DOCKET NO. D-1969-210 CP-14

DELAWARE RIVER BASIN COMMISSION

Exelon Generation Company, LLC
Limerick Generating Station and Surface Water Augmentation
Montgomery, Bucks, Schuylkill, Berks and Chester Counties, Pennsylvania

PROCEEDINGS

This docket is issued in response to an Application submitted to the Delaware River Basin Commission (DRBC or Commission) on November 17, 2014 by Exelon Generation Company, LLC (Exelon Generation or docket holder) to make permanent (through the expiration date of this docket) the consumptive use condition changes regarding the Limerick Generating Station (LGS), which were temporarily approved by the Executive Director via letter dated August 19, 2014..

The Application was reviewed for continuation of the project in the Comprehensive Plan and approval under Section 3.8 of the *Delaware River Basin Compact*. The Bucks, Montgomery, Berks, Schuylkill, Chester and Philadelphia County Planning Commissions have been notified of pending action. A public hearing on this project was held by the DRBC on March 10, 2015.

A. DESCRIPTION

1. **Purpose**. This docket shall continue the approval of the following:

a. Normal project operations
b. Long-term operations and surface water withdrawals from the Schuylkill River, the Perkiomen Creek, the Delaware River, the Wadesville Mine Pool (WMP) and the Tamaqua Area Water Authority's (TAWA) Still Creek Reservoir and Owl Creek Reservoirs (Tamaqua Reservoirs) to supply the consumptive and non-consumptive cooling water needs at LGS
c. Water Supply Modification Project
d. WMP Withdrawal and Streamflow Augmentation Project
e. A surface water discharge to the Schuylkill River of up to 14.2 million gallons per day (mgd) consisting primarily of blowdown from the LGS facility
f. A total surface water withdrawal from the Schuylkill River of 1.7422 billion gallons per month (bgm)
g. A peak daily surface water withdrawal from the Schuylkill River of up to 58.2 mgd (44 mgd consumptive plus 14.2 mgd non-consumptive)

h. A total groundwater withdrawal allocation of up to 6.1 million gallons per month (mgm) (The wells supply potable, non-potable, and emergency use water to the LGS and associated buildings. During fire emergencies and other plant emergencies, groundwater withdrawals are not restricted.)
    i. LGS Well 1 (the "Alley Well"): up to 0.104 mgd (3.1 mgm)
    ii. LGS Well 3 (the "Batch Plant Well"): up to 0.094 mgd (2.8 mgm)
    iii. Limerick Training Center Well: up to 0.075 mgd (0.1 mgm)
    iv. Limerick Energy Information Center Well: up to 0.044 mgd (0.1 mgm)
i. Use of the various water sources subject to the conditions and requirements contained in the DECISION Section of this docket
j. Operation and Monitoring Plan (O&M Plan, as attached)

This docket shall also make permanent the consumptive use condition changes approved by the Commission's Executive Director via letter dated August 19, 2014. The approved changes include the approval to increase consumptive water use by the LGS from 24 mgd with one unit operating and 44 mgd with two units operating to 25.5 mgd and 47.3 mgd, respectively, when the ambient air temperatures are 87˚F or greater. This increase in consumptive use will not increase the facility's total surface water use and thus entails no increase in the monthly allocation of 1.7422 bgm, maximum daily surface water allocation of 58.2 mgd or daily non-consumptive use allocation of 14.2 mgd previously approved by the Commission. In support of its request, Exelon Generation has explained that recent repairs to its closed-circuit cooling water system, which included repairs to cooling tower fill, have resulted in an increased cooling efficiency. The increased cooling efficiency has resulted, in turn, in an increase in the evaporative water loss (consumptive use). Approval of the requested increase in consumptive use is needed to provide Exelon Generation with operational flexibility during extended periods of high ambient air temperature (87˚F or greater). .

There are two attachments associated with this docket.
Attachment No. 1 consists of the *LGS System Map*.
Attachment No. 2 consists of the *O&M Plan*

For the purpose of this docket, *augmentation water* refers to water supplied by Exelon Generation from DRBC-approved sources to the Schuylkill River and Perkiomen Creek during periods of low natural stream flow to compensate for LGS surface water withdrawals for consumptive use. Schuylkill River *augmentation water* is supplied from the WMP and/or Still Creek Reservoir and Owl Creek Reservoirs, and Perkiomen Creek *augmentation water* is supplied from the Delaware River via the water diversion system. *Augmentation water* also may be used for LGS non-consumptive use only under limited circumstances set forth in this docket. Natural flow refers to the naturally-occurring flow in the source waterbody not augmented by releases from Commission sponsored reservoir storage projects (Blue Marsh).

2. <u>Location and Physical Features</u>. The overall project consists of multiple release, withdrawal, and discharge components in different locations. Attachment No. 1 is a system map that depicts the locations and interrelationship of these components. Specific coordinates of the withdrawal and intake points have not been provided in this docket for security purposes.

a. Limerick Generating Station (LGS): The project includes the continued operation of a nuclear power plant with two generating units each having a maximum Reactor Thermal Power of 3,515 megawatts (MW), with circulating cooling water for the steam turbine condensers to be furnished from cooling towers and surface water to be withdrawn from the Schuylkill River and/or Perkiomen Creek as described below. LGS is located on a 491-acre site adjoining the east bank of the Schuylkill River mostly in Limerick Township (a small portion extends into Lower Pottsgrove Township), Montgomery County, Pennsylvania, about 1.7 miles south of the nearest part of the Borough of Pottstown. The LGS site property also includes 154 acres adjoining the west bank of the Schuylkill River in East Coventry Township, Chester County. No plant features of LGS are situated in this area; it serves only as the western portion of the LGS exclusion area. Water intake structures and discharge structures associated with the facility and its operations are described below. The main facilities at the site include two reactor enclosures, two turbine enclosures, two hyperbolic cooling towers, administrative and service buildings, an Independent Spent Fuel Storage Installation (ISFSI), and a water treatment building. The addition of the ISFSI was completed in February 2008.

b. LGS Schuylkill River Intake (Withdrawal Location): The primary LGS intake is located in Limerick Township, Montgomery County, Pennsylvania on the non-tidal portion of the Schuylkill River. The facility is located at River Mile 92.47 - 48.22 (Delaware River – Schuylkill River). Specific location information for this water withdrawal location has been withheld for security reasons.

Water withdrawn through the Schuylkill River intake ("Schuylkill Pumphouse") is used for consumptive and non-consumptive applications at LGS. The water enters the front and sides of the intake structure through trash bar racks, passes through intake bays and traveling screens, and then flows into the pump wells. The LGS intake is designed to limit the velocity of the water approaching the traveling screens to a maximum of 0.61 feet per second (fps).

c. LGS Perkiomen Creek Intake (Withdrawal Location): The auxiliary LGS intake is located in Graterford Township, Montgomery County, Pennsylvania on the Perkiomen Creek. The facility is located at River Mile 92.47 –32.36 – 8.53 (Delaware River – Schuylkill River – Perkiomen Creek). Specific location information for this water withdrawal location has been withheld for security reasons.

Exelon Generation is approved to withdraw water from Perkiomen Creek for use at LGS when its 24-hour average natural flow is at least 180 cfs (for one unit in operation) or 210 cfs (for two units in operation) as measured at the U.S. Geological Survey (USGS) Graterford gaging station, and the use of the Schuylkill River is limited or restricted.

Subject to the flow restrictions as defined in DECISION Condition II.ee. of this docket, the approval to withdraw water from the Perkiomen Creek [via natural flow or after augmentation from the Delaware River (intrabasin transfer)] also applies when the natural flow criteria for the Schuylkill River are met provided that (1) an abnormal condition exists that prevents withdrawal from the Schuylkill River (e.g., the Schuylkill Pumphouse is out of service, an ice jam on the river prevents withdrawal, or an upstream spill causes severe intake water quality impairment which could result in equipment damage); (2) a plant operational/maintenance

condition exists that could be mitigated by the selective use of Perkiomen Creek water (e.g., using Perkiomen Creek water that contains less total dissolved solids than Schuylkill River water when a condenser chemistry issue is detected and until such issue can be resolved); or (3) LGS has already switched over to using the Perkiomen Creek intake when use of the Schuylkill River is restricted, but the Schuylkill River flow then cycles between meeting and not meeting its flow criteria, which would otherwise require LGS to repeatedly start up and shut down both intake pumphouses within a relatively short period of time (See DECISION Condition II.ee).

The Perkiomen Creek intake consists of a pumphouse ("Perkiomen Pumphouse") and in-stream components that consist of a series of 15 submerged stationary slotted screens, placed at midstream in the Perkiomen Creek and connected to three intake pipelines. The screens are cylindrical, each approximately 6 feet long and 2 feet in diameter, with a slot size of 2 mm. The average through-slot velocity is less than 0.4 fps; maximum through-slot velocity is less than 0.5 fps. The water passes through the screens and the three intake pipelines connected to the onshore pumphouse. The pumphouse contains three 50% capacity intake pumps and a small (approximately 400 gpm) auxiliary pump. Shallow weirs located in the creek just downstream of the Perkiomen intake maintain a pool level above the submerged screens. The intake and its associated discharge pipeline to LGS are used to supply water from the Perkiomen Creek to LGS. The water discharges into a storage tank located at the LGS plant site for subsequent use.

Exelon Generation also is approved to use Perkiomen Creek water to supply the small auxiliary pump, which operates as needed to: (1) maintain system operability by keeping the discharge pipelines and storage tank sufficiently full to prevent water hammer when the intake pumps are started; (2) maintain level in the storage tank when the system is not in use; and (3) provide freeze protection by agitating the storage tank water during frigid weather conditions.

d. Wadesville Mine Pool (Release Location): During periods when the flow criteria for the Schuylkill River are not met, Exelon Generation is approved to use water from the WMP to augment flow in the Schuylkill River and to withdraw an equivalent amount (minus evaporative losses), to be used by Exelon Generation as *augmentation* water for LGS. Up to 446.4 mgm (14.4 mgd, 10,000 gpm) of water may be used to augment the Schuylkill River for this purpose. The pumping and conveyance system currently used to maintain the water level of the WMP, which is located on Reading Anthracite Company (RAC) property, is located at the border of New Castle and Norwegian Townships, just west of St. Clair Borough, all within Schuylkill County, Pennsylvania.

The Wadesville anthracite minefield is located in the Llewellyn Formation and there are no active deep mines in or near the area. The Wadesville Operation extends for approximately 2,000 acres in the Townships of Norwegian and New Castle and the Borough of St. Clair, all within Schuylkill County in Pennsylvania.

The WMP and the dewatering pumps have been operational for approximately 50 years. The WMP is approximately 700 feet deep, one mile wide and three miles long. An estimate of the amount of water stored in the mine pool (3.6 billion gallons) was determined in 1953. The WMP withdrawal has been reviewed and approved by Pennsylvania Department of

Environmental Protection (PADEP). In accordance with a DRBC and PADEP (successor to Pennsylvania Department of Environmental Resources) Administrative Agreement dated August 19, 1976, mine drainage projects are deemed to not have a substantial effect on the water resources of the Delaware River Basin for the purposes of the agreement. Under the terms of the 1976 agreement, DRBC will have no further involvement in the technical review of such projects unless a request for assistance is made to DRBC by PADEP. In accordance with the 1976 agreement, DRBC is only approving the use of the water for the purposes of augmentation.

The existing pump house, which is located at the Wadesville shaft approximately ¼-mile from the open pit, contains pumping equipment used for dewatering of the mine pool to support present-day operations. The top of the shaft is at elevation 782 feet above mean sea level (MSL) and its bottom elevation is at 46 feet MSL. Two vertical turbine pumps operate, as available, to maintain the water level at approximately 450 feet (El 332 feet MSL) below the surface. The bottom of the casing of the lower pump is approximately 600 feet (El 182 feet MSL) below the surface. The pumps are capable of discharging at a rate in the range of 9,000 to 10,000 gpm total.

Information published in a 1953 bulletin by the Bureau of Mines states that the:

- Surface elevation at Wadesville is at El 821.2 feet MSL;
- Elevation of the Pool Bottom is El 65 feet MSL;
- Overflow elevation at a concrete pipe at the Saint Clair shaft is El 732 feet MSL; and
- Estimated water in the workings is 3.6 billion gallons (in 1953).

The WMP facilities are found on the "Pottsville, PA" USGS Quad as follows:

FACILITY	LATITUDE (N)	LONGITUDE (W)
Wadesville Pump House	40° 42' 55"	76° 12' 22"
Wadesville Outfall	40° 42' 52"	76° 12' 24"

The existing outfall is used to discharge mine pool water via a dry swale to the East Norwegian Creek in the Schuylkill River Watershed. East Norwegian Creek joins with West Norwegian Creek to form Norwegian Creek, which flows under the Borough of Pottsville, via a culvert, to join the Schuylkill River at River Mile 123.4. The WMP water is discharged at River Mile 92.47 - 123.4 - 2.4 - 0.5 (Delaware River – Schuylkill River – Norwegian Creek – East Norwegian Creek) in accordance with National Pollutant Discharge Elimination Discharge Permit System (NPDES) Permit Nos. PA00593508 and PA0123293, renewed by PADEP on April 4, 2008 and December 21, 2007, respectively. The NPDES permits for the WMP discharges are issued to Reading Anthracite Company (Pottsville, PA). In accordance with the existing administrative agreement between PADEP and DRBC, PADEP is responsible for the issuance of permits for the discharge from the mine operations.

