

Testimony of Eric Joseph Epstein  
Before the Susquehanna River Basin Commission  
December 15, 2011

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SRBC Commission Meeting and Public Hearing,  
Best Western East Mountain Inn & Suites,  
2400 East End Boulevard,  
Wilkes-Barre, PA

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Re: PPL's Conceptual Proposal to Develop and Implement  
A Corporate Storage Asset Pool for Consumptive Use  
Mitigation

Presented to the SRBC on June 23, 2011

Submitted by:  
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REVIEW OF  
PPL'S SUSQUEHANNA RIVER BASIN  
COMMISSION PRESENTATION  
JUNE 23, 2011  
ENTITLED

“CONCEPTUAL PROPOSAL TO DEVELOP AND  
IMPLEMENT A CORPERATE STORAGE ASSET POOL  
FOR CONSUMPTIVE USE MITIGATION”

November 2011

Keith L. Harner, PE  
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## 1.0 Introduction

PPL made a presentation to the Susquehanna River Basin Commission (SRBC) on June 23, 2011 for a “Conceptual Proposal to Develop and Implement a Corporate Storage Asset Pool for Consumptive Use Mitigation”. This review will follow the power point presentation as provided by PPL.

## 2.0 Presentation Review

### 2.1 Regulatory Framework for Proposal – Page 3 of Presentation

- **18 CFR § 806.22 provides for SRBC discretion to determine the acceptable manner of CU mitigation**

Consumptive use regulations are covered under:

“18 CFR § 803.2 b) In addition, §§803.42, 803.43 and 803.44 contain the following specific purposes: Protection of public health, safety and welfare; stream quality control; economic development; protection of fisheries and aquatic habitat; recreation; dilution and abatement of pollution; the regulation of flows and supplies of surface and ground waters; the avoidance of conflicts among water users; the prevention of undue salinity; and protection of the Chesapeake Bay.”

And

“18 CFR § 803.42 H) Other alternatives.

(2) Alternatives to compensation may be appropriate such as discontinuance of that part of the project's operation that consumes water, imposition of conservation measures, utilization of an alternative source that is unaffected by the compensation requirement, or a monetary payment to the commission in an amount to be determined by the commission from time-to-time.

(3) The commission shall, in its sole discretion, determine the acceptable manner of compensation or alternatives to compensation, as applicable, for consumptive uses by a project. Such a determination will be made after considering the project location, anticipated amount of consumptive use and its effect on the purposes set forth in §803.2 of this part, and any other pertinent factors.

(c) *Quantity of consumptive use.* For purposes of evaluating a proposed project, the commission shall require estimates of anticipated consumptive use from the project sponsor. The commission, as part of the project review, shall evaluate the proposed methodology for monitoring consumptive losses and compensating flows including flow metering devices, stream gauges, and other facilities used to measure the consumptive use of the project or the rate of streamflow. If the commission determines that additional flow measuring devices are required, these shall be provided at the expense of the project sponsor and shall be subject to inspection by the commission at any time. When the project is operational, the commission shall be responsible for determining when compensation is required and shall notify the project sponsor accordingly. The project sponsor shall provide the commission with periodic reports in the time and manner as it requires showing actual consumptive uses associated with the project. The commission may use this data to modify, as appropriate, the magnitude and timing of the compensating releases initially required when the project was approved.

(d) *Quality of compensation water.* The physical, chemical and biological quality of water used for compensation shall at all times meet the quality requirements for the purposes listed in §803.2, as applicable. “

The Susquehanna River Basin Commission (SRBC) regulations allow for alternative methods to be used as mitigation for consumptive uses. The preceding sections of the regulations set forth the criteria for an alternative method. It should be noted that any alternative would be required to protect existing fisheries and aquatic habitat.



## 2.2 SRBC Consumptive Use Program – Page 4 of Presentation

- ***“...the intent of the Commission’s CU mitigation program is to replace CU during low flow periods to avoid worsening conditions beyond the natural.***
- ***“...mitigation can be driven ... to protect the local stream source, or it can be driven ... with the goal of not reducing inflows to the Chesapeake Bay.”***

The actual full section of the SRBC Consumptive Use Mitigation Plan states:

“Mitigation Goal As laid out in the Compact, the intent of the Commission’s CU mitigation program is to replace CU during low flow periods to avoid worsening conditions beyond the natural. The implementation of the mitigation can be driven by local conditions to protect the local stream source, or it can be driven by conditions at a downstream location, with the goal of not reducing inflows to the Chesapeake Bay beyond the 1-in-20-year (P95) monthly flows in August, September, and October. It is likely the final mitigation strategy will incorporate aspects of both local and basin wide implementation.”

