



**January 29, 2025**

**Project Sponsor: Susquehanna Nuclear, LLC.  
Facility: Susquehanna Steam Electric Station,  
Salem Township, Luzerne County.**

**Testimony of Eric j. Epstein**

**Applications for renewal of surface water withdrawal of up to 76.000 mgd (peak day) from the Susquehanna River, consumptive use of up to 53.000 mgd (peak day), and groundwater withdrawal of up to 0.125 (30-day average) from Well TW-2. (Docket Number, 19950301.).**

## **Background.**

The Susquehanna Steam Electric Station (SSES”) is a two unit, 2,700- megawatt (“MW”), nuclear-fueled electric generating station. The Susquehanna River is the primary source of water for SSES and provides essentially all of the cooling water associated with the generation of electricity.

TW-1 is a reserve emergency source for the SSES domestic water supply system. Groundwater withdrawals from well TW-2 are used to supply water primarily for domestic use at SSES.

The SSES is authorized by Commission Docket No. 19950301-2 to withdrawal 0.125 mgd (30-day average) from groundwater well sources TW-1 and TW-2 at the existing thermoelectric power generation facility located in Salem Township, Luzerne County, Pennsylvania. Docket No. 19950301-2 also authorized surface water withdrawal from the Susquehanna River at the rate of 76 mgd and the consumptive use of up to 53 mgd.

The water system consists of two wells TW-1 and TW-2, which are used to provide a combined withdrawal (30-day average) rate of 0.125 mgd. However, TW-1 is designated as a reserve source and would require an emergency use permit from PA DEP prior to use. Groundwater withdrawals at the SSES are used to provide domestic water, demineralized water, maintaining pump seals, and other miscellaneous uses at the facility.

The Nuclear Regulatory Commission (“NRC”) approved the Unit 1 operating license on July 17, 1982, and commercial operation began June 8, 1983. The Unit 2 operating license was issued March 3, 1984, and commercial operation began February 12, 1985.

The units share a common control room, refueling floor, turbine operating deck, radwaste system, and other auxiliary systems. SSES uses a closed-cycle heat dissipation system (two natural draft cooling towers) to transfer waste heat from the circulating water system to the atmosphere. The circulating water and service water systems draw water from, and discharge to, the Susquehanna River.

The river intake structure is located on the western bank of the river and consists of two water entrance chambers with 1 inch, on-center vertical trash bars and 3/8- inch-mesh traveling screens. A low- pressure screen-wash system periodically operates to release organisms and debris impinged on the

traveling screens to a pit with debris removal equipment that collects material into a dumpster for offsite disposal.

Cooling tower blowdown, spray pond overflow, and other permitted effluents are discharged to the Susquehanna River through a buried pipe leading to a submerged discharge diffuser structure, approximately 600 feet downstream of the river intake structure. The diffuser pipe is 200-feet long, with the last 120 feet containing 72 four-inch portals that direct the discharge at a 45-degree angle upwards and downstream. Warm circulating water from the cooling towers can be diverted to the river intake structure to prevent icing; this usually occurs from November through March on an as-needed basis.

## **Upgrades.**

PPL applied to and received approval from the U.S. Nuclear Regulatory Commission to upgrade Unit 2 in 1994 (“stretch” upgrade) and to similarly upgrade 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 limit of the units. Presently, Unit 1 and Unit 2 are each approved for 3,489 megawatts thermal (t) power. The EPU, if approved, will increase the limit for each unit to 3,952 MW (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.

PPL 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.

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 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.

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.

The 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.

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.

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 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 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.

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.

PPL had 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. |

Commission Docket No. 19950301, as approved March 9, 1995, was 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.

The project sponsor 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.

In 2016 the project sponsor requested an increase in the peak day surface water withdrawal to 76.000 million gallons per day (mgd) and an increase in the peak day consumptive use to

53.000 mgd. The requested increases are needed to support continued operations following the Extended Power Uprate to provide quantity sufficient to cover the maximum daily water demand under full power dual-unit operations during worst-case conditions. Commission staff recommended the project sponsor's request for modification be approved.

## **Conclusion.**

The SSES is requesting renewal of surface water withdrawal of up to 76.000 mgd (peak day) from the Susquehanna River, consumptive use of up to 53.000 mgd (peak day), and groundwater withdrawal of up to 0.125 (30-day average) from Well TW-2 (Docket No. 19950301).

Data centers are not Talen's core business. Fitting out data centers is a substantial cost. Selling capacity takes the company into a highly competitive business. Operating data centers requires specific and expensive skills. Technology change complicates and adds costs for each area of running this business, and increases the demand for water.

On-site physical developments that need to be addressed prior to approving the application and additional water.

1. Bitcoin mining: A partnership of Talen-owned Cumulus with Terawulf, one substation delivering to the existing, on-site facility is reported at 150 MW with a potential for 200 MW.

How will this development impact water use?

2. Data center development: Initial demand listed as up to 65 MW, but elsewhere reported by Talen at an initial 48 MW.

How will this development impact water use?

3. How can the SRBC be assured that water is not being diverted from Talen to Amazon?

4. 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.

What is the status of this request?

5. The Susquehanna River Basin Commission) owns storage

in Cowanesque Lake. The SRBC purchased the storage to mitigate the consumptive water use of the nuclear power plants. The SRBC uses a process to model and screen alternatives based on consumptive use mitigation. The project is subject to water mitigation requirements, as per Commission Regulation 18 CFR §806.22(b). Cowanesque Reservoir allocated to the SSES (13,061 acre-feet).

What model and screen alternatives based on consumptive use mitigation were submitted and reviewed?

6. Cowanesque Lake storage is used to mitigate consumptive water use at the Susquehanna Steam Electric Station and Three Mile Island Nuclear Generating Station. This allows the plants to continue operating and use cooling water when demand is high.

What impact will the restart of Three Mile Island have on Lake Cowanesque storage capacity?

7. As temperatures rise and climate hazards, such as drought, floods, and extreme precipitation intensify, nuclear infrastructure is put at risk.

Did Talen provide a plan to respond to climate challenges?

8. The SRBC adopted a new policy last summer that may impact data centers, and calls for a dry cooling option for all new applications.

(d) Project sponsors proposing new or significantly modified power generation plants in the basin shall consider the use of dry cooling technologies and submit to the Commission a rigorous alternatives analysis. This analysis shall include evaluation of the costs, benefits, trade-offs and drawbacks of various cooling and water conservation techniques, and a full evaluation of options for providing effective consumptive use mitigation.

Consumptive use and uprates have placed increased pressure on the Susquehanna Steam Electric Station to consume more water as outlined in the enclosed testimony.

The 1983 and 1984 version of the SSES is materially different than the plant requesting approval flow use.

Did Talen Energy provide a dry cooling option?