The PADEP submitted the *Total Maximum Daily Load (TMDL) Report for the Upper Schuylkill River Watershed* to the United States Environmental Protection Agency (EPA) on March 28, 2007. The report included TMDLs for the three primary metals associated with acid mine drainage (AMD) (iron, manganese, and aluminum) and pH, and addressed three segments of the Schuylkill River on Pennsylvania's 1996 303(d) list of impaired waters. On April 7, 2007, the EPA approved the TMDL. Both NPDES permitted discharges from the Wadesville site are included in the TMDL.

e. Delaware River Diversion (Withdrawal Location): During periods when use of the Perkiomen Creek is allowed and the flow criteria for the Schuylkill River and the Perkiomen Creek are not met, Exelon Generation is approved to use an intrabasin transfer of water from the Delaware River to the Bradshaw Reservoir for subsequent release (augmentation) into the East Branch Perkiomen Creek (EBPC). The released water then flows into the Perkiomen Creek and reaches the point of withdrawal at the Perkiomen Creek intake, where it is pumped to LGS. Docket No. D-1965-76 CP (8) approves the diversion of Delaware River water into the Bradshaw Reservoir. Docket No. D-79-52 CP approves the pumping of water from the Bradshaw Reservoir into the EBPC. Docket D-79-52 CP limits the maximum quantity pumped by the Bradshaw Reservoir Pumping Station to the EBPC for PECO (now Exelon Generation) to 42 mgd plus a ten percent allowance for evaporative and leakage losses in the open channel of the connecting waterways or a total of 46.2 mgd. The attached O&M Plan provides that when water is pumped from the Bradshaw Pumping Station for Exelon Generation use as consumptive use at LGS an additional 3% of the amount pumped will be added for evaporative and leakage losses in the open channel of the connecting waterways.

The diversion of water from the Delaware River for LGS consumptive cooling water needs is accomplished through a series of pumping stations, the Bradshaw Reservoir, transmission mains, the EBPC and Perkiomen Creek. The Point Pleasant Pumping Station is located at Delaware River Mile 157.3 in Plumstead Township, Bucks County, Pennsylvania, and is owned and operated by Forest Park Water Authority (FPWA). Specific location information for this water withdrawal location has been withheld for security reasons.

Docket No. D-65-76 CP (8) was approved on February 18, 1981 with no expiration date. The docket approves a total diversion from the Delaware River of 95 mgd. Of the 95 mgd:

- Up to 48.8 mgd (39.5 mgd for public water supply purposes plus 4 mgd for evaporative and seepage losses and up to 5.3 mgd is provided to maintain the minimum stream flows in the Neshaminy Creek downstream of the water treatment plant); and,
- Up to 46.2 mgd (42 mgd for LGS consumptive losses + 10% for evaporative losses in the open channel of the connecting waterways).

The original approval was issued to the Neshaminy Water Resources Authority (NWRA) but a change of ownership occurred in 1994, transferring the docket from the NWRA to the FPWA. The portion of the FPWA diversion for Exelon Generation's is pumped from the Delaware River for discharge into the Bradshaw Reservoir. The remaining portion for local

public water supply purposes (up to 48.8 mgd) is pumped from the Delaware River for discharge through the Bradshaw Reservoir to the North Branch Neshaminy Creek.

The Bradshaw Reservoir, pumping station, and transmission main were approved by DRBC via Docket No. D-79-52 CP on February 18, 1981. Docket No. D-79-52 CP does not have an expiration date. The Bradshaw Reservoir facility, which is owned and operated by Exelon Generation, includes a pumping (booster) station that is used to transfer water, when required, to the EBPC through a transmission main for Exelon Generation's use. The water is disinfected seasonally, as required by PADEP NPDES Permit No. PA0052221 (effective July 1, 2009), before it reaches the EBPC by mixing with ozone at Exelon Generation's water treatment plant (the "Bedminster Water Processing Facility" or BWPF), which is located along the transmission main route. The transmission main and BWPF also are owned and operated by Exelon Generation.

Condition II.P. of Docket No. D-79-52 CP reserves the right of the Commission to open said docket at any time, and to reconsider its decision and any and all conditions imposed hereunder in light of further information developed by, or decisions rendered in, pending or future proceedings conducted by other State and Federal agencies concerning the development and operation of LGS and related facilities. Condition II.P. also allowed the Commission to, at any time, modify existing conditions, or impose additional conditions, upon the construction and operation of this facility to reflect new or changed information or to conform to requirements imposed on the project by other agencies. By approval of this docket, the Commission is modifying one of the DECISION Conditions of Docket No. D-79-52 CP as described in the next paragraph.

DECISION Condition II.C. of Docket No. D-79-52 CP required PECO (Exelon Generation's predecessor) to maintain 27 cfs in the EBPC while LGS was in operation and 10 cfs at all other times. By approval of this docket, the Commission is modifying DECISION Condition II.C. of Docket No. D-79-52 to require a minimum flow of 10 cfs (6.5 mgd) in the EBPC at all times (See Condition II.gg.).

The rate of release into the EBPC is equal to the LGS's consumptive cooling water demand plus an additional three percent (unless modified as discussed above to compensate for evaporative losses estimated to occur during the approximately 18-hour transit time). The flow in the EBPC enters into the main branch of Perkiomen Creek and flows downstream to a point in the Graterford area, where Exelon Generation's Perkiomen Creek intake structure and transfer pipeline are used to convey the water directly to LGS.

In accordance with Docket No. D-65-76 CP (8), the Point Pleasant Pumping Station may withdraw up to 95 mgd of water from the Delaware River. Up to 46.2 mgd (42 mgd consumptive use at LGS plus 4.2 mgd for transmission losses) may be routed to the EBPC for use by Exelon Generation to maintain minimum creek flows, provide for recreational event augmentation, and provide for water withdrawals at the Perkiomen Creek intake at Graterford, Pennsylvania. At Graterford, up to 42 mgd of water may be pumped to LGS for consumptive use.

Water diverted from the Delaware River via the Point Pleasant Pumping Station is restricted to the use, conditions and service area approved in Docket No. D-65-76 CP (8) on February 18, 1981 and by DECISION Condition II.ii. of this docket, and cannot be used for any other purposes unless approved by the Commission. Docket versions D-65-76 CP-9 and D-65-76 CP-10 covered additional items primarily related to Forest Park Water. Docket version D-65-76 CP-8 remains in effect and unchanged by the subsequent docket versions.

f. Tamaqua Reservoirs (Release Location): During periods when the natural flow criteria for the Schuylkill River are not met, Exelon Generation is approved to use water from the Tamaqua Reservoirs as Schuylkill River *augmentation* water and to withdraw an equivalent amount (minus evaporative losses) for consumptive use at LGS subject to the conditions in this docket. Exelon Generation has a contract with TAWA for compensatory releases of water from Still Creek Reservoir into Still Creek and a separate contract with TB for releases from the Owl Creek Reservoirs into Owl Creek. Still Creek Reservoir is located in Rush Township, Schuylkill County, Pennsylvania, approximately 2.3 miles north of Hometown, Pennsylvania and 5,000 feet upstream from the confluence of Still Creek and the Little Schuylkill River at River Mile 92.47 - 102.1 - 30.15 - 1.0 (Delaware River – Schuylkill River – Little Schuylkill River – Still Creek). The Owl Creek Reservoirs are located in the Borough of Tamaqua, Schuylkill County, Pennsylvania. The existing dams are located at River Miles 92.47 – 102.1 – 22.1 – 1.7 and 92.47 – 102.1 – 22.1 – 2.3 (Delaware River – Schuylkill River – Little Schuylkill River – Owl Creek).

The DRBC issued Entitlement No. 311 to the Tamaqua Borough Authority (TBA now TAWA) on August 6, 1976. The Entitlement confirmed that TBA (now TAWA) could use, withdraw or divert up to 38.044 million gallons per month for consumptive use and 205.156 million gallons per month for non-consumptive use for water supply purposes from Still Creek without being subject to DRBC surface water charges. At the time that draft Docket No. D-1969-210 CP-13 was released for public comment, Commission staff were reviewing an application from TAWA and TB to increase augmentation releases from the Tamaqua Reservoirs from 36 mgd to 43.3 mgd (Docket Application No. D-2010-028 CP-1).

The Commonwealth of Pennsylvania Department of Forests and Waters, Water and Power Resources Board (currently PADEP) issued Water Allocation No. WA-626 to the TBA (now TAWA) on January 5, 1965. The permit allocated 8 million gallons per day from Still Creek (248 mgm) for public water supply purposes. The permit involves public water supply diversions and is not related to releases on behalf of LGS and expires on January 5, 2015.

The Commission issued Docket No. D-2010-028 CP-1 on December 5, 2012 to TAWA and TB for the Tamaqua Reservoirs. Docket No. D-2010-028 CP-1 approved releases of up to 36 mgd from Still Creek Reservoir and up to 8 mgd from the Owl Creek Reservoirs, with a total not to exceed 43.3 mgd for use as consumptive water by Exelon Generation at the LGS.

g. LGS Outfall No. 001 (Discharge Location): LGS's Outfall No. 001 discharges primarily cooling tower blowdown, with intermittent additions of wastewater from the spray pond, holding pond, and liquid radwaste treatment systems, including laundry drains.

Liquid radioactive wastes are handled by systems enclosed within the protected area of the plant. These systems comprise the LGS radioactive liquid waste management system, which collects, treats, stores, and disposes of radioactive liquid wastes. The wastes are collected in sumps and drain tanks at various locations throughout each Limerick Unit and then transferred to the appropriate collection tanks in the common radwaste enclosure according to their classification (i.e., equipment drain, floor drain, chemical drain, or laundry drain waste). The liquid wastes are processed through treatment units to reduce radionuclide concentrations and are then either returned to the condensate system for re-use in the plant, packaged for offsite shipment, or monitored and discharged from the plant into the cooling tower blowdown line on a batch basis. The mixing of the effluent with the blowdown flow maintains the radionuclide concentrations at the release point in the Schuylkill River below 10 CFR Part 20 limits. Radionuclide effluents are under the jurisdiction of the U.S. Nuclear Regulatory Commission (NRC). Exelon Generation prepares and submits an Annual Radiological Environmental Operating Report for LGS to the NRC that assesses calculated offsite dose data resulting from radioactive liquid effluents. The Commission is deferring to the effluent limitations as prescribed by the NRC and as included in the LGS NPDES Permit which specifies the effluent discharge requirements for each agency from Outfall No. 001.

Outfall No. 001's discharge structure is a multi-port diffuser. Wastewater is returned to the Schuylkill River through the discharge diffuser, which is encased in the concrete channel stabilization structure on the east side of the river, about 700 feet downstream of the intake. The discharge diffuser consists of a 28-inch carbon steel pipe with a total of 283 nozzles (1.25 inch diameter) installed on 6-inch centers. The diffuser is supplied by a 36-inch carbon steel cooling tower blowdown pipe.

Effluent will continue to discharge to River Mile 92.47 – 48.01 (Delaware River – Schuylkill River) via Outfall No. 001, in Limerick Township, Montgomery County, in accordance with this docket and PADEP's NPDES Permit No. PA0051926 as follows:

FACILITY	LATITUDE (N)	LONGITUDE (W)
LGS Outfall No. 001	40° 13' 13"	75° 35' 22"

No changes in the location or capacity of any of the facilities described above are necessary to implement the requirements provided for in this docket. All existing facilities of the LGS project remain as previously approved. Intake water to the docket holder's facilities and discharges from Outfall 001 are metered. No new facilities are proposed.