The SRBC Plan also acknowledges that the existing Q7-10 flow requirements do not protect the stream/river ecosystems nor do they provide Federal Energy Regulatory Commission (FERC) flows to the Conowingo pond in times of low flow. The SRBC Plan also states that final mitigation strategy is likely to incorporate aspects of both local and basin wide implementation.

Page 5 of the presentation provides a fairly accurate history of the SRBC consumptive use program. Page 6 of the presentation states that pooling of assets and cooperative management of the assets are the best means to meet basin needs. Basin needs should be looked at as a whole with all assets and uses within the river system

included, not just PPL's and SRBC's. Page 7 lists PPL's consumptive uses and mitigation which is assumed to be correct. Page 8 states that there are inefficiencies in the present system.

### **2.3 Opportunities with Respect to Current Use of Storage – Page 9 of Presentation**

- **Commission or private regulation of storage (either low flow augmentation or for CU make-up) typically results in enhanced flow conditions above points of use. (e.g., water released from Cowanesque for TMI improves streamflow conditions between the source water and point of use.)**
- **These enhanced conditions already afford the Commission flexibility in siting and approving CU make-up storage in the basin.**
- **New opportunities for storage development in the basin (which are generally limited) can best leverage the benefits provided by existing storage assets via consideration of pooling concepts and cooperative management.**

While all these statements have merit, 18 CFR §803.42 Standards for consumptive uses for water also contains the following requirement:

“i) The required amount of compensation shall be provided by the applicant or project sponsor at the point of taking (for a surface source) or another appropriate site as approved by the commission to satisfy the purposes outlined in this paragraph (b) (1). If compensation for consumptive use from a surface source is to be provided upstream from the point of taking, such compensation shall reasonably assure no diminution of the flow immediately downstream from the point of taking which would otherwise exist naturally, plus any other dedicated augmentation. “

Release of the mitigation flows upstream of the consumptive use does provide enhanced stream flows upstream of the consumptive use, but any analysis of mitigation (pooled or otherwise) should also include documentation that during drought conditions

a release from an upstream asset provides the total mitigation assumed at the point of consumption. Using PPL's example, documentation should be provided that a release from the Cowanesque Lake would not be diminished by the time it travels downstream (over 260 stream miles) to the intake of Three Mile Island (TMI).

#### **2.4 PPL Pooled Asset Proposal - Page 10**

- **Consolidate PPL-owned existing (Lake Chillisquaque) and future storage assets (as approved by SRBC) in to a corporate storage asset pool for the collective use by existing and future PPL CU projects in the basin.**
- **Operate the asset pool in coordination with SRBC operation of Cowanesque (for PPL) and other SRBC controlled assets to optimize local basin flow conditions and flows to the Chesapeake Bay.**
- **Manage developed assets on a collective basis (joint use basis, not dedicated to specific CU projects) for greatest efficiency and in concert with SRBC managed assets to minimize PPL in-lieu payment to the Commission and to maximize public interest benefit.**

#### **2.5 PPL Basin-wide CU Mitigation Assets – Page 11**

- **PPL-Owned Storage Assets**
  - **Lake Chillisquaque (existing) 8.6 MGD**
  - **Rushton Mine (West Branch) - 10+ MGD**
  - **Greenwich Mine (West Branch – currently discharges to Allegheny Basin)**
  - **Holtwood Pond - 14+ MGD**
- **Third-Party Assets**
  - **PPL is currently evaluating the feasibility of accessing certain 3rd party assets for inclusion in the asset pool (up to 30 MGD capability, subject to a non-disclosure agreement)**
    - **Greatest near-term development potential**

This review of PPL's proposal will assume that all statements on pages 11 and 12 of the presentation are true. Those assumptions are: the Rushton mine and Holtwood

pond will produce 10 and 14 MGD respectively and the 30 MGD third party assets will enter upstream of the intake and the flow is adequate to offset the total CU of the proposed Bell Bend Nuclear Power Plant (Bell Bend). The flow table on page 12 of the presentation would then look like this:

Flow Point	Existing	PPL Mitigation	Added column	Pooled Asset Mitigation
HUC 2050106	48.4	48.4	48.4	+
Susquehanna U/S of W/B confluence	7.6	7.6	7.6	+
West Branch	-15.4	-5.4	-5.4	deficit reduced but still a deficit
Susquehanna D/S of W/B confluence	-7.8	2.2	2.2	+
D/S Swatara Creek	-7.8	2.2	2.2	+
D/S Brunner Intake	-19.4	-----	-9.4	deficit
Chesapeake Bay	-19.4	4.6	4.6	+

