated.

Currently, sludge disposal is accomplished by injecting the sludge back into the mine void. Mechanical sludge dewatering facilities/methods will be utilized to accommodate expanded treatment. The "dry" sludge can be readily disposed of by truck transport and placed into the existing (permitted) sludge drying basins located approximately 3,500 feet from the existing treatment plant site. Upon exhaustion of the remaining capacity of the drying basins, dried sludge could then be land-filled on the (permitted) Coal Refuse Disposal Area. Revisions to environmental permits (PADEP) to allow sludge disposal in the sludge drying basins and/or to the Pauline Hollow Coal Refuse Disposal Area would be required.

The Rushton Mine has adequate space for an expanded water treatment plant, additional drawdown wells and pumps, and sludge handling facilities.

#### Environmental Impacts - Rushton

The following construction and operational environmental impacts are anticipated:

- **Noise:** Small. There is a low population density in this area. Temporary construction noise has to comply with local ordinances at the project property line. Any noise at the property line is mitigated by distance and screening. The recovery well and water treatment plant are located away from the property line and any noise associated with their operation will be almost undetectable at the property line.
- **Erosion:** Small. Construction impacts would be minimized through implementation of appropriate erosion and sediment control BMPs. The mine voids are surrounded by bed rock making erosion of the mine unlikely. Discharge is by open channel to the Moshannon Creek. Low flow releases will occur during a time of low flow in the creek. Because flow discharges will be within the typical flow values of the stream, stream bank erosion will not be accelerated.

- **Effluents:** Small. Rushton Mine is compliant with its NPDES permit. All consumptive use mitigation would be subject to regulation under a revised NPDES permit for the project.
- **Surface water:** Small [positive]. - Moshannon Creek has historically been affected by abandoned mine drainage. Rushton Mine discharges must meet Commonwealth water quality standards. During the summer season water quality improvement will occur to Moshannon Creek as the Rushton discharge becomes a greater percentage of the overall volume in the creek.
- **Groundwater:** Neutral to small. Any impacts to neighboring wells or stream recharge are expected to be small. The mine has historically been maintained in a drawn down condition during active mining periods. This operation ceased in 1991. When Rushton Mine was active, the mine was dewatered to elevation 1,240 ft; this drawdown far exceeds the maximum drawdown proposed. No wells in service prior to closure of Rushton Mine would be adversely affected by the proposed operation. There has been little residential development on surrounding lands since that time. The Rushton Mine is overlain by several other mines which are all inactive. The water-filled voids in these overlying mines would mask any effect of pool fluctuations in the Rushton Mine. Finally, the bulk of the area over and around Rushton Mine is served by the Pennsylvania American Water Company (PAWC).
- **Sludge disposal:** Neutral. Installation of a new sludge dewatering system would eliminate potential concerns.
- **Terrestrial:** None – A search of the Pennsylvania Natural Diversity Inventory for this site resulted in “No Known Impact” responses from the Pennsylvania Game Commission, the Pennsylvania Department of Conservation and Natural Resources, the Pennsylvania Fish and Boat Commission, and the U.S. Fish and Wildlife Service. Endangered species of bats are found in Centre and Clearfield Counties. However, due to the extensive surface mining that has occurred in this area, habitat for nursing and roosting bats is not present. The Rushton Mine site was previously disturbed for both subsurface and strip mining with the culm banks being stabilized. Revegetation and natural succession is occurring. Because of the perched water table in this area no wetlands are anticipated to be impacted by this drawdown.
- **Aquatic:** Small [positive]. Although designated as both a Trout Stocked Fishery and a Migratory Fishery, Moshannon Creek is listed

as an impaired stream, as it does not support reproduction of trout and other fish species and has little to no aquatic life. Discharge of treated mine pool water is helping to improve the water quality and water temperature in the creek. An increased discharge during seasonally low streamflow periods would improve stream water quality.

- **Socioeconomic:** Small [positive]. Because the Moshannon Creek is already slightly impaired and has been for decades, any improvements in overall water quality will eventually lead to a small increase in positive socioeconomic impacts. Expansion of the water treatment plant will create temporary construction opportunities and may result in the need for additional permanent jobs (e.g., waste water treatment plant operators).

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#### Mitigation from Holtwood

The Holtwood dam and hydroelectric facility is an existing project owned and operated by PPL Holtwood, LLC, an affiliate of PPL Bell Bend, LLC. The project is located on the lower Susquehanna River in Lancaster and York Counties, southwest of the City of Lancaster. The project operates under an existing license (FERC No. 1881) issued by the Federal Energy Regulatory Commission (FERC). PPL Holtwood, LLC currently operates the project for daily peaking utilizing existing storage in the reservoir behind the dam to regulate project inflow from the upriver Safe Harbor hydroelectric plant.

In a letter to PPL dated June 27, 2012, the SRBC staff indicated that it could not recommend approval of use of the Holtwood pond (Lake Aldred) for direct consumptive use mitigation for the Bell Bend project. However, that letter also acknowledged that "this does not preclude using operations at Holtwood as potential mitigation for other, more appropriate PPL assets."

In its March 2012 application to the SRBC in support of BBNPP, PPL proposed to allocate storage in the Holtwood pond based on an elevation 167.5 feet during the summer months and between 167.5 feet and 165.0 feet after September 15 to facilitate consumptive use mitigation operations. During the recreation season (through September 15), PPL proposed to provide up to 3,370 acre-feet of storage in Lake Aldred above the FERC-required recreational pool minimum elevation of 167.5 feet to provide consumptive use make-up water in the basin. After September 15, PPL proposed to provide up to 6,090 acre-feet of Lake

Aldred storage for consumptive water use mitigation.

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Based on OASIS modeling (utilized by the SRBC to simulate the routing of water through a water resources system) previously performed, the Holtwood project will have the capability of providing up to 27 mgd of consumptive water use mitigation during the summer recreation period and higher amounts after September 15 (>31 mgd).

No changes to the project's current FERC license or other operating permits would be required. Reservoir operations would continue to fluctuate on a daily basis to provide hydroelectric generation during peak periods of the day.

#### Environmental Impacts - Holtwood

Use of the Holtwood project would require no new construction or development. All proposed operations would be consistent with the project's existing FERC license and other operating permits. Changes to daily pond operations would be small. Any deviations would be within the limits of current operational ranges. As a result, no new environmental impacts will occur.

In contrast to other upstream mitigation sources that may be diverted by the upstream Safe Harbor reservoir (no project minimum release is in effect), there is greater certainty that consumptive water use mitigation releases from Holtwood will improve daily low flow conditions to the Chesapeake Bay, which supports the goals of Executive Order 13508.

#### **Secondary Option**

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**Environmental Impacts**

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