3. <u>Design Criteria.</u> Exelon Generation is approved to withdraw water to meet its consumptive and non-consumptive needs at LGS in accordance with the Conditions in the DECISION Section of this docket and the O&M Plan approved by this docket. The following generally describes those conditions:

A. Surface Water Withdrawals from the Schuylkill River:

i. UNAUGMENTED:

- Surface water withdrawals from the Schuylkill River shall not exceed 58.2 mgd (44 mgd consumptive plus 14.2 non-consumptive) and 1.7422 bgm to supply the consumptive and non-consumptive needs of LGS; except that on days when the ambient air temperature is 87˚F or greater, the consumptive use shall not exceed 47.3 mgd, with no increase in the maximum monthly (1.7422 bgm) or daily (58.2 mgd) total surface water withdrawals from the Schuylkill River and no increase in daily non-consumptive use (14.2 mgd).
- With one unit in operation, when the 24-hour average flow in the Schuylkill River, as measured at the Pottstown Gaging station (USGS Gage No. 01472000), is **greater than 530 cfs**, the **unaugmented** surface water withdrawal for consumptive use is restricted to 24 mgd and to 14.2 mgd non-consumptive use, with the total not to exceed 1.7422 bgm. However, on days when the ambient air temperature is 87˚F or greater, the consumptive use is restricted to 25.5 mgd. As set forth in DECISION Condition II.x., total surface water withdrawals from the Schuylkill River may not exceed 1.7422 bgm and 58.2 mgd; and non-consumptive use may not exceed 14.2 mgd. Any and all consumptive use above 24 mgd must be replaced with commensurate augmentation releases from either the WMP, Tamaqua Reservoirs, and/or with water diverted from the Delaware River via the Perkiomen Creek. Such replacements must be made on a 1:1 gallons per day (gpd) basis over the 24-hour period beginning on the day after a consumptive use in excess of 24 mgd.
- With two units in operation, when the 24-hour average flow in the Schuylkill River, as measured at the Pottstown Gaging station (USGS Gage No. 01472000), is **greater than 560 cfs**, the **unaugmented** surface water withdrawal for consumptive use is restricted to 44 mgd and to 14.2 mgd non-consumptive use, with the total not to exceed 1.7422 bgm. However, on days when the ambient air temperature is 87˚F or greater, the consumptive use is restricted to 47.3 mgd. As set forth in DECISION Condition II.x., total surface water withdrawals from the Schuylkill River may not exceed 1.7422 bgm and 58.2 mgd; and non-consumptive use may not exceed 14.2 mgd. Any and all consumptive use above 44 mgd must be replaced with commensurate augmentation releases from either the WMP, Tamaqua Reservoirs, and/or with water diverted from the Delaware River via the Perkiomen Creek. Such replacements must be made on a 1:1 gpd basis over the 24-hour period beginning on the day after a consumptive use in excess of 44 mgd.

ii. AUGMENTED:

- With one unit in operation, when the 24-hour average flow in the Schuylkill River, as measured at the Pottstown Gaging station (USGS

Gage No. 01472000), is **less than or equal to 530 cfs**, the **augmented** surface water withdrawal for consumptive use is restricted to 24 mgd and to 14.2 mgd non-consumptive use, with the total not to exceed 1.7422 bgm. All consumptive use will be augmented on a 1:1 gpd basis. However, on days when the ambient air temperature is 87˚F or greater, the consumptive use is restricted to 25.5 mgd. As set forth in DECISION Condition II.x., total surface water withdrawals from the Schuylkill River may not exceed 1.7422 bgm and 58.2 mgd; and non-consumptive use may not exceed 14.2 mgd. Any and all consumptive use must be replaced with commensurate augmentation releases from either the WMP, Tamaqua Reservoirs, and/or with water diverted from the Delaware River via the Perkiomen Creek. Such replacements must be made on a 1:1 gpd basis in accordance with augmentation requirements specific to each of the sources used.

- With two units in operation, when the 24-hour average flow in the Schuylkill River, as measured at the Pottstown Gaging station (USGS Gage No. 01472000), is **less than or equal to 560 cfs**, the **augmented** surface water withdrawal for consumptive use is restricted to 44 mgd and to 14.2 mgd non-consumptive use, with the total not to exceed 1.7422 bgm. All consumptive use will be augmented on a 1:1 gpd basis. However, on days when the ambient air temperature is 87˚F or greater, the consumptive use is restricted to 47.3 mgd. As set forth in DECISION Condition II.x., total surface water withdrawals from the Schuylkill River may not exceed 1.7422 bgm and 58.2 mgd; and non-consumptive use may not exceed 14.2 mgd. Any and all consumptive use must be replaced with commensurate augmentation releases from either the WMP, Tamaqua Reservoirs, and/or with water diverted from the Delaware River via the Perkiomen Creek. Such replacements must be made on a 1:1 gpd basis in accordance with augmentation requirements specific to each of the sources used.

B. Schuylkill River *Augmentation Water* Sources (WMP and Tamaqua Reservoirs)

- Exelon Generation may use the WMP and the Tamaqua Reservoirs to provide *augmentation water* to the Schuylkill River to meet LGS's consumptive use demands as identified above at times when the 24-hour average flow in the Schuylkill River as measured at the Pottstown gaging station is less than or equal to 530 cfs with one unit in operation and 560 cfs with two units in operation. All consumptive use will be augmented on a 1:1 gpd basis.
- Up to 446.4 mgm (14.4 mgd) of water may be used to augment the Schuylkill River from the WMP.
- Up to 43.3 mgd and 1.342 bgm may be used to augment the Schuylkill River from the Tamaqua Reservoirs.

- During augmentation from WMP, when Schuylkill River TDS concentrations reach 500 mg/l as indicated at the Landingville Gaging Station (USGS Gage No. 01468500), Exelon Generation is required to discontinue use of the WMP as an augmentation source (DECISION Condition II.oo.).

C. Surface Water Withdrawals from Perkiomen Creek and Perkiomen Creek *Augmentation Water* Source (Water Diversion from the Delaware River to EBPC via Bradshaw Reservoir)

i. UNAUGMENTED:

- When use of the Schuylkill River is restricted, or when the Schuylkill River is unrestricted and under the specific conditions listed in Section A.2.c., paragraph two, of this docket, Exelon Generation may withdraw water from the **unaugmented** Perkiomen Creek for use at LGS at a rate of up to 24 mgd when its natural flow is **at least 180 cfs** (116 mgd) (with one unit in operation) or 42 mgd (65 cfs) when its natural flow is **at least 210 cfs** (136 mgd) (with two units in operation) as measured at the Graterford gaging station (USGS Gage No. 01473000) with the total not to exceed 1.302 bgm. However, on days when the ambient air temperature is 87˚F or greater, the consumptive use is restricted to 25.5 mgd with one unit operating and 47.3 mgd with two units operating. As set forth in DECISION Condition II.x., total surface water withdrawals from the Schuylkill River may not exceed 1.7422 bgm and 58.2 mgd; and non-consumptive use may not exceed 14.2 mgd. Any and all consumptive use above 24 mgd (with one unit operating) and 44 mgd (with two units operating) must be replaced with commensurate augmentation releases from either the WMP, Tamaqua Reservoirs, and/or with water diverted from the Delaware River via the Perkiomen Creek. Such replacements must be made on a 1:1 gpd basis in accordance with augmentation requirements specific to each of the sources used.

ii. AUGMENTED

- When use of the Schuylkill River is restricted, or when the Schuylkill River is unrestricted and under the specific conditions listed in Section A.2.c., paragraph two, of this docket, and the natural flow of the Perkiomen Creek is **less than 180 cfs** (with one unit in operation) or **less than 210 cfs** (with two units in operation), Exelon Generation may withdraw up to 42 mgd of water for the purpose of supplying the consumptive needs of LGS from the **augmented** Perkiomen Creek at Graterford, Pennsylvania. Perkiomen Creek *augmentation water* is routed from the Bradshaw Reservoir as part of the up to 46.2 mgd (71.5 cfs) pumped to the EBPC for conveyance to Graterford. This

water, which is diverted from the Delaware River via the Point Pleasant Pumping Station, is restricted to the use, conditions and service area approved in Docket No. D-65-76 CP-8 and cannot be used for any other purposes unless approved by the Commission. All consumptive use will be augmented on a 1:1 gpd basis.

- In accordance with Condition III. a. of Docket D-1977-110 CP - Amendment 1 (Merrill Creek Owners Group or MCOG docket), "Compensation Releases", in lieu of curtailment, shall be made for all "Designated Units" listed in Table A of the MCOG docket whenever the Commission's Drought Management Plan (present or future) causes the flow objective at the Trenton gage to drop below 3,000 cfs and the "Equivalent Flow" at Trenton drops below 3,000 cfs. In addition, "Compensation Releases" will be required if and when the "Equivalent Flow" at Trenton drops below 3,000 cfs for five consecutive days due to reasons beyond the control of the DRBC. In accordance with Condition III. b. of the MCOG docket, "Designated Units" (LGS Units 1 and 2 are both "Designated Units") shall be exempt from curtailment by the DRBC as long as the freshwater equivalent consumptive use resulting from the operation of the units is being replaced by "Compensation Releases" from the Merrill Creek Reservoir Project. However, such releases from the Merrill Creek Reservoir are not required for any portion of the consumptive use augmentation released for LGS from the WMP, Still Creek Reservoir, and/or Owl Creek Reservoirs (See DECISION Condition II.hh.).

D. Minimum Flow in the EBPC

- Exelon Generation shall maintain a minimum flow of at least 10 cfs in the EBPC at all times in accordance with the O&M Plan. The docket holder shall develop recreational flow management plans to increase flows in the EBPC above 10 cfs to support specific short-term recreational events. The recreational flow management plan must be approved by the Executive Director in accordance with DECISION Condition II.ff. included in this Docket.

E. Emergency Use of Surface water

- During an emergency, if normal constraints on withdrawals cannot be met, the docket holder may use surface water from the sources, designated herein as necessary, to address the emergency until it has been stabilized, in accordance with the O&M Plan and/or emergency shutdown procedures established by the NRC. Notification of and consultation with the Executive Director should occur as soon as possible but no later than 24 hours after the emergency is known by the docket holder.

- In the event that conditions exist that require the water diversion system to be in service to supply water for LGS's consumptive use, but the system is unavailable or of diminished capacity, an equal volume of water, up to 43.3 mgd (peak daily withdrawal) and 1.342 bgm, may be released from the Tamaqua Reservoirs, subject to the Operating Rule Curves and allowing an additional three percent for in-transit evaporative losses, and withdrawn for consumptive use at LGS. Notification of such releases to the Commission should occur as soon as possible but no later than 48 hours after the event occurs.

4. **Area Served**. Exelon Generation is the sole owner of LGS and the power developed at the plant will be transmitted and distributed throughout the service area via the Regional Transmission Organization, PJM Interconnection, LLC.

For the purpose of defining the Area Served, the Application is incorporated herein by reference consistent with conditions contained in the DECISION Section of this docket.

Prior facilities and processes for the Exelon Generation LGS have been described in previous DRBC Dockets and/or Resolutions as indicated below:

DRBC Docket No.	Approval Date
D-1969-210 CP-13	May 8, 2013
Resolution No. 2011-12	December 8, 2011
Resolution No. 2011-04	May 11, 2011
Resolution No. 2010-10	December 8, 2010
Resolution No. 2009-11	December 9, 2009
Resolution No. 2008-13	December 10, 2008
D-69-210 CP (Final) (Revision 12)	October 27, 2004
D-69-210 CP (Final) (Revision 11)	June 26, 2003
D-69-210 CP (Final) (Revision 10)	April 25, 1990
D-69-210 CP (Final) (Revision 9)	February 22, 1989
D-69-210 CP (Final) (Revision No. 8)	February 22, 1989
D-69-210 CP (Final) (Revision 6)	April 29, 1986
D-69-210 CP (Final) (Revision No. 5)	April 29, 1986
D-69-210 CP (Final) (Revision No. 4)	October 30, 1985
D-69-210 CP (Final) (Revision No. 2)	August 9, 1985
D-69-210 CP (Final) (Revised)	May 29, 1985
Resolution No. 76-18	1976
Resolution No. 76-13	1976
D-69-210 CP (Final)	November 5, 1975
D-69-210 CP	March 29, 1973

a. **Water withdrawals**. There is no LGS water supply system drawing surface water for potable use at LGS. The potable water supply to the facility is provided by one of four

groundwater wells in use at the LGS. The four groundwater wells are located in the Southeastern Pennsylvania Groundwater Protected Area (GWPA).

Well 1 (the "Alley Well") supplies water to a head tank for potable use at LGS. Well 3 (the "Batch Plant Well") provides a backup source of LGS fire emergency and other emergency water. The Well 3 pump operates to replenish a fire emergency water storage tank during a fire emergency or other emergency, in the event the backup supply is needed, or during standby when the tank level is low.

Exelon Generation also uses the "Limerick Training Center" (LTC) well and the "Limerick Energy Information Center" (LEIC) well. The LTC well is used to supply water for sanitary purposes (restrooms) and is typically in operation only before and during the annual LGS refueling outage. The LEIC well is used to supply water for sanitary purposes (restrooms) and is also used infrequently.