Summary of PPL consumptive use and mitigation flows:

Consumptive Use

SSES	40.8 MGD
Montour	24.0 MGD
Brunner Island	11.3 MGD
Phoenix Links	0.3 MGD
Bell Bend	30.0 MGD
<u>Total CU</u>	<u>106.4 MGD</u>

Proposed Mitigation	
Cowanesque	48.4 MGD
Chillisquaque	8.6 MGD
Rushton	10.0 MGD
Holtwood	14.0 MGD
<u>3<sup>rd</sup> party</u>	<u>30.0 MGD</u>
Total Mitigation	111.0 MGD

Even if sufficient engineering data were provided to justify all the statements PPL has made in their presentation, this proposal still leaves sections of the West Branch and the main Susquehanna River with reduced flows as indicated on the preceding table. These lower flows occur even though the proposal provides mitigation flows which exceed consumptive uses by 4.6 MGD. PPL's proposal does not meet the requirements of 18 CFR §803.2. It does not protect the fisheries and aquatic habitat of the River.

**3.0 Engineering data required to justify assumptions:**

Rushton Mine will provide 10 MGD mitigation flows.

1. Disturbance of mining areas creates a very complex hydrological matrix. There are changes to the surface runoff characteristics, connections between surface water and ground water, shallow ground water and deep ground water and interconnections between different watersheds by mine passageways. Documentation should be provided to justify that the 10 MGD treated mitigation flow directed to the West Branch is not just a diversion of natural ground water migration to the headwater streams in the area. The increased pumping in dry weather could also result in the disappearance of flows from the small headwater streams which may try to recharge the ground water being withdrawn.
2. The quality of the mitigation water must be addressed. All streams in the area are designated by DEP to be in a non-attained condition. The stream to which this proposed discharge is directed is already degraded due to metals and most likely PH due to mine drainage. The treatment of 10 MGD

can be costly for the initial treatment plant construction (\$11.1 million for the Lancashire mine treatment system for 10.5 MGD), as well as, the continued operation of the plant. Provide documentation that discharge of 10 MGD mitigation flows from the mine will not have an adverse effect on the receiving stream.

3. Stage, storage, discharge curves should be incorporated into the SRBC OASIS model to determine the effect of this mitigation flow on the entire watershed.

Holtwood will provide 14 MGD mitigation flows.

1. Stage, storage, discharge curves should be incorporated into the SRBC OASIS model to determine the effect of this mitigation flow on the entire watershed.
2. If the SRBC OASIS model has not been updated to include all the power generation facilities in the lower basin it should be updated. Exelon just updated their OASIS model for the Conowingo and Muddy Run projects in June 2011. That model includes guaranteed releases from the Holtwood reservoir. The update of the SRBC model will allow PPL to determine if there is sufficient volume of water in the reservoir when mitigation flows are required to be discharged.

Third party flows:

1. Provide documentation that the flows will enter above the proposed Bell Bend intake.
2. Stage, storage, discharge curves should be incorporated into the SRBC OASIS model to determine the effect of this mitigation flow on the entire watershed.
3. Documentation indicates that Bell Bend will need 31 MGD of consumptive use mitigation. If less than 27.9 MGD of mitigated flows are provided above the intake for the proposed facility, then the Susquehanna River below the confluence of the West Branch would see a deficit flow.
4. The Susquehanna River water quality at the proposed facility location is in a non-attainment condition. Provide documentation that the discharge of the mitigation flows and the proposed facility will not have an adverse quality impact on the Susquehanna River.

#### 4.0 Recent Susquehanna River Reports

PPL provided a report in September 2007 entitled “HOLTWOOD REDEVELOPMENT PROJECT FERC PROJECT NO. 1881 CONSUMPTIVE USE STUDY EFFECT OF 17 CFS ON BIOLOGICAL RESOURCES BETWEEN THE BRUNNER ISLAND STATION AND SAFE HARBOR IMPOUNDMENT” written by Kleinschmidt Energy and Water Resources Consultants. The following is the summary of the report:

“The change in water surface elevation corresponding to 17 cfs in the stretch between the Brunner Island and the Safe Harbor Impoundment is approximately one-tenth of the typical standard error in field measurement techniques of 0.1 ft. It is Kleinschmidt's opinion that there will be no measurable effects on either the aquatic habitat or the biological resources located in this section of the River as related to the 17 cfs of consumptive use at the Brunner Island Station.”

