



# SUSQUEHANNA RIVER BASIN COMMISSION

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**Docket No. 19950301-1**  
**Approval Date: March 9, 1995**  
**Modification Date: September 12, 2007**

## **PPL SUSQUEHANNA, LLC– SUSQUEHANNA STEAM ELECTRIC STATION**

Surface Water Withdrawal of up to 66.000 mgd (Peak Day) from the Susquehanna River,  
Groundwater Withdrawal of 0.125 mgd (30-Day Average) from Wells TW-1 and TW-2,  
and Consumptive Water Use of up to 48.000 mgd (Peak Day),  
for Power Plant Operation,  
Salem Township, Luzerne County, Pennsylvania

### **Review Authority**

This project is subject to review pursuant to Article 3, Section 3.10, of the Susquehanna River Basin Compact (Compact), P.L. 91-575, 84 Stat. 1509 et seq., and Susquehanna River Basin Commission (Commission) Regulation §806.4, relating to projects requiring review and approval. The Commission received the applications for consumptive use of water and surface water withdrawal on December 20, 2006, and for groundwater withdrawal on August 9, 2007.

### **Description**

**Purpose.** The purpose of the applications is to request an increase in consumptive water use and approval of surface water and groundwater withdrawals for processes related to an increase in power production and continued operations at the Susquehanna Steam Electric Station (SSES).

**Location.** The project is located in the Middle Susquehanna Subbasin, HUC 02050107, Salem Township, Luzerne County, Pennsylvania.

**Background.** The SSES is currently approved by the Commission to consumptively use water (Commission Docket No. 19950301, dated March 9, 1995, [Docket]). That approval incorporates the terms of all related Commission resolutions adopted prior to the approval of the Docket, including Commission Resolution Nos. 82-5, 83-1, 89-12, 90-02, and 91-2. Resolution No. 82-5, effective February 11, 1982, deemed that release of water stored in the Cowanesque Reservoir presents an acceptable manner of mitigation for consumptive use. Resolution No. 83-1, effective January 13, 1983, temporarily certified the project sponsor, PPL Susquehanna, LLC (PPL), to be in compliance with the Commission's consumptive use regulation at the SSES. PPL entered into an agreement, effective June 30, 1986, to participate in

the development of water storage at the Cowanesque Reservoir for the purpose of securing consumptive use mitigation. The operations and release plan from Cowanesque Reservoir was adopted by Resolution No. 89-12, effective September 21, 1989. Under the terms of Resolution No. 90-02, adopted by the Commission on January 18, 1990, the consumptive water use mitigation provided by the SSES through releases at the Cowanesque Reservoir was determined to satisfy the Commission's mitigation requirement for the existing operation. Resolution No. 91-2, effective May 9, 1991, imposed recordkeeping and reporting requirements on the SSES.

The project sponsor participated in the reallocation of storage in the Cowanesque Lake project and, through an agreement with the Commission, sponsored a total of 16,061 acre-feet of storage at the Cowanesque Lake project. Of this amount, 3,000 acre-feet of storage was subsequently dedicated to the Montour Steam Electric Generating Station, and the remaining 13,061 acre-feet is available to the SSES to mitigate consumptive losses during low flow periods.

PPL applied to and received approval from the U.S. Nuclear Regulatory Commission (NRC) to uprate Unit 2 in 1994 ("stretch" uprate) and to similarly uprate Unit 1 in 1995. The Docket, dated March 9, 1995, approved the corresponding increase in consumptive water use (approximately 3.1 percent) associated with these power uprates and determined that water storage in Cowanesque Reservoir allocated to the SSES (13,061 acre-feet) was sufficient to mitigate for consumptive losses of 40,000 million gallons per day (mgd) (on a 30-day average) during low flow periods. At that time, the Commission determined that the increase accounted for all of the water storage at Cowanesque Reservoir that was available for mitigation at the SSES.

PPL applied to and received approval from the NRC to uprate Units 1 and 2 again in 2001 ("measurement uncertainty recapture" uprate). No similar application was made to the Commission at that time.

In October 2006, PPL submitted an application to the NRC for approval of an Extended Power Uprate (EPU) that will increase the thermal power level of the units. Presently, Unit 1 and Unit 2 are each approved for 3,489 megawatts (MW) thermal (t) power. The EPU, if approved, will increase the limit for each unit to 3,952 MWt (approximately a 13.3 percent increase). The increased thermal power will result in an increase in peak and average consumptive water use and surface water withdrawal, and prompted the pending applications.