WELL NO.	DEPTH	CASED DEPTH/ CASING DIAMETER	PUMP CAPACITY	YEAR DRILLED
Well 1 - Alley	310'	Unknown / 8"	90 gpm	Unknown
Well 3 – Batch Plant	585'	Unknown' / 8"	65 gpm	1987
Limerick Training Center (LTC)	560'	Unknown' / 6"	52 gpm	Unknown
Limerick Energy Information Center (LEIC)	198'	30' / 6"	30 gpm	1971

Wells Nos. 1 and 3 and the LTC and LEIC wells are located in the Schuylkill - Sprogels Run subbasin, where total net annual groundwater withdrawal [151.77 million gallons per year (mgy)] is less than the withdrawal limit set in Section 6.1 of the *GWPAR* (1,455 mgy). The total annual groundwater allocation from these four wells is 73.2 mgy (6.1 mgm), a fraction of which will be returned to groundwater. However, even if no water from these four project wells were returned to groundwater, the total net annual groundwater withdrawal from this subbasin would remain below the withdrawal limits set in Section 6.1 of the *GWPAR*. Therefore, the proposed withdrawals from the wells, in conjunction with other withdrawals in this subbasin, are in accordance with the requirements of Section 6.1 of the *GWPAR*.

b. <u>NPDES Permit(s) / DRBC Docket</u>.

<u>1. Limerick Generating Station:</u> NPDES Permit No. PA0051926 was approved by the PADEP on November 14, 2014 (effective December 1, 2014) and includes final effluent limitations for the project discharge of up to 14.2 mgd to surface waters classified by

PADEP as warm water/migratory fisheries (WWF/MF). The following effluent limits are among those listed in the Permit and meet or are more stringent than the effluent requirements of the DRBC.

EFFLUENT TABLE A*: DRBC Parameters Included in NPDES Permit

OUTFALL 001 (Non-Contact cooling water and industrial waste)		
PARAMETER	**LIMIT**	**MONITORING**
pH (Standard Units)	6 to 9	As required by NPDES Permit
Total Suspended Solids	Monitor & Report	As required by NPDES Permit
Temperature	110°F (Max)	As required by NPDES Permit
Total Dissolved Solids ***	Monitor & Report	As required by NPDES Permit **

* See Condition II.q. for submittal of monitoring results to DRBC

** See Condition II.r. for additional DRBC monitoring requirements

*** See Condition II.s. for requesting substitution of specific conductance for TDS

2. Bradshaw Reservoir/Pipeline: NPDES Permit No. PA0052221 was approved by the PADEP on December 8, 2014 (effective January 1, 2015) includes final effluent limitations for the project discharge of 46.2 mgd (42 mgd plus ten percent allowance for losses) to the EBPC, classified by PADEP as a Trout Stocked Fishery (TSF). The Bradshaw Reservoir, pumping station, and transmission main were approved by the DRBC via Docket No. D-79-52 CP on February 18, 1981.

3. WMP Discharge: NPDES Permit No. PA00593508, made effective by PADEP on April 4, 2008, includes final effluent limitations for the project discharge to surface waters (East Branch Norwegian Creek) classified by the PADEP as a Cold Water Fishery (CWF). NPDES Permit No. PA0123293, made effective by PADEP on December 21, 2007, includes final effluent limitations for the project discharge to surface waters (East Branch Norwegian Creek) classified by PADEP as a Cold Water Fishery (CWF).

c. Other. Exelon Generation has submitted the attached O&M Plan that includes withdrawals from the Schuylkill River, Perkiomen Creek, the Delaware River via the Perkiomen Creek, and *augmentation* of the Schuylkill River from the WMP and/or the Tamaqua Reservoirs (O&M Plan - Attachment No. 2). The O&M Plan is approved by this docket and provides for the collection of data and analysis to determine the project's compliance with the terms of this docket. As provided in the DECISION Section of this docket, changes to the O&M Plan may be approved by the DRBC Executive Director.

d. Cost. There are no construction costs associated with this project.

e. Relationship to the Comprehensive Plan. The Exelon Generation LGS facility was included in the Comprehensive Plan on March 29, 1973 by Docket No. D-69-210 CP, and has been the subject of subsequent revisions as listed above and discussed below.

The LGS facility was again modified in the Comprehensive Plan on November 5, 1975 by Docket No. D-69-210 CP (Final). The project description, conditional Findings and

DECISION portions of the docket all were included. Docket No. D-65-76 CP (8) for the Point Pleasant Pumping Station (Delaware River Diversion), and Docket No. D-79-52 CP for the Bradshaw Reservoir are related to this docket approval (DA-No. 13), as they contain requirements integral to the supply of Delaware River water for use as consumptive cooling water at the LGS facility. The project is located within the drainage area of the Pennsylvania Scenic River Area recreational designation that was included in the Comprehensive Plan by Docket No. D-78-50 CP on July 26, 1978. Issuance of this docket will continue approval of the LGS and its water resource components in the Comprehensive Plan.

B. BACKGROUND

This BACKGROUND section is provided to assist interested parties in understanding the various Commission actions regarding Exelon Generation's nuclear powered LGS facility located primarily in Limerick Township, Montgomery County, PA.

Since 2003, under the terms and conditions in DRBC Dockets D-69-210 CP-11/12, Exelon Generation has conducted the Water Supply Modification Demonstration Project and the WMP Withdrawal and Streamflow Augmentation Demonstration Project (Demonstration Project) in conjunction with its water withdrawal at the LGS facility located approximately 75 miles down river near Pottstown, PA. In accordance with the authority granted the Executive Director, the Demonstration Project has also received several Executive Directive approvals, the latest of which, dated April 3, 2008, approved an extension of two LGS demonstration projects through December 31, 2008. Docket D-69-210 CP-12 was scheduled to expire on December 31, 2009 at which time if not extended or replaced, operations would revert to the condition included in Docket D-69-210 CP (Final) as amended by Resolutions Nos. 76-13 and 76-16. On December 9, 2009, the Commission approved Resolution No. 2009-11 which extended the operations of the demonstration projects under Docket D-69-210 CP-12 until December 31, 2010 or until the Commission approves a revised docket, whichever occurs first. On December 8, 2010, the Commission approved Resolution No. 2010-10 which extended the operations of the demonstration projects under Docket D-69-210 CP-12 until December 31, 2011 or until the Commission approved a revised docket, whichever occurred first.

On May 11, 2011, the Commission approved Resolution 2011-4 for an increase in the peak daily water withdrawal from 56.2 mgd to 58.2 mgd. In addition the Resolution also included a revised method to specify allocation quantities on a monthly basis using a 31-day month, as opposed to a rolling 30-day average. Thus the water withdrawal limits are a peak daily withdrawal of 58.2 mgd, not to exceed 1.7422 bgm. On December 8, 2011, the Commission approved Resolution No. 2011-12 which extended the operations of the demonstration project under Docket D-69-210 CP-12 for a period of one year (until December 31, 2012) or until the Commission approves a revised docket, whichever occurs first. During the Demonstration Project at that time, water pumped from the WMP in New Castle and Norwegian Townships, Pennsylvania (PA) and water released from Still Creek Reservoir in Rush Township, PA was used to augment flows in the Schuylkill River for use as consumptive cooling water at

LGS in place of makeup water that was being supplied from the Delaware River when water withdrawals from the natural river flow from the Schuylkill River were restricted.

During the operation of the Demonstration Project, Exelon Generation submitted weekly reports to the Commission. The Commission posted the weekly reports on its website at http://www.state.nj.us/drbc/wadesville.htm. Exelon Generation has also submitted annual reports summarizing the findings for each year of the demonstration projects, which were also posted on the Commission web site. In addition, the Commission, the Pennsylvania Fish and Boat Commission (PFBC) and PADEP held two meetings each year (generally one in January and the other in July) that were open to the public, at which the Exelon Generation operations and reports were discussed. Docket No. D-1969-210 CP-13 decreased these meetings to annually and the last was held in 2014.

On September 17, 2007, Exelon Generation filed an application for the renewal with modifications of the Commission's past approvals of water resource operations at LGS. The Commission's past approvals relating to the LGS consisted of a series of dockets and resolutions dating from March 23, 1973 (D-69-210 CP) through Resolution No. 2011-04 dated May 11, 2011. In its application, Exelon Generation requested docket modifications to provide long-term approval of operations and surface water withdrawals based on its experience gained during the demonstration project. Exelon Generation also requested consolidation of the Commission's various LGS-related approvals into a single comprehensive docket. The comprehensive docket would address the surface water withdrawals requested to meet consumptive and non-consumptive needs at LGS, and the surface water discharge to the Schuylkill River of up to 14.2 million gallons per day (mgd) from the LGS facility.

Exelon Generation originally requested approval of a surface water withdrawal of up to 56.2 mgd (42 mgd consumptive plus 14.2 non-consumptive) or 1.686 billion gallons per 30 days (bg/30 days) to supply the consumptive and non-consumptive needs of the LGS from the Schuylkill River. Exelon Generation further requested that the docket provide the Executive Director with authority to approve alternate augmentation sources and has requested modifications to its existing dockets to incorporate into the single comprehensive renewal docket modified provisions of the demonstration projects. Exelon Generation also requested that the Schuylkill River low flow restriction be reduced from 560 cfs with two units operating and 530 cfs with one unit operating, to 379 cfs with either one or two units operating; that the Delaware River remain an approved source of consumptive cooling water for LGS; that TAWA's Still Creek Reservoir and WMP remain approved Schuylkill River augmentation sources; that the limit for TAWA's Still Creek releases to augment Schuylkill River flows for purposes of LGS operations be increased from 36 mgd to 43.3 mgd; that TAWA's Owl Creek Reservoirs be used in combination with TAWA's Still Creek Reservoir be used a augmentation water and use at LGS; that the temperature restriction of 59° F applicable to Schuylkill River withdrawals be eliminated; that the 4-day/2-day travel time requirements for Schuylkill River augmentation sources be eliminated; that river and stream monitoring requirements be modified; and that the Restoration and Monitoring Fund be continued.

By letter dated March 30, 2011, Exelon Generation amended their application requesting a daily maximum withdrawal of up to 58.2 mgd (44 mgd consumptive use plus 14.2 non-consumptive use) without changing the amount of water to be withdrawn over a 30 day period (1.686 bg/30 days).

DOCKET NO. D-1969-210 CP-13

The Commission issued Docket No. D-1969-210 CP-13 on May 8, 2013. Docket No. D-1969-201 CP-13 provided for the consolidated Commission approvals for the water withdrawals and discharge associated from the LGS. The docket holder requested docket modifications to provide long-term approval of operations and surface water withdrawals based on its experience gained during the two demonstration projects. The docket holder also requested consolidation of the Commission's various LGS-related approvals into a single comprehensive docket. The comprehensive docket addressed the surface water withdrawals requested to meet consumptive and non-consumptive needs at LGS, and the surface water discharge to the Schuylkill River of up to 14.2 million gallons per day (mgd) of blowdown from the LGS facility.

Surface Water Allocation: The docket holder initially requested approval of a surface water withdrawal from the Schuylkill River of up to 1.686 billion gallons per 30 days. As described in the Background section, by letter dated March 30, 2011, the docket holder amended their application requesting a daily maximum withdrawal of up to 58.2 mgd (44 mgd consumptive use plus 14.2 non-consumptive use). The docket holder also indicated it did not need an increase in the monthly withdrawal amount based on a daily withdrawal of up to 56.2 mgd (42 mgd consumptive plus 14.2 mgd non-consumptive).

The docket holder requested the increase in the daily maximum withdrawal because consumptive use values associated with evaporation from the LGS cooling towers were heavily dependent on plant operation and ambient conditions. Consumptive use tends to be the highest at full power operation and extreme high ambient temperatures in combination with lower relative humidity. Ambient conditions can vary throughout the day as well as daily. There can also be prolonged periods of extreme conditions that result in maximum consumptive use over one or more days. The LGS was designed to operate without requiring more than 42 mgd of consumptive use. Since construction, the thermal output for each Limerick Unit was re-rated from 3,192 MWt to 3,458 MWt (an 8.33% increase) while still operating within the 42 mgd limit. A power uprate of 1.7% was approved by the NRC on April 8th, 2011, to increase the total allowable per unit thermal output to 3,515 MW. The docket holder calculated that the LGS would operate closer to, but still within the 42 mgd limit after this latest increase. In addition, data collected during the 2010 summer revealed consumptive use numbers as high as ~41.5 mgd due to ambient conditions significantly exceeding design conditions (extended periods of low humidity, 90+ degree temperatures). To increase the operating margin and to maintain docket compliance the docket holder requested a maximum daily water use allocation of 58.2 million gallons (44 mgd consumptive plus 14.2 non-consumptive), but with no increase in the monthly water allocation limit of 1.686 billion gallons per 30-days.

The Commission instituted a revised method to specify allocation quantities. The method allocates a volume of water (typically in million gallons) on a monthly basis using a 31-day month (mgm), as opposed to a rolling 30-day average. The allocations included in the docket reflected this allocation method.

The docket included the approval of the increase in the daily maximum withdrawal from 56.2 mgd (42 mgd consumptive plus 14.2 non-consumptive) to 58.2 mgd (44 mgd consumptive plus 14.2 mgd non-consumptive), and limited the monthly allocation to 1.7422 bgm subject to the conditions in its DECISION Section.