This conclusion is based upon the change of water surface elevation. The report does not include any analysis of the existing water quality or the effects of reduced flows would have on water quality. The report also does not address any potential impact on the fish habitat as a result in the change in water quality by the proposed reduced flows.

Since that time, there have been several recent reports completed for the Susquehanna River. The Consumptive Use Mitigation Plan – SRBC 2008, Ecosystem Flow Recommendations for the Susquehanna River Basin – The Nature Conservancy 2010, and the draft Susquehanna River Management Plan – PA Fish and Boat

Commission 2011. All three reports include sections on consumptive use. All three reports make statements that the existing requirement for the mitigation of the Q7-10 flow rates does not adequately protect the ecosystems of the Susquehanna River. The following paragraphs from the Susquehanna River Management Plan draft best expresses the concerns about future consumptive use increases in the Susquehanna River Basin:

“A potentially significant threat to aquatic communities in the Susquehanna River Basin is increased consumptive use (CU) of water to meet expanding societal demands for water. CU is defined by SRBC as water that is used in a way it is not returned to the basin, including through evaporation, irrigation, use in products and diversions out of the Susquehanna watershed. Consumptive water use regulation, adopted by the SRBC in 1976 and most recently updated in November 2010, requires project sponsors to provide mitigation, either through providing compensatory water or fees, for their water use during low flow events. The maximum current use potential in the basin is estimated to be 882.5 million gallons per day (mgd) and is projected to increase to 1,202.2 mgd by 2025 of which, mitigation is required for 116.7 mgd and 390.3 mgd, respectively. Historically, actual usage falls somewhat below the actual permitted usage, but management based on permitted values allows for more conservative estimates for resource protection (SRBC 2008).”

And

“The most recent CU mitigation plan has recognized the need for revised mitigation thresholds from the historic Q7-10 threshold to be more responsive to demonstrated aquatic and riparian resource needs, potentially including recently observed disease-related mortality of smallmouth bass and largemouth bass in the Susquehanna River and major tributaries. The 2008 Plan quantifies the need to secure more storage to achieve mitigation flows at the permitted levels, and the SRBC is currently working with partners to develop and acquire innovative storage options in order to set more protective/responsive CU mitigation goals (SRBC 2008).”



The following paragraph from the Ecosystem Flow Recommendations for the Susquehanna River Basin – The Nature Conservancy 2010 is of particular concern. This is the very section of the river which will see reduced low flows under the PPL proposal.

“Water quality, specifically DO concentrations, is directly correlated to low flow magnitudes. Allowable point source discharges are calculated using the assimilative capacity of the 7-day, 1 in 10 year, low flow event (Q7-10). Under the Q7-10 condition, effluent discharge must not cause DO concentrations to fall below the standard of 4 mg/L. On the lower Susquehanna the Q7-10 flow translates to the monthly Q99 for July and August and the monthly Q96 for September and October (USGS unpublished data). During summer and fall, flows less than the monthly Q96 could result in DO concentrations less than 4 mg/L. Further, egg, larval and juvenile fishes, and species such as the eastern hellbender and wood turtle, require higher concentrations (5 mg/L), and most likely, higher flows. Chaplin et al. (2009) also demonstrated that DO concentrations in shallow margin and backwater are frequently lower than in main channel habitats. In other words, even if DO concentrations exceed 4 mg/L in the main channel, they may likely be lower in shallow margin and backwater habitats that are critical for egg, larval, and juvenile life stages (EPA 1986, Greene 2009). Therefore, water withdrawals should not cause streamflows to fall below the monthly Q96 more often than they would under unregulated conditions, and flows greater than the monthly Q96 may be necessary to maintain water quality conditions that support sensitive species, life stages and habitats.”

## 5.0 Conclusions:

The establishment of a cooperative and coordinated pooled asset program for consumptive use mitigation between stakeholders has the potential to offset negative impacts on the Susquehanna River system. However, the pooling proposal from PPL (which includes PPL and SRBC controlled facilities) does not meet or exceed existing regulations. A pooled asset plan should make it possible to utilize different mitigation sources to protect different sections of the river system, but the use of the Holtwood reservoir provides mitigation flow well below the consumptive uses of PPL. That release would only help the Conowingo Reservoir (Baltimore city) and the Chesapeake Bay. The lower Susquehanna River is one of the most vulnerable sections of the river during low flows. This proposal does not protect that section of the river. Even when all PPL's statements are assumed to be true (including that the 3<sup>rd</sup> party mitigation flows would be provided upstream of the proposed Bell Bend facility) there remains reduced flows in sections of the West Branch and lower Susquehanna River.