**Project Features.** PPL has requested continued approval for consumptive water use of up to 48,000 mgd on a peak day, and elimination of the 30-day average consumptive use limitation of up to 40,000 mgd. The project sponsor also has requested approval for a surface water withdrawal of up to 66,000 mgd (peak day) from the Susquehanna River, and approval for a total groundwater withdrawal of 0.125 mgd (30-day average) from Wells TW-1 and TW-2. The withdrawals and consumptive water will support the operation of the facility as it will be modified by the EPU.

Specific locational information concerning discrete water-related project features has been withheld for security reasons.

The project consists of two nuclear-powered base-load steam electric generating units, known as Unit 1 and Unit 2. Units 1 and 2 began commercial operation in 1983 and 1985, respectively, and each unit has a closed-cycle cooling system with an evaporative cooling tower. The SSES has a spray pond, common to both units, which provides supplemental cooling. Consumptive water losses at the SSES result from evaporation and drift losses at the cooling towers and similar losses from the spray pond.

Surface water withdrawals at the SSES result from pumping Susquehanna River water from a cooling water intake structure to supply makeup water to the cooling tower basins and the spray pond, and to supply raw water to a water treatment system. The withdrawals are used to make up for consumptive water losses and for water discharged back to the Susquehanna River in conjunction with non-consumptive usage as necessary to maintain adequate water levels and quantity for facility operation.

The river intake structure includes flow meters to measure the withdrawal. However, in 2001, the SSES reported that the measurement was inaccurate due mainly to corrosion and fouling of the carbon steel intake pipes which interfered with the operation of the sonic flow meters. Commission staff subsequently reviewed and approved a procedure for use of cooling tower performance diagrams as an alternative to direct measurement to account for consumptive water use.

Groundwater withdrawals to supply sanitary water for the facility, to produce demineralized water, to maintain pump seals, and for miscellaneous process uses at the SSES result from pumping water from two on-site wells, Wells TW-1 and TW-2 (the primary well). The two well system was designed to provide for a mechanical backup should one well become unavailable and, as such, the wells cannot be operated simultaneously and are not separately metered. The 8-inch-diameter wells were drilled in 1974 to depths of approximately 75 feet. The site is underlain by the Devonian Mahantango Formation, a siltstone and shale. Glacial deposits, which consist of stratified sand and gravel overlying the bedrock, occur in thicknesses of 0 to 20 feet, except when infilling buried bedrock valleys when the thickness can exceed 80 feet. The wells likely are completed in the glacial deposits, but the SSES was unable to provide well logs.

In September 2006, PPL requested a license renewal from NRC extending the term of the operating licenses by 20 years, from July 2022 to July 2042 (Unit 1) and from March 2024 to March 2044 (Unit 2). The project sponsor has requested that the Commission extend the term of its approval to 37 years to coincide with the requested 20-year license renewal of the SSES through March 23, 2044.

**Aquifer Test.** A 7-day, constant-rate aquifer test of Well TW-2 was conducted on December 7-14, 1992. In addition to the production well and Well TW-1, three piezometers and one observation well were monitored. A separate stepped-rate pumping test of Well TW-2 preceded the constant-rate aquifer test. During the stepped-rate pumping test, Well TW-2 was pumped at rates varying from approximately 30 gallons per minute (gpm) to 90 gpm.

The testing was not pre-approved by Commission staff. With Well TW-2 pumping at 92 gpm, 37.16 feet of drawdown occurred at the production well after 7 days of pumping. Drawdown of 23.87 feet occurred at Well TW-1. No testing data was available for Well TW-1.

**Coordination.** Commission staff has coordinated with the NRC during review of the project. In October 2006, NRC received a request for approval of an EPU at the SSES that would increase the thermal power limit of the units. NRC has not acted on this request to date but has issued its draft environmental assessment statement for public comment. Commission staff has reviewed the environmental assessment and provided NRC staff with this docket for coordination with its permits.

### **Findings**

The project is subject to Commission approval, monitoring, and reporting requirements, as per Commission Regulations §806.4(a)(1)(iii), §806.22, §806.23, and §806.30.

All water evaporated or otherwise lost from the cooling system or other power generation processes is considered to be a consumptive water use subject to Commission regulation.

As part of its application, PPL submitted a water use monitoring plan that proposes the continued use of cooling tower performance diagrams to account for daily consumptive water use. PPL also proposed replacement of two of the four carbon steel intake pipes with stainless steel pipes to eliminate the corrosion and fouling problems that prevent accurate metering. Commission staff has reviewed the plan and finds it to be acceptable as an interim measure, with modifications to account for evaporation off the spray pond.