Groundwater Allocation: The docket holder historically used four groundwater wells located onsite; Well 1, Well 3, the LTC well and the LEIC well. Potable water supply to the facility is provided by Well 1. Well 3 is used for backup fire emergencies. The LTC and LEIC wells are used for sanitary purposes (restrooms) and are not in frequent operation. The four groundwater wells are located in the GWPA. Commission staff advised the docket holder that allocations for these wells will be included in the docket. For the design year 2019, the docket holder estimated no change in demand for all four wells.

Wells Nos. 1 and 3 and the LTC and LEIC wells are located in the Schuylkill - Sprogels Run subbasin, where total net annual groundwater withdrawal (151.77 mgy) is less than the withdrawal limit set in Section 6.1 of the *GWPAR* (1,455 mgy). The total annual groundwater allocation from these four wells is 73.2 mgy (6.1 mgm), a fraction of which will be returned to groundwater. However, even if no water from these four project wells were returned to groundwater, the total net annual groundwater withdrawal from this subbasin would remain below the withdrawal limits set in Section 6.1 of the *GWPAR*. The proposed withdrawals from the wells, in conjunction with other withdrawals in this subbasin, were found to be in accordance with the requirements of Section 6.1 of the *GWPAR* and were approved.

Temperature Restriction: The docket holder requested that the temperature restriction of 59°F applicable to Schuylkill River withdrawals be eliminated. The docket holder's withdrawals from the Schuylkill River for consumptive cooling water needs were restricted when river temperatures below LGS were above 59°F, except during April, May and June, when the Schuylkill River flow, as measured at the Pottstown gaging station, was in excess of 1,791 cfs (1,158 mgd). Commission staff reviewed the data collected during the multi-year Demonstration Project, conducted under Commission approved dockets, and determined that the 24-hour average ambient river water 59°F temperature threshold used to restrict the withdrawals for the LGS consumptive use when 24-hour average river ambient flow in the Schuylkill River were above 560 cfs and at or below 1,791 cfs, is not directly linked to the dissolved oxygen (DO) concentrations in the Schuylkill River at the various down river monitoring points. Withdrawal of Schuylkill River water at temperatures exceeding 59°F, without *augmentation*, did not result in lower ambient DO. The approval to remove the 59°F threshold was granted.

Minimum Flow Threshold: The docket holder requested a revision of the minimum flow threshold for requiring *augmentation flow* (from the 24-hour average flow) in the Schuylkill River. The flow threshold is measured at the Pottstown gaging station. The previous docket

contained a minimum flow threshold which required Exelon Generation to provide *augmentation flow* when the Schuylkill River 24-hour average flow (as measured at the Pottstown gage) was less than or equal to 560 cfs (with two units in operation) or 530 cfs (with one unit in operation). The docket holder requested that the minimum flow threshold be lowered to a new flow threshold of 379 cfs, with either one or two units in operation. Although ambient Schuylkill River flows of less than the 379 cfs were occasionally experienced during the term of the demonstration project, Exelon Generation was either *augmenting* the Schuylkill River or withdrawing water from Perkiomen Creek for its consumptive use at LGS. As a result, the requested flow threshold reduction to 379 cfs was not evaluated under *exclusion of augmentation* or use of Perkiomen Creek during the demonstration project. Commission staff found that there was insufficient information presented to conclude that there would not be a significant impact of the proposed operational change as it relates to availability of water resources to downstream users and impacts on aquatic life. Therefore, Commission staff did not recommend changing the minimum flow threshold to 379 cfs. The docket continues to require Exelon Generation to provide *flow augmentation* when the 24-hour average flow in the Schuylkill River (as measured at the Pottstown gaging station) is less than or equal to **560 cfs** (with two units in operation) or **530 cfs** (with one unit in operation).

Discharge from Outfall 001: The docket holder requested the approval to discharge up to 14.2 mgd of blowdown from the LGS to the Schuylkill River via Outfall No. 001. The docket approved a 14.2 mgd discharge to the Schuylkill River from Outfall 001.

EARLY HISTORY

On November 5, 1975, the Commission added the LGS to the Comprehensive Plan and approved the project under Section 3.8 of the *Compact* by Docket No. D-69-210 CP (Final). The docket also incorporated into the Comprehensive Plan the Project Description, Findings and DECISION sections of Docket No. D-69-210 CP dated March 29, 1973. The "Findings" section included a subsection entitled "Source of Water Supply 1. Schuylkill River", which read as follows:

> "Schuylkill River water at the plant site may be used for nonconsumptive use whenever the effluent discharged back to the river meets all applicable water quality standards.
>
> Schuylkill River water at the plant may be used for consumptive use when flow (not including future augmentations of flow from Commission-sponsored projects) as measured at the Pottstown gage is in excess of 530 cfs (342 mgd) with one unit in operation and 560 cfs (362 mgd) with two units in operation with the following exceptions:
>
> (a) There shall be no withdrawals when river water temperatures below the Limerick station are above 15°C except during April, May and June when the flow as measured at the Pottstown gage is in excess of 1791 cfs (1158 mgd).

(b) Use of the Schuylkill River will be limited to a withdrawal that will result in an effluent that meets all applicable water quality standards.

The constraints on non-consumptive use of Schuylkill River water were considered necessary to prevent violation of total dissolved solids, stream quality objectives and effluent quality requirements of the Commission's water quality regulations. The constraint on consumptive use of Schuylkill River water is to protect water quantity and water quality below the Limerick Station. Both sets of constraints would be suspended in the event of any operational emergency requiring a shutdown of the plant."

In March of 1985, Philadelphia Electric Company (PECO) (currently known as "Exelon Generation") applied for a modification of Docket No. D-69-210 CP (Final) seeking temporary relief from the temperature limitation and the condition that water for evaporative use could not be withdrawn from the Schuylkill River when the flow at Pottstown gage (not augmented by releases from Commission sponsored reservoir storage projects) fell below the minimum flow of 530 cfs for one LGS unit in operation. A public hearing was held, and 61 comments were received and entered into the hearing record, many of which concerned the relief requested from the temperature restriction. [See Docket No. D-69-210 CP (FINAL) (REVISED), May 29, 1985]. After careful consideration of the comments, the Commission approved the temporary relief from the temperature restriction, but did not approve the relief from the 530 cfs flow requirement.

In reaching its decision to grant the temporary waiver from the temperature restriction, the Commission recognized the need to protect the Dissolved Oxygen (DO) standard. It further recognized the comments of the Pennsylvania Fish Commission (PFC) (currently PFBC) that the special seasonal needs of aquatic life required more restrictive standards. It also recognized that "[b]ecause DO varies over the day, and a number of hours are required to shut down power plant operations if the DO criteria are triggered, it is necessary to establish a buffer or 'margin of safety' somewhat above Pennsylvania or Federal water quality standards in order to assure that DO levels will not be violated during actual operations." (Docket No. D-69-210 CP (FINAL) (REVISED) May 29, 1985, p. 8.)

In summarizing its rationale for approving the temporary relief, the Commission found:

"The objective of the 59° temperature limitation contained in the original docket decision, was to prevent the Limerick project from aggravating dissolved oxygen conditions in the Schuylkill River during critical periods. The temporary substitution of direct dissolved oxygen monitoring at each critical downstream location is consistent with that objective. In addition, the dissolved oxygen monitors will provide data, not otherwise available to the water resource agencies, for better management of the Schuylkill River."

(Docket No. D-69-210 CP (FINAL) (REVISED), May 29, 1985, p. 11.)

The "Decisions" section of the May 29, 1985 docket contained the following DO criteria that were substituted for the temperature restrictions:

> "(a) No withdrawals for consumptive use shall be made from the Schuylkill River or the natural flow of any of its tributaries whenever dissolved oxygen in the Schuylkill River at or below Limerick as measured at any one or more of the monitoring locations: (i) is less than 7.0 mg/l instantaneous during the period March 1 to June 15, or (ii) is equal to or less than 5.1 mg/l daily average or equal to or less than 4.2 mg/l instantaneous value during the remainder of the year."

(Docket No. D-69-210 CP (FINAL) (REVISED), May 29, 1985, p. 12.)

The Docket also contained monitoring and reporting requirements for the period ending December 31, 1985.

On December 16, 1985, PECO submitted an application (amended January 22, 1986) for a temporary modification of Docket No. D-69-210 CP (Final) (REVISED) to allow: (1) the temporary continued substitution of the condition approved in May 1985, allowing DO monitoring in place of the temperature restriction in the original docket; and (2) the option to transfer the existing consumptive use of the Schuylkill Basin waters from the Titus and Cromby generating stations on the Schuylkill to the Limerick Unit 1 generating unit. Included with its request to use DO criteria in lieu of the temperature restriction, PECO also requested that

> "…the proposed DO limits be made at five out of six monitoring points noting that individual monitoring sites may be impacted by localized positions resulting from point source discharges."

and

> "…the proposed DO limits of 5.1 mg/l average and 4.2 mg/l instantaneous apply throughout the year and stated that a more restrictive limit during the fish spawning season is overly conservative." (Docket No. D-69-210 CP (Final) (Revision No. 5), p. 4.)

After careful consideration of the application and comments, on April 29, 1986, the Commission issued Docket No. D-69-210 CP (FINAL) (REVISION 5), approving the request for continued modifications through the period ending December 31, 1986, subject to the terms and conditions set forth in the docket. In its approval, the Commission incorporated the recommendations of the PFC with regard to the DO criteria and monitoring locations, and relied upon the monitoring data collected from August 9 through November 30, 1985. The Commission also reiterated its concern for the protection of DO levels below LGS:

> "However, one of the purposes of the original 59°F temperature limitation was to prohibit any further degradation of DO during low DO conditions, by allowing depletion of streamflow via consumptive use at Limerick. Regardless of the cause of low DO at any one of the monitoring sites, depletion of streamflow by consumptive use at Limerick could aggravate the DO problem."

(Docket No. D-69-210 CP (FINAL) (REVISION 5), April 29, 1986, p. 4.)

In lieu of the temperature-related restrictions, the "DECISION" Section of the April 29, 1986 docket contained the following DO criteria:

> "(1) For the period ending December 31, 1986, the provisions of Docket No. D-69-210 CP, [attached and included as part thereof to D-69-210 CP (Final)] headed "FINDINGS", "Sources of Water Supply", "1. Schuylkill River" paragraph "(a)" on page 5 are temporarily suspended, and in place thereof the following provision is substituted:
>
> (a) No withdrawals for consumptive use shall be made from the Schuylkill River or the natural flow of any of its tributaries whenever dissolved oxygen (i) is less than 7.0 mg/l daily average or 6.0 mg/l instantaneous during the period March 1 to June 15 at any one of the monitoring sites in riffle spawning areas located below Limerick approved by the Executive Director in consultation with the Pennsylvania Fish Commission (PFC) or (ii) is equal to or less than 5.1 mg/l daily average or equal to or less than 4.2 mg/l instantaneous value at any of the six existing monitoring stations temporarily approved by DRBC Docket No. D-69-210 CP (Final) (Revised)."

(Docket No. D-69-210 CP (FINAL) (REVISION 5), April 29, 1986, pp. 10 and 11.)

The Commission issued Docket No. D-69-210 CP (FINAL) (REVISION 6) on April 29, 1986, which approved the use of waters from Still Creek and Owl Creek Reservoirs as augmentation to be used as consumptive cooling water at LGS through December 31, 1986. (PECO applied for Revision 6 on March 4, 1986.)

On December 8, 1986, PECO submitted an application to extend the amendments contained in docket Revisions 5 and 6. On March 25, 1987, the Commission approved Resolution No. 87-2, granting PECO's request until December 31, 1987. The Commission noted that court proceedings were delaying the construction of the facilities needed to transfer Delaware River water to LGS and preventing them from being available during 1987. The Commission also noted that the operation under docket Revisions 5 and 6 did not result in any violation of DRBC standards or policies. An additional extension of Revisions 5 and 6 was approved on February 24, 1988 (Resolution No. 88-5 (Revision 7)) through December 31, 1988. On February 22, 1989, the Commission approved Revision 8, granting an extension through

December 31, 1989 of the conditions originally established in Revision 5 substituting DO limitations for the earlier temperature restrictions.

On February 8, 1990, PECO submitted an application to extend the DO criteria through August 1, 1990, when the Delaware River diversion facilities were expected to be operational. On April 25, 1990, the Commission approved Revision 10, extending the DO criteria through August 1, 1990. The temperature restrictions were required to be followed after August 1, 1990. In addition, the Commission adjusted the DO monitoring sites.

Since August 1, 1990, the temperature restrictions have been in place and Exelon Generation has complied with them.

In its May 21, 2004 (amended July 31, 2004), Exelon Generation stated that it appeared that there was no longer any water quality or scientific justification for the continuation 59ºF temperature restrictions. Exelon Generation provided additional data and background information to support a demonstration project that relaxes the restriction on consumptive withdrawals for LGS during periods when the 24-hour ambient river temperature in the Schuylkill River exceeds 59ºF. Exelon Generation's goal was to demonstrate that there was no reasonable potential for its LGS consumptive use withdrawals to cause violations of state or Commission water quality standards for DO, and therefore that no state or Commission limit or condition should be imposed. Furthermore, Exelon Generation indicated that the restoration/monitoring fund benefits will outweigh any potential negative effects of temporary changes in DO even if they were to occur. Exelon Generation acknowledged that there was a past need for the Commission temperature limit to ensure compliance with the DO standard established by the Commission and the State of Pennsylvania to protect the Schuylkill River, even though Exelon Generation found no technical background information for the basis of the 59ºF found in the Commission record.