## Appendix A

### Reference Documents

From the SRBC website:

Groundwater Management Plan

Lower Susquehanna Comprehensive Water Resource Study

SRBC Comprehensive Plan

Consumptive Use Mitigation Plan

Agricultural Consumptive Water Use

Water Assessment & Protection Strategic Plan (PDF)

From PPL Website:

HOLTWOOD REDEVELOPMENT PROJECT FERC PROJECT NO. 1881,  
CONSUMPTIVE USE STUDY, EFFECT OF 17 CFS ON BIOLOGICAL  
RESOURCES BETWEEN THE BRUNNER ISLAND STATION AND SAFE  
HARBOR IMPOUNDMENT

PDF reports found on the web:

Ecosystem Flow Recommendations for the Susquehanna River Basin – The  
Nature Conservancy 2010

Draft Susquehanna River Management Plan – PA Fish and Boat Commission  
2011

## Appendix A

### Reference Documents Continued

PDF reports found on the web continued:

HYDROLOGIC CHARACTERIZATION OF A LARGE UNDERGROUND MINE POOL IN CENTRAL PENNSYLVANIA, Jay W. Hawkins, Eric F. Perry, and Mike Dunn

APPENDIX 2 - Model Development and Verification SRBC OASIS model.

OPERATIONS MODELING CALIBRATION REPORT ADDENDUM TO CONOWINGO HYDROELECTRIC PROJECT-RSP 3.11 FERC PROJECT NUMBER 405 AND MUDDY RUN PUMPED STORAGE PROJECT

EXPERT WITNESS REPORT OF ARNOLD GUNDERSEN REGARDING CONSUMPTIVE WATER USE OF THE SUSQUEHANNA RIVER BY THE PROPOSED PPL BELL BEND NUCLEAR POWER PLANT - supplied by Eric Epstein

## Appendix B

### Professional History

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#### **EDUCATION**

Pennsylvania State University, State College, PA, March 1976  
B.S. Civil Engineering

#### **CONTINUING EDUCATION**

PADOT Bridge Inspection Certification  
Penn State Management Certification Program  
ArcINFO, ArcVIEW, ArcGIS  
AutoCAD  
OSHA Trench Training  
Urban Hydrology and Storm Water Management

#### **PROFESSIONAL REGISTRATION**

Pennsylvania Professional Engineer - PE-033769-E (1984)

#### **WORK EXPERIENCE**

County of Lancaster - Assistant County Engineer - April 1993 - December 2009

- Acting Department Head since 2008
- Responsible for the preparation and oversight of a \$5,000,000 budget
- Provided construction management for projects ranging from \$10,000 to \$600,000
- Responsible for the preparation of the County's Act 167 Storm Water Management Plans
- Provided supervision for over 50 employees
- Arranged and conducted public meetings and hearings
- Provided property and right-of-way acquisition services
- Prepared PADEP permit applications
- Prepared State and Federal grant applications
- Served as project manager for County subdivision and design projects
- Prepared construction specifications and plans for County projects

Dover Township - Township, Water and Sewer Authority Engineer - July 1986 - April 1993

- Served as Engineer to the Township Supervisors, Water Authority and Sewer Authority
- Provided Subdivision and Land Development reviews
- Provided construction management for all public works projects
- Oversaw the computerized water and sewer billing
- Inspected public works improvements installed by developers
- Completed traffic studies for Township roads
- Provided construction stakeout for Township projects
- Assisted with budget preparation

City of York, City Engineer - January 1985 - July 1986

- Department Head
- Responsible for preparation and oversight of the department budget
- Designed, bid and provided construction management for projects ranging from \$50,000 to \$250,000
- Provided traffic studies for City Streets
- Completed project stakeout and construction inspection of public works projects
- Reviewed stormwater management and erosion sedimentation plans
- Provided Right-of-way surveys

Huth Engineers Inc. - Project Engineer - November 1979 - January 1985

- Performed sewer system inflow and infiltration studies
- Provided hydrology and hydraulic engineering design
- Performed dam inspections
- Designed public works projects with costs up to \$1.5 million
- Performed bridge inspections
- Provided resident engineer services for a sewage treatment plant upgrade