However, as the SSES has demonstrated, it can successfully meter quantities of water well in excess of the amount withdrawn from any single pump located at the Susquehanna River intake structure to an accuracy within 2.5 percent. Commission staff recommends that PPL propose a permanent method to quantify the daily consumptive water use based on metering rather than estimation and averaging. The permanent monitoring plan should contain metering, accurate to within five percent, on the total water withdrawal from the Susquehanna River, on groundwater pumped from Wells TW-1 and TW-2, on the wastewater discharge on the diffuser discharge and other locations, as appropriate, as well as a schedule for implementation for review and approval by Commission staff. The plan should also contain a methodology to account for the instream evaporative loss that occurs as a result of the thermal loading from the diffuser discharge.

Should metering of the stainless steel intake pipe not provide improved accuracy, Commission staff will evaluate other proposed methods of measurement for suitability.

Should the proposed accounting procedure fail to measure the SSES's consumptive water use and total water withdrawal from the Susquehanna River, the Commission reserves the right to modify the measuring, monitoring, and accounting procedures. Commission staff will provide the project sponsor with prior written notice of any required change in the measuring,

monitoring, and accounting procedures. Any alternative measuring, monitoring, or accounting procedure requested by the project sponsor must be reviewed and approved by Commission staff.

Although the Docket currently requires that the project sponsor keep daily records of consumptive water use and report these data to the Commission annually, Commission staff recommends that the reporting frequency be changed to quarterly, as specified in Commission Regulation §806.30(b)(1).

The project was previously approved for the consumptive use of 40.000 mgd of water on a 30-day average, not to exceed a daily peak usage of 48.000 mgd. PPL has requested approval of up to 48.000 mgd as a peak day and the elimination of the requirement that limits the 30-day average consumptive water use to 40.000 mgd. Commission staff recommends approval of the requested increase of consumptive water use of up to 48.000 mgd (peak day).

The project's consumptive use of water is subject to mitigation requirements, as per Commission Regulation §806.22. Currently, as approved in the Docket, consumptive water use mitigation is provided by releases of water from the Cowanesque Reservoir to the Susquehanna River during periods of low flow, under an Operations/Release Plan approved by Commission Resolution No. 89-12. That plan prescribes the amounts of releases to be made whenever the natural flow at Wilkes-Barre and/or Harrisburg is less than or equal to Q7-10 flow plus the amount of consumptive use. This mitigation method applies to full or partial operation of the SSES, but not when both Units 1 and 2 are shut down.

The project sponsor proposes to continue utilizing the current method to satisfy its water mitigation requirements. Provided that the project sponsor continues to comply with the terms of the Contract, Commission staff finds that PPL may continue to use the releases of water storage from the Cowanesque Reservoir to mitigate up to 40.000 mgd based on a 30-day average of consumptive water use. Commission staff recommends that the approved method of mitigation for consumptive use in excess of 40.000 mgd based on a 30-day average be payment of the Commission's prevailing consumptive use fee.

The existing surface water withdrawal predates the effective date of Commission Regulation §806.4(a)(2)(iv); however, the project sponsor's increase in withdrawal from the Susquehanna River related to the proposed EPU triggers Commission review and approval. Commission staff recommends approval of the requested surface water withdrawal of up to 66.000 mgd (peak day), as submitted by the project sponsor.

The use of Wells TW-1 and TW-2 predates July 13, 1978, and did not previously require approval by the Commission. The project sponsor has requested waivers from the Commission's required aquifer testing for the wells, and submitted a 1992 aquifer test report for Well TW-2. Commission staff recommends approval of the waivers. Pumping at Wells TW-1 and TW-2 at the requested rates is not expected to cause any adverse impacts to other groundwater users, as there are no nearby wells.

Commission staff recommends approval of a 30-day average withdrawal of 0.072 mgd from Well TW-1 and 0.125 mgd from Well TW-2, and a total groundwater withdrawal of

0.125 mgd. Commission staff recommends approval of peak instantaneous pumping rates of 50 gpm for Well TW-1 and 150 gpm for Well TW-2, the capacities of the well pumps.

The project is subject to Commission monitoring and reporting requirements, as per Commission Regulation §806.30. The project sponsor should install appropriate meters on its surface water withdrawal from the Susquehanna River, and monitor its withdrawal daily. Currently, one meter is used to measure withdrawals from both wells. Commission staff recommends that the project sponsor maintain the meter for Wells TW-1 and TW-2, and monitor withdrawals daily. The project sponsor should report withdrawal data from surface water and groundwater to the Commission quarterly.