While Exelon Generation provided a rationale for the requested relaxation of the temperature restriction during the demonstration project period, it did not present sufficient information to justify that having an unrestricted use of the Schuylkill River waters for LGS consumptive cooling water needs, would continue to ensure compliance with the DO standard established by the Commission and the State of Pennsylvania to protect the Schuylkill River. The Commission has consistently expressed its concerns over the need to protect the DO standard and the aquatic biology downstream of the LGS. The Commission has used the temperature restriction as a reliably measurable criterion to accomplish this goal, and when the Commission has suspended the temperature restriction, it has substituted DO criterion. During those suspensions in 1985-90, the Commission expressed concern over the DO monitoring techniques and the ability of the LGS to react quickly if ambient DO concentrations were to drop to levels of concern. The Commission granted relief from the temperature restriction in consideration of the operating status of the LGS (i.e. only one generator was operating), the potential to temporarily augment flows (i.e. Titus and Cromby facility cutbacks, etc.) and the status of the Delaware diversion project, which would provide a more reliable alternative source of cooling water to the LGS during periods when restrictions were in place on the use of the Schuylkill River. Exelon Generation has offered no justification for its proposal to suspend the temperature restriction

without reinstating DO criteria. Moreover, Exelon Generation's application included copies of comments submitted in 1982-83 by the U.S. Fisheries Service (USFS), Del-AWARE Unlimited Inc. et al. and the Pennsylvania Department of Environmental Resources (PADER), predecessor of PADEP, which also raised issues regarding appropriateness of the 59°F temperature restriction. The Commission responded to these concerns at that time and continued to support the operating and temperature restrictions to protect the Schuylkill River DO and aquatic biology.

As indicated above, Commission staff reviewed the information and data provided by Exelon Generation in accordance with the terms of Docket D-69-210 CP-12, Docket Application D-1969-210 CP-13, and information of its own and state sources. Commission staff conferred with PADEP and PFBC in reaching the conclusions and decisions contained in Docket No. D-1969-210 CP-13.

C. FINDINGS

This docket shall continue approval of the following:

a. Normal project operations
b. Long-term operations and surface water withdrawals from the Schuylkill River, the Perkiomen Creek, the Delaware River, the WMP and the Tamaqua Reservoirs to supply the consumptive and non-consumptive cooling water needs at LGS
c. Water Supply Modification Project
d. WMP Withdrawal and Streamflow Augmentation Project
e. A surface water discharge to the Schuylkill River of up to 14.2 mgd consisting primarily of blowdown from the LGS facility
f. A total surface water withdrawal from the Schuylkill River of 1.7422 bgm
g. A peak daily surface water withdrawal from the Schuylkill River of 58.2 mgd (44 mgd consumptive plus 14.2 mgd non-consumptive)
h. A total groundwater withdrawal allocation of up to 6.1 mgm (The wells supply potable, non-potable, and emergency use water to the LGS and associated buildings. During fire emergencies and other plant emergencies, groundwater withdrawals are not restricted.)
    i. LGS Well 1 (the "Alley Well"): up to 0.104 mgd (3.1 mgm)
    ii. LGS Well 3 (the "Batch Plant Well"): up to 0.094 mgd (2.8 mgm)
    iii. Limerick Training Center Well: up to 0.075 mgd (0.1 mgm)
    iv. Limerick Energy Information Center Well: up to 0.044 mgd (0.1 mgm)
i. Use of the various water sources subject to the conditions and requirements contained in the DECISION Section of this docket
j. O&M Plan (as revised, copy attached)

In response to an application filed on August 7, 2014, the Executive Director granted the temporary approval of changes to the consumptive use conditions via letter dated August 14, 2014. This docket shall also make permanent (through the expiration date of this docket) the consumptive use condition changes approved by the Commission's Executive Director via letter

dated August 19, 2014. The approved changes include the approval to increase consumptive water use by the LGS from 24 mgd with one unit operating and 44 mgd with two units operating to 25.5 mgd and 47.3 mgd, respectively, when the ambient air temperatures are 87˚F or greater. This increase in consumptive use will not increase the facility's total surface water use and thus entails no increase in the monthly allocation of 1.7422 bgm, maximum daily surface water allocation of 58.2 mgd or daily non-consumptive use allocation of 14.2 mgd previously approved by the Commission. In support of its request, Exelon Generation has explained that recent repairs to its closed-circuit cooling water system, which included repairs to cooling tower fill, have resulted in an increased cooling efficiency. The increased cooling efficiency has resulted, in turn, in an increase in the evaporative water loss (consumptive use). Approval of the requested increase in consumptive use is needed to provide Exelon Generation with operational flexibility during extended periods of high ambient air temperature (87˚F or greater). On November 14, 2014, Exelon filed an application requesting the changes be made permanent. This docket makes the approvals granted by the Executive Director permanent through the expiration of this docket.

Total Dissolved Solids

Section 3.10.4.D.2. of the Commission's *Water Quality Regulations* (*WQR*) requires a basin-wide effluent limit of 1,000 mg/l for total dissolved solids (TDS), or a concentration established by the Commission which is compatible with designated water uses and stream quality objectives, and recognizes the need for reserve capacity to serve future dischargers. The docket holder's previous NPDES Permits and/or DRBC Dockets never applied the Commission's basin-wide TDS effluent limit of 1,000 mg/l or an alternate concentration established by the Commission to the discharge from Outfall No. 001.

The Commission's basin-wide in-stream TDS criteria is: 1) the receiving stream's resultant TDS concentration be less than 133% of the background (WQR Section 3.10.3.B.1.b.), and 2) the receiving stream's resultant TDS concentration shall not exceed 500 mg/l (WQR Section 3.10.3.B.2.).

The 133% of the background TDS requirement is for the protection of aquatic life. The 500 mg/l TDS requirement is to protect the use of the receiving stream as a drinking water source. The EPA's Safe Drinking Water Act's secondary standard for TDS is 500 mg/l.

Accordingly, the docket holder shall continue to monitor for TDS at the location included in the O&M Plan which represents Outfall No. 001 as required in EFFLUENT TABLE A. The docket holder shall submit a report within 20 months from docket approval date which includes (at least) the 48 TDS samples as previously required in Docket No. D-1969-210 CP-13.

After the effluent TDS information is gathered, the docket holder is required to demonstrate that the discharge satisfies the Commission's TDS requirements (both end of pipe and in-stream). The demonstration shall be done at the Q7-10 design condition (consecutive 7-day flow with a 10-year recurrence interval). Section 3.10.5.D. of the Commission's *WQR* states

that the Commission's numerical stream quality objectives are based on a minimum consecutive 7-day flow with a 10-year recurrence interval and Section 4.30.7.A.7.b. of the WQR requires that the stream flow to be used in the determination of the waste assimilative capacity of an unregulated stream be the consecutive 7-day flow with a 10-year recurrence interval.

If the docket holder's discharge cannot satisfy the Commission's TDS requirements, a TDS determination from the Commission will be required. If necessary, Commission staff will use these data to determine an appropriate monthly average and daily maximum TDS effluent limit for Outfall No. 001. If a monthly average and daily maximum TDS effluent limit for Outfall 001 is required, the docket will be modified upon docket renewal to include the appropriate TDS requirements (See DECISION Condition II.r.).

Temperature

Section 4.30.6B. of the Commission's *WQR* requires that the discharge of wastewater to non-trout/non-tidal waters not increase the ambient temperature of the receiving waters by more than 5°F, nor shall such discharge result in stream temperatures exceeding 87°F. The Commission may grant heat dissipation areas for specific thermal discharges in accordance with the conditions contained in Section 4.30.6F.5. of the Commission's *WQR*.

On November 5, 1975, the Commission assigned the docket holder a heat dissipation area consisting of one-half the stream width (150 feet) and 3,500 feet downstream from Outfall 001 in Condition II. h. of Docket No. D-1969-210 CP (Final).

In the Environmental Report - Operating License Stage (ER-OL) for LGS, dated December 1981, the U.S. Nuclear Regulatory Commission (NRC) updated the review of the thermal discharge from LGS for compliance with EPA's recommended thermal effluent limitations for stream electric power generating point sources. The review included evaluations of the thermal discharge at cooling tower blowdown temperatures with 50, 5 and 1% probabilities of exceedance. The only set of conditions for which the temperature rise limitation of 5°F was exceeded was for the 1% exceedance blowdown temperature for October at the Q7-10 design condition (consecutive 7-day flow with a 10-year recurrence interval). The predicted temperature rise under this condition was 5.3°F.

The NRC's Final Environmental Statement (FES) for LGS, dated April 1984 re-analyzed the thermal discharge from LGS due to several modifications made to the design of the blowdown discharge system. The docket holder provided the NRC the updated thermal analysis, which considered the final design of the cooling tower blowdown diffuser, location of discharge, revised blowdown estimates and updated Schuylkill River temperature and flow data. The 1984 analysis considered annual average, monthly average and extreme combinations of Schuylkill River flow rate, LGS blowdown flow rate, and river/blowdown temperature differences. The analysis predicted ambient river temperature 50 feet downstream of the diffuser after mixing with one-third of the river flow. The analysis point is near the "top" of the Commission's 1975 heat dissipation area for the LGS discharge. The extreme condition again considered the 1% exceedance blowdown temperature for October at the Q7-10 design condition (consecutive 7-day flow with a 10-year recurrence interval). The 1984 analysis predicted temperature rises well

below the Commission's 5°F limitation for almost all scenarios, except for the extreme condition. The predicted temperature rise under this condition was again approximately 5.3°F.

The Commission's heat dissipation area granted in 1975 does not comply with the current allowable dimensions available for heat dissipation areas. It is estimated that the maximum width allowable for this location is approximately 150 feet, and that the maximum allowable length is 1,000 feet (vs. the 3,500 feet). This is considerably smaller than the 1975 heat dissipation area.

During the Demonstration project (2003-2011), the docket holder conducted hourly temperature monitoring at the LGS intake as well as at the Pennsylvania American Water Company's (PAWC) Royersford Plant's intake. The PAWC intake is located approximately 2 miles downstream of the LGS thermal discharge from Outfall No. 001. Docket No. D-1969-210 CP-13 required the docket holder to summarize the percent of time during the Demonstration project that the ambient data from the LGS intake and the PAWC intake suggested that the Commission's ambient temperature criterion of 87°F was exceeded.

In addition, Docket No. D-1969-210 CP-13 required the docket holder to perform an updated thermal CORMIX analysis of their discharge. The CORMIX analysis was submitted in a timely manner. Commission staff are still reviewing the analysis. Until such time as the Commission makes a determination regarding a revised heat dissipation area for Outfall No. 001, the existing heat dissipation area will remain in effect (See DECISION Condition II.t.).

Perkiomen Creek Augmentation Source – Delaware River via the Water Diversion System

Water diverted from the Delaware River to the EBPC via Bradshaw Reservoir (up to 42 mgd) will remain an approved source of Perkiomen Creek *augmentation water* for consumptive use at LGS.

Schuylkill River Augmentation Source

WMP

Commission staff recommend the continued approval of the use of the WMP as an *augmentation water* source of up to 446.4 mgm (10,000 gpm, 14.4 mgd, 22.4 cfs) contingent upon the diversion being operated in accordance with the discharge limitations required by PADEP in NPDES Permits Nos. PA00593508 and PA0123293, and the in-stream TDS restriction to be developed at Landingville, PA (See DECISION Conditions II.nn. & Condition II.oo.).

Tamaqua Reservoirs

Commission staff recommend the continued approval of the use of Still Creek Reservoir as an *augmentation water* source of up to 1.116 bgm (36 mgd, 55.7 cfs) and not the previously requested 43.3 mgd due to pipe release restrictions at the Still Creek Reservoir. TB is required to

operate the reservoir and associated systems in accordance with the limitations included in the Commonwealth of Pennsylvania Department of Forests and Waters, Water and Power Resources Board's Water Allocation No. WA-626 and DRBC's Docket No. D-2010-028 CP-1.

Commission staff recommend the continued approval of the use of water released from TB's Owl Creek Reservoirs in combination with TAWA's Still Creek Reservoir not to exceed a total of 43.3 mgd in accordance with DRBC Docket No. D-2010-028 CP-1.

The docket holder previously requested that the Executive Director be given the authority to approve alternate *augmentation* sources. Commission staff continue not to recommend the approval of this request and recommend that any new or alternate *makeup* or *augmentation* source be subject to Commission approval after the public comment process which a Section 3.8 review provides.