The second (“measurement uncertainty recapture”) uprate was implemented by the project sponsor at Units 1 and 2 in 2001 and 2002, respectively. No request for approval of increase in surface water withdrawal was submitted to the Commission for this second uprate. Commission staff contends that the modifications made in 2001 and 2002 as a result of the second uprate caused an increase in the amount of water withdrawn at the project in excess of 100,000 gallons per day (gpd) above that which it was withdrawing prior to May 11, 1995. Therefore, the increase triggered Commission approval pursuant to §803.44(a)(2) of the regulations in effect at that time. The project sponsor does not agree with Commission staff; however, the project sponsor has offered a settlement to the Commission to resolve this matter. Commission staff recommends acceptance of the project sponsor’s proposed settlement.

The project sponsor has paid the appropriate application fee, in accordance with Commission Regulation §806.16, and in accordance with Commission Resolution No. 2005-03. The project sponsor has requested a waiver of the Commission’s required notice of the groundwater withdrawal application, based on the wells remote location, the amount of withdrawal, and the historic operation. Commission staff recommends approval of the request. The project sponsor has provided all other proofs of notification, as required by Commission Regulation §806.15.

No adverse impacts to other area surface water or groundwater withdrawals are anticipated. The project is physically feasible, does not conflict with or adversely affect the Commission’s Comprehensive Plan, and does not adversely influence the present or future use and development of the water resources of the basin.

PPL has requested that the Commission extend the term of approval to coincide with its requested 20-year renewal of the NRC license for the SSES (through March 23, 2044). The requested 37-year term of approval has not been approved by NRC and is much longer than the Commission’s standard 15-year term for new approvals. In consideration of these facts, Commission staff recommends that this approval remain effective until March 9, 2025, the term of the prior Docket approval.

### **Decision**

1. Commission Docket No. 19950301, as approved March 9, 1995, is hereby modified to approve the surface water withdrawal of up to 66.000 mgd (peak day) from the Susquehanna

River; the groundwater withdrawal (30-day averages) of 0.072 mgd from Well TW-1 and 0.125 mgd from Well TW-2, and a total groundwater withdrawal of 0.125 mgd; and the consumptive water use of up to 48.000 mgd (peak day) pursuant to Article 3, Section 3.10, of the Compact.

2. The project's 30-day average consumptive use limit of up to 40.000 mgd is rescinded.
3. The foregoing findings are hereby adopted and shall be incorporated into and made a part of this decision.
4. Conditions "a," "b," "d," and "e" of the existing approval (Docket No. 19950301) are hereby rescinded.
5. The project sponsor shall comply with all Commission regulations, including monitoring and reporting requirements, as per Commission Regulation §806.30.
6. Within one hundred twenty (120) days from the date of this approval, the project sponsor shall submit a plan to the Commission for review and approval by Commission staff that accounts for all water withdrawn from the Susquehanna River and the total consumptive water use at the facility. The project sponsor shall propose a methodology to account for their consumptive water use based on metering or other approved methods, rather than estimation. Following approval, the project sponsor shall execute the plan and complete any installation of meters in accordance with the approved schedule, but not longer than four (4) years from the date of this approval. The project sponsor shall notify the Commission, in writing, when the meters are installed and certify the accuracy of the measuring devices to within five (5) percent of actual flow. The project sponsor shall notify the Commission when the monitoring plan has been fully implemented.
7. The project sponsor shall keep daily records of the project's consumptive water use, and shall report the data to the Commission quarterly, and as otherwise required. Quarterly monitoring reports shall be submitted on-line and are due within thirty (30) days after the close of the preceding quarter. The daily quantity of water consumptively used shall be the quantity evaporated or otherwise lost from the cooling system or other power generation processes, including losses from the river surface due to thermal loading.
8. The project sponsor shall, as an interim measure, account for total consumptive water use at the facility using the procedures outlined in the water monitoring plan modified to account for evaporation off of the spray pond and off the river surface due to thermal loading. Within thirty (30) days from the date of this approval, the project sponsor shall submit the modified water monitoring plan to the Commission for review and approval by Commission staff. The interim monitoring measure shall expire four (4) years from the date of this approval.
9. The project sponsor shall keep daily records of the metered withdrawal from Wells TW-1 and TW-2. The required reporting data shall be submitted to the Commission quarterly, and as otherwise required. Monitoring reports shall be submitted on-line and are due within thirty (30) days after the close of the preceding quarter.

10. The maximum instantaneous rate of production from Wells TW-1 and TW-2 shall not exceed 50 gpm and 150 gpm, respectively, and the wells shall not be operated simultaneously.