Travel Time

As part of Docket No. D-1969-210 CP-13, Commission staff evaluated the estimated travel time from the confluence of Norwegian Creek and the Schuylkill River to the Limerick Generating Station using *USGS Water Resources Investigation Report 01-4214: Prediction of Velocities for a Range of Streamflow Conditions in Pennsylvania*. The result was an estimated travel time of approximately 2.5 days. `````The travel time in accordance with DECISION Conditions II.ll. (Still Creek) and II.tt. (Wadesville) of this docket, which provides for a 3-day/2-day travel time for *augmentation* sources from the Upper Schuylkill.

Monitoring

Commission staff recommend the following monitoring requirements continue:

Upper Schuylkill River near Norwegian Creek

The docket holder shall continue to perform biological (macroinvertebrates, fish) and water quality sampling at Biological Stations 106 (Schuylkill River above the confluence of Norwegian Creek) and 109 (Schuylkill River below the confluence of Norwegian Creek). Water quality sampling will occur during releases from WMP at a minimum frequency of one sample per month; parameters for the water quality sampling will include TDS, alkalinity, total recoverable iron, dissolved iron, conductivity, pH, dissolved oxygen, and water temperature. Fishery surveys will be conducted, when conditions permit, once per year during summer low-flow periods as defined in the O&M Plan, using methods consistent with the prior sampling at these stations. Benthic macroinvertebrates will be sampled, when conditions permit, once every two years during summer low-flow periods as defined in the O&M Plan; methods for benthic macroinvertebrates will now follow the PADEP semi-quantitative method for wadeable streams (ICE methods; Instream Comprehensive Evaluation) in both the field and the laboratory. During both the fishery and macroinvertebrate surveys, *in situ* water chemistry (temperature, conductivity, pH, and dissolved oxygen) will be monitored and reported.

East Norwegian Creek

Water quality sampling of East Norwegian Creek upstream of the confluence with West Norwegian Creek shall continue to be conducted concurrently with the upper Schuylkill River sampling at Stations 106 and 109 for the same parameters (TDS, alkalinity, total recoverable iron, dissolved iron, conductivity, pH, dissolved oxygen, and water temperature) and at the same frequency (during releases from the WMP at a minimum frequency of one sample per month).

WMP Pumphouse Discharge Channel leading to East Norwegian Creek

The docket holder shall continue to report on the annual maintenance inspection for erosion of the channel leading to East Norwegian Creek prior to augmenting from WMP for the first time in each year.

Still Creek and Little Schuylkill River near Still Creek Reservoir

The docket holder shall continue to perform biological (macroinvertebrates, fish) and water quality sampling at multiple stations in the vicinity of Still Creek. For water quality, sampling will occur on both Still Creek (at SC1, upstream of PA Route 309 Bridge) and the Little Schuylkill River (at LSR1 and LSR2, just below SR1020 Bridge and just below PA Route 54 Bridge, respectively). Water quality will be monitored during Still Creek releases for Exelon Generation at a frequency of one sample per month; parameters will include water temperature, conductivity, pH, and dissolved oxygen at all three stations. Fishery surveys will be conducted, when conditions permit, once per year during summer low-flow periods using methods consistent with the prior sampling and at the same two primary stations (both below Still Creek, with a separation at Neifert Creek). Benthic macroinvertebrates will be sampled, when conditions permit, once every two years during summer low-flow periods within 100 meter reaches coinciding with the fishery surveys; methods for benthic macroinvertebrates will follow the PADEP semi-quantitative methods for wadeable streams (ICE methods; Instream Comprehensive Evaluation) in both the field and the laboratory. During both the fishery and macroinvertebrate surveys, *in situ* water chemistry (temperature, conductivity, pH, and dissolved oxygen) will be monitored and reported.

East Branch Perkiomen Creek

The docket holder shall continue to perform biological (macroinvertebrates, fish) and water quality sampling at multiple stations on the EBPC. Fishery surveys will be conducted, when conditions permit, once per year in mid- to late fall at two stations sampled during previous surveys (EEF 36235 above the Dublin USGS gage, and EEF 30700 below Callowhill Road). Fish survey methods will be consistent with the prior sampling surveys. Benthic macroinvertebrates will be sampled, when conditions permit, once every two years during summer low-flow periods at the two stations sampled during previous surveys (E36725 at Elephant Road, and E29910 at Callowhill Road). Methods for benthic macroinvertebrates will follow the PADEP semi-quantitative methods for wadeable streams (ICE methods; Instream Comprehensive Evaluation) in both the field and the laboratory. Water quality sampling will include *in situ* water chemistry (temperature, conductivity, pH, and dissolved oxygen) during

both the fishery and macroinvertebrate surveys. The ecological monitoring requirements for the EBPC are also contained in the docket holder's Water Obstruction and Encroachment Permit No. E09-077A, Special Condition S., issued by the state on 01/07/1982.

WMP Pumphouse Discharge Location

During the normal augmentation season of each year (July to October), the docket holder shall continue to monitor for TDS and conductivity monthly. Monthly NPDES sampling (for TSS, total Mn, total Fe, and pH) is performed by RAC. The docket holder shall report results. In addition, daily withdrawals of WMP water released for Exelon Generation shall be monitored and reported.

Still Creek Reservoir Discharge

Daily releases of water from Still Creek Reservoir shall continue to be monitored and Exelon Generation will be responsible to report in accordance with the O&M Plan.

Landingville USGS Gage

The docket holder will continue to work with the USGS to install/maintain a real-time monitor for conductivity at the USGS Landingville (01468500) gaging station. The Landingville gage is located on the Schuylkill River approximately 10.5 miles below the WMP source and approximately 47 miles upstream of the first public water supply intake (Pottstown Water Authority). The docket holder shall continue to provide the annual cost-share to the Commission to operate and maintain the conductivity meter at the USGS gage within 60 days of invoice (See DECISION Condition II.w.). The docket holder shall also continue to conduct in-stream sampling of the Schuylkill River at the Landingville USGS gage in order to establish the statistical relationship between TDS and conductivity. The docket holder shall initiate sampling of the Schuylkill River at the Landingville USGS gage when 24-hour average flow at that location is at or below 110 cfs. Up to 100 samples of TDS and conductivity shall be taken at the site in order to develop a statistical relationship between TDS and conductivity. The docket holder will ensure that conditions during sampling for TDS and conductivity span the range of lower flows, with a particular emphasis on adequate sampling at flows when TDS is expected to approach or exceed 500 mg/l. The docket holder shall submit the results of the in-stream sampling for TDS and conductivity and will work with DRBC to quantify the statistical relationship between these parameters. This analysis will include a determination of the conductivity at the Landingville USGS gage corresponding to a significant risk that TDS will exceed 500 mg/l.

Upon confirmation of the relationship between TDS and conductivity at Landingville and the ability to assess/access conductivity data real-time via the USGS website, the docket holder will be required to discontinue the use of the WMP as an augmentation source within 72 hours of crossing the conductivity threshold established above the 24-hour average TDS exceeding 500 mg/l at the Landingville USGS gage (See DECISION Condition II.oo.). Following implementation of the conductivity threshold, the docket holder will collect monthly paired samples of TDS and conductivity at the Landingville USGS gage to validate the continued use of

the conductivity threshold in place of a TDS requirement. After one full year of monitoring, the docket holder may request and the Executive Director may approve a reduction in the monthly paired samples of TDS and conductivity based on a written request from the docket holder and a demonstration that the conductivity/TDS relationship is consistent over time and flow conditions. During the term of this docket, the docket holder may also submit to the Executive Director a written request for an alternative monitoring program required in DECISION Condition II.u. and an alternative to the Landingville TDS threshold location provided herein. Until such time as the Executive Director provides written approval of an alternate monitoring and/or an alternate TDS threshold location, the docket holder will continue to comply with the requirements contained in this condition and the monitoring requirements in DECISION Condition II.u.

General Monitoring Data Conditions

The required monitoring data will be reported to the DRBC as detailed in the O&M Plan. Macroinvertebrate data will be analyzed using the appropriate Index of Biotic Integrity (IBI) established by PADEP.

Schuylkill River at LGS Intake and a Downstream Location

From May 1 to October 31 of each year, the docket holder shall continuously monitor (once every 15 minutes) dissolved oxygen, temperature, pH, and conductivity at its intake (or suitable replacement) and also at a downstream location such as the PAWC Royersford intake (or suitable replacement). In addition, conductivity and temperature monitoring shall occur throughout the remainder of the year. The capability for such monitoring shall be provided by the docket effective date (See DECISION Condition II.v.).

Restoration and Monitoring Fund

The elimination of the temperature restriction of 59°F applicable to Schuylkill River withdrawals as part of Docket No. D-1969-210 CP-13 also resulted in the cessation of the requirement for the Restoration and Monitoring Fund (RMF). Exelon Generation's contribution to the RMF was calculated based on the volume of water that was not transferred from the Delaware River as *augmentation* water when the Schuylkill River was temperature restricted. Exelon Generation's previous contribution formula is no longer valid (e.g. the temperature restriction is no longer applicable). Exelon Generation has agreed to continue to make contributions to the RMF with an annual payment by March 31st of the following year. The amount will continue to be determined by multiplying the annual LGS consumptive use of water, as reported to DRBC, by a rate of $0.015 per thousand gallons. The details and methodology of Exelon Generation's continued contributions to the RMF can be found in the O&M Plan.

Other

The Schuylkill River has an estimated seven-day low flow with a recurrence interval of ten years of 313 cfs/202.3 mgd (Q_{7-10}) at Pottstown, PA. The ratio of this low flow to the design wastewater discharge (14.2 mgd/22.0 cfs) from the LGS facility is 14:1.

The estimated Q_{7-10} for the Schuylkill River at the LGS withdrawal location (as calculated at the Pottstown USGS gaging station (01472000)) is 313 cfs (202.3 mgd). Commission staff recommends that LGS's water withdrawal from the Schuylkill River not cause the natural streamflow of the Schuylkill River to be less than the estimated Q_{7-10} at the point where Outfall 001 discharges. Whenever the natural streamflow in the Schuylkill River immediately downstream of Outfall 001 is less than 313 cfs (202.3 mgd), the LGS withdrawal from the Schuylkill River shall be reduced until a Schuylkill River flow of 313 cfs (202.3 mgd) is achieved. This restriction does not preclude LGS from using available *augmentation* water or the Schuylkill River for non-consumptive use. If the docket holder exhausts its Schuylkill River *augmentation water* supplies, the docket holder must obtain its consumptive use supply from Perkiomen Creek in accordance with the provision in this docket.

The estimated Q_{7-10} for the Perkiomen Creek at the Perkiomen Pumphouse withdrawal location (as calculated at the Graterford gaging station (USGS Gage No. 01473000)) is 19.4 cfs (12.5 mgd). When use of the Schuylkill River is restricted, Exelon Generation may withdraw water from the Perkiomen Creek when its natural 24-hour average flow is at least 180 cfs /116 mgd (with one unit in operation) or 210 cfs/136 mgd (with two units in operation) as measured at the Graterford gaging station (USGS Gage No. 01473000). Additionally, Exelon Generation may use water from the Perkiomen Creek for LGS's water demands when the flow criteria for the Schuylkill River are met as provided for in DECISION Condition II.ee.

During the summer of 2010, the rating curve used at the Pottstown gaging station (USGS Gage No. 01472000) had errors approximating 300 cfs, due reportedly to the amount of aquatic vegetation and the resulting inaccuracy of the rating curve. Due to the importance of the Pottstown USGS gage relative to the operations of the LGS, it is imperative that accurate flow measurements are available from the gage. The docket holder shall request that the USGS develop/confirm rating curves at approximately monthly intervals at the Pottstown USGS gage from May through October (See DECISION Condition II.w.).

At the Perkiomen Pumphouse location, there are weirs/dams that may prevent or significantly interfere with eel passage upstream/downstream of the Pumphouse location. Within 180 days of the docket effective date, the docket holder shall submit a scope of work and schedule to conduct an American eel survey. The scope of work shall at a minimum detail the work to conduct a quantitative survey at one location upstream and two locations downstream (one immediately below the weirs/dams and one below Wetherill dam) of the Pumphouse location and an assessment of the impact of the weir/dam at the Pumphouse location. The scope of work will be subject to the approval by the Executive Director. Copies of the scope of work shall also be submitted to the PFBC and PADEP. Upon approval of the scope of work by the Executive Director, the docket holder shall commence with the American eel survey. Based in

part upon the results of the American eel survey, the Executive Director may direct the docket holder to submit an engineering feasibility report to the Executive Director which will provide alternatives and recommendations to facilitate fish and eel passage at the Pumphouse location. Copies of the feasibility report shall also be submitted to the PFBC and PADEP. Based on the results of the engineering feasibility report, the Executive Director may direct the docket holder to complete designs and specifications for the recommended alternative for fish and eel passage at the Pumphouse location and to proceed with implementing the recommended alternative (See DECISION Condition II.bbb. of this docket).