11. The project sponsor shall maintain the meter for Wells TW-1 and TW-2, accurate to within five (5) percent, to measure its groundwater withdrawal.

12. The project sponsor shall keep daily records of the project's surface water withdrawal and shall report the data to the Commission quarterly, and as otherwise required. Quarterly monitoring reports shall be submitted on-line and are due within thirty (30) days after the close of the preceding quarter.

13. The project sponsor shall maintain any meters or other measuring devices approved by the Commission, accurate to within five (5) percent, so as to provide a continuous, accurate record of withdrawals and uses, and certify to the Commission once every five (5) years, or as otherwise requested, the accuracy of all measuring devices and methods to within five (5) percent of actual flow.

14. The project sponsor has offered a settlement by agreement pursuant to Commission Regulation §808.18, in the amount of \$500,000, for its alleged noncompliance with Commission regulations, and is hereby accepted. Except where the full amount of same has been tendered to the Commission in advance hereof, this action shall be contingent upon, and shall not be effective until payment of the settlement amount is made to the Commission or arrangements for such payment have been made that are acceptable to the Executive Director of the Commission. Failure to make such payment or payment arrangement with the Commission within forty-five (45) days hereof shall render this approval null and void.

15. The project sponsor shall comply with applicable Commission water conservation requirements as per Commission Regulation 806.25(b).

16. To satisfy the Commission's current mitigation requirements for consumptive water use set forth in Commission Regulation §806.22, the project sponsor shall continue to comply with the terms set forth in a Contract with the Commission for water supply storage at the Cowanesque Reservoir and make quarterly payments to the Commission based on the rate of \$0.14 per 1,000 gallons of water consumptively used by the project in excess of 40,000 mgd based on a 30-day average. The daily quantity of water consumptively used shall be the quantity evaporated or otherwise lost from the cooling system or other power generation processes. Payment amounts shall be calculated by applying this rate to the 30-day average amount of water used consumptively by the project, calculated daily, in excess of 40,000 mgd. Quarterly payments are due and payable within thirty (30) days after the close of the preceding quarter. The rate of payment, after appropriate notice to consumptive users of water using this method of compliance, is subject to change at the Commission's discretion.

17. The notification requirements specified in Commission Regulation §806.15 are hereby waived for the groundwater withdrawal application.



18. The constant-rate aquifer testing requirements specified in Commission Regulation §806.12 are hereby waived.

19. If the Commission determines that the operation of the project's groundwater withdrawal from Wells TW-1 and TW-2 adversely affects any existing groundwater or surface water withdrawal, the project sponsor shall be required to provide, at its expense, an alternate water supply or other mitigating measure.

20. To satisfy the Commission's registration requirement, the project sponsor shall register with the Pennsylvania Department of Environmental Protection all surface water and groundwater sources described in this docket in accordance with the Pennsylvania Water Planning Act (Pennsylvania Act 220).

21. Commission approval shall not be construed to exempt the project sponsor from obtaining all necessary permits and/or approvals required for the project from other federal, state, or local government agencies having jurisdiction over the project. The Commission reserves the right to modify, suspend, or revoke this action if the project sponsor fails to obtain or maintain such approvals.

22. If the project sponsor fails to comply with the provisions of the Compact or any rule, regulation, or order of the Commission, or any term or condition of this docket, the project is subject to enforcement actions pursuant to Commission Regulation §808.

23. The Commission reserves the right to reopen any project docket or issue such additional orders, as may be necessary, to mitigate or avoid adverse impacts or otherwise to protect public health, safety, welfare, or the environment.

24. Commission approval confers no property rights upon the project sponsor. The securing of all rights necessary and incident to the project sponsor's development and operation of the project shall be the sole and exclusive responsibility of the project sponsor, and this approval shall be subject thereto.

25. All other conditions in Commission Docket No. 19950301 not inconsistent herewith shall remain effective.

26. Based on Commission Regulation §806.31(a), this approval is effective until March 9, 2025. The term of this docket modification is in accordance with the term of the prior Docket approval. As specified in Commission Regulation §806.31(e), if the project sponsor submits a renewal application no later than September 9, 2024, the existing approval shall be deemed extended until such time as the Commission renders decision on the application.

27. If the project is discontinued for such a period of time and under such circumstances that an abandonment of the project may reasonably be inferred, the Commission may rescind the approval of the project unless a renewal is requested by the project sponsor and approved by the Commission.

By the Commission:

Dated: September 12, 2007



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Cathleen C. Myers, Chair  
Pennsylvania Commissioner