In accordance with DECISION Condition III.a. of Docket D-1977-110 CP -Amendment 1 (Merrill Creek Owners Group docket), "Compensation Releases", in lieu of curtailment, shall be made for all "Designated Units" listed in Table A of the MCOG docket whenever the Commission's Drought Management Plan (present or future) causes the flow objective at the Trenton gage to drop below 3,000 cfs and the "Equivalent Flow" at Trenton drops below 3,000 cfs. In addition, "Compensation Releases will be required if and when the "Equivalent Flow" at Trenton drops below 3,000 cfs for five consecutive days due to reasons beyond the control of the DRBC. In accordance with DECISION Condition III.b. of the MCOG docket, "Designated Units" (LGS Units 1 and 2 are both "Designated Units") shall be exempt from curtailment by the DRBC as long as the freshwater equivalent consumptive use resulting from the operation of the units is being replaced by "Compensation Releases" from the Merrill Creek Reservoir Project. However, such releases from the Merrill Creek Reservoir are not required for any portion released for LGS from the Still Creek Reservoir (See DECISION Condition II.hh.).

Liquid radioactive wastes are handled by systems enclosed within the protected area of the plant. These systems comprise the LGS radioactive liquid waste management system, which collects, treats, stores, and disposes of radioactive liquid wastes. The wastes are collected in sumps and drain tanks at various locations throughout each Limerick Unit and then transferred to the appropriate collection tanks in the common radwaste enclosure according to their classification (i.e., equipment drain, floor drain, chemical drain, or laundry drain waste). The liquid wastes are processed through treatment units to reduce radionuclide concentrations and are then either returned to the condensate system for re-use in the plant, packaged for offsite shipment, or monitored and discharged from the plant into the cooling tower blowdown line on a batch basis. The mixing of the effluent with the blowdown flow maintains the radionuclide concentrations at the release point in the Schuylkill River below 10 CFR Part 20 limits. Radionuclide effluents are under the jurisdiction of the NRC. Exelon Generation prepares and submits an Annual Radiological Environmental Operating Report for LGS to the NRC that assesses calculated offsite dose data resulting from radioactive liquid effluents. No adverse radiological impacts on the environment have been reported.

The nearest surface water intake of record for public water supply downstream of LGS's cooling water discharge is Pennsylvania American Water Company's Royersford system, approximately 2.15 miles downstream.

The limits in the NPDES Permit(s) are in compliance with Commission effluent quality requirements, where applicable.

The project does not conflict with the Comprehensive Plan and is designed to prevent substantial adverse impact on the water resources related environment, while sustaining the current and future water uses and development of the water resources of the Basin.

D. DECISION

I. On the effective date for Docket No. D-1969-210 CP-14 below:

a. The project described in Docket No. D-1969-210 CP-13 is removed from the Comprehensive Plan to the extent that it is not included in Docket No. D-1969-210 CP-14; and

b. Docket No. D-1969-210 CP-13 is terminated and replaced by Docket No. D-1969-210 CP-14; and

c. The project and the appurtenant facilities described in Section A "Location and Physical Features" shall be continued in the Comprehensive Plan.

II. The project and appurtenant facilities as described in the Section A "Location and Physical Features" of this docket are approved pursuant to Section 3.8 of the *Compact*, subject to the following conditions:

STANDARD CONDITIONS

a. Docket approval is subject to all conditions, requirements, and limitations imposed by PADEP in its NPDES Permit, and such conditions, requirements, and limitations are incorporated herein, unless they are less stringent than the Commission's.

b. The facility and operational records shall be available at all times for inspection by the DRBC.

c. The facility shall be operated at all times to comply with the requirements of the Commission's *WQR* and *Water Code*.

d. Except as otherwise authorized by this docket, if the docket holder seeks relief from any limitation based upon a DRBC water quality standard or minimum treatment requirement, the docket holder shall apply for approval from the Executive Director or for a docket revision in accordance with Section 3.8 of the *Compact* and the *Rules of Practice and Procedure*.

e. Nothing herein shall be construed to exempt the docket holder from obtaining all necessary permits and/or approvals from other State, Federal or local government agencies having jurisdiction over this project.

f. The docket holder is permitted to treat and discharge the categories of wastewaters defined in the "Area Served" section of this docket.

g. The docket holder is permitted to provide the water approved in this docket to the areas included in Section A.4. Area Served of this docket. Any expansion beyond those included in Section A.4. Area Served is subject to DRBC review and approval in accordance with Section 3.8 of the *Compact*.

h. The docket holder shall pay for surface water use in accordance with the provisions of Resolution No. 74-6, as amended.

i. The docket holder shall make wastewater discharge in such a manner as to avoid injury or damage to fish or wildlife and shall avoid any injury to public or private property.

j. Nothing in this docket approval shall be construed as limiting the authority of DRBC to adopt and apply charges or other fees to this discharge or project.

k. The issuance of this docket approval shall not create any private or proprietary rights in the waters of the Basin, and the Commission reserves the right to amend, suspend or rescind the docket for cause, in order to ensure proper control, use and management of the water resources of the Basin.

l. Unless an extension is requested and approved by the Commission in advance, in accordance with paragraph 11 of the Commission's Project Review Fee schedule (Resolution No. 2009-2), the docket holder is responsible for timely submittal of a docket renewal application on the appropriate DRBC application form at least 12 months in advance of the docket expiration date set forth below. The docket holder will be subject to late charges in the event of untimely submittal of its renewal application, whether or not DRBC issues a reminder notice in advance of the deadline or the docket holder receives such notice. In the event that a timely and complete application for renewal has been submitted and the DRBC is unable, through no fault of the docket holder, to reissue the docket before the expiration date below (or the later date established by an extension that has been timely requested and approved), the terms and conditions of the current docket will remain fully effective and enforceable against the docket holder pending the grant or denial of the application for docket approval.

m. The Executive Director may modify or suspend this approval or any condition thereof, or require mitigating measures pending additional review, if in the Executive Director's judgment such modification or suspension is required to protect the water resources of the Basin.

n. The docket holder and any other person aggrieved by a reviewable action or decision taken by the Executive Director or Commission pursuant to this docket may seek an administrative hearing pursuant to Articles 5 and 6 of the Commission's *Rules of Practice and Procedure,* and after exhausting all administrative remedies may seek judicial

review pursuant to Article 6, section 2.6.10 of the *Rules of Practice and Procedure* and section 15.1(p) of the Commission's *Compac*t.

o. If the operation of this project significantly affects or interferes with any domestic or other existing wells or surface water supplies, or if the docket holder receives a complaint by any user of wells or surface water supplies within the zone of influence of the withdrawal, the docket holder shall immediately notify the Executive Director of any complaints by users of wells or surface water supplies within the zone of influence of the withdrawal, and unless excused by the Executive Director, shall investigate such complaints. The docket holder should direct phone call notifications of potential well or surface water interference or complaints of interference to the DRBC Project Review Section at 609-883-9500, extension 216. Oral notification must always be followed up in writing directed to the Executive Director. In addition, the docket holder shall provide written notification to all potentially impacted users of wells or surface water supplies of the docket holder's responsibilities under this condition. Any well or surface water supply which is substantially adversely affected, or rendered dry or otherwise unusable as a result of the docket holder's project withdrawal, shall be repaired, replaced or otherwise mitigated at the expense of the docket holder. A report of investigation and/or mitigation plan prepared by a hydrologist shall be submitted to the Executive Director as soon as practicable. The Executive Director shall make the final determination regarding the validity of such complaints, the scope or sufficiency of such investigations, and the extent of appropriate mitigation measures, if required.

p. For the duration of any drought emergency declared by either Pennsylvania or the Commission, water service or use by the docket holder pursuant to this approval shall be subject to the prohibition of those nonessential uses specified by the Governor of Pennsylvania, the Pennsylvania Emergency Management Council, PADEP, or the Commonwealth Drought Coordinator to the extent that they may be applicable, and to any other emergency resolutions or orders adopted hereafter by the Commission.

MONITORING CONDITIONS - DISCHARGE

q. The docket holder shall comply with the requirements contained in the EFFLUENT TABLE in Section A.4.b.1. of this docket. The docket holder shall submit the required monitoring results electronically to the DRBC Project Review Section via email **aemr@drbc.state.nj.us** on the **Annual Effluent Monitoring Report Form** located at this web address: http://www.state.nj.us/drbc/programs/project/application/index.html. The monitoring results shall be submitted annually, absent any observed limit violations, by January 31. If a DRBC effluent limit is violated, the docket holder shall submit the result(s) to the DRBC within 30 days of the violation(s) and provide a written explanation that states the action(s) the docket holder has taken to correct the violation(s) and protect against any future violations.

r. The docket holder shall monitor for TDS at the location included in the O&M Plan which represents Outfall No. 001 twice/month, as required in EFFLUENT TABLE A/NPDES Permit, for 24 months. Exelon Generation shall submit a report within 20 months of the approval date for Docket No. D-1969-210 CP-14, which includes (at least) the 48 TDS samples collected since the effort started as a result of Docket No. D-1969-210 CP-13.

Included in the report will be an analysis that evaluates the discharge from Outfall No. 001 and compliance with the Commission's TDS requirements. Upon docket renewal, if necessary, Commission staff will use this data to determine an appropriate monthly average and daily maximum TDS effluent limit for Outfall No. 001.

s. The docket holder may request of the Executive Director in writing the substitution of specific conductance for TDS. The request should include information that supports the effluent specific correlation between TDS and specific conductance. Upon review, the Executive Director may modify the docket to allow the substitution of specific conductance for TDS monitoring.

t. The docket holder submitted a CORMIX modeling analysis to the Commission as required in Docket No. D-1969-210 CP-13. The analysis is still being reviewed. Until such time as the Commission makes a determination regarding a revised heat dissipation area for Outfall 001, the existing heat dissipation area will remain in effect.

MONITORING CONDITIONS - OTHER

u.

i. Docket No. D-1969-210 CP-13 required the docket holder to request that the USGS install a real-time monitor for conductivity at the USGS Landingville (01468500) gaging station within 180 days of the effective date of that docket. The docket holder met this requirement in a timely fashion. The docket holder shall continue to provide the annual cost-share to the Commission to operate and maintain the conductivity meter at the USGS gage as was required as part of Docket No. D-1969-210 CP-13. The docket holder shall also continue to conduct in-stream sampling of the Schuylkill River at the Landingville USGS gage in order to establish the statistical relationship between TDS and conductivity. The docket holder shall continue to initiate sampling of the Schuylkill River at the Landingville USGS gage when the 24-hour average flow at Landingville is at or below 110 cfs. Up to 100 samples of TDS and conductivity shall be taken in order to develop a statistical relationship between TDS and conductivity. The docket holder will ensure that conditions during sampling for TDS and conductivity span the range of lower flows, with a particular emphasis on adequate sampling at flows when TDS is expected to approach or exceed 500 mg/l. The docket holder shall submit the results of the in-stream sampling for TDS and conductivity to the Executive Director for review and approval. This analysis will include a determination of the conductivity at the Landingville USGS gage corresponding to a significant risk that TDS will exceed 500 mg/l. Following implementation of the conductivity threshold, the docket holder shall collect monthly paired samples of TDS and conductivity at the Landingville gage to validate the continued use of the conductivity

threshold in place of a TDS requirement. After one full year of monitoring, the docket holder may request and the Executive Director may approve a reduction in the monthly paired samples of TDS and conductivity based on a written request from the docket holder and a demonstration that the conductivity/TDS relationship is consistent over time and flow conditions.

ii. Docket No. D-1969-210 CP-13 required the docket holder to submit to the Executive Director a program designed to monitor TDS and its constituents in the Schuylkill River at a point above the confluence of Norwegian Creek. The monitoring program was approved. The monitoring program will continue to be conducted during the period when water from the WMP is being utilized by the docket holder. This monitoring will continue to be conducted as proposed.

iii. Docket No. D-1969-210 CP-13 required the docket holder to submit to the Executive Director a program designed to monitor TDS and its constituents in the WMP water that is being released by the docket holder. The monitoring program was approved. The monitoring program will continue to be conducted as proposed.

iv. Six (6) months prior to the expiration of this docket, the docket holder will submit a report to the DRBC and PADEP on the effects of the WMP water impacts on the TDS and its constituent levels on the water quality of the Schuylkill River. Utilizing the information in the report or other supplemental information it provides, Exelon may request a modification to the TDS regulatory requirements as a supplement to its renewal application. The DRBC will consider the request during its review of the application.

v. The docket holder shall provide continuous (every 15 minutes) but not real time measurement data for dissolved oxygen, temperature, pH, and conductivity at their Schuylkill River intake (or suitable replacement) and at a downstream location (such as the PAWC Royersford intake, or suitable replacement) for the period of May 1 to October 31 of each year by the effective date of this docket. In addition, conductivity and temperature monitoring shall occur throughout the remainder of the year. The results shall be submitted monthly to the Commission.

w. The docket holder shall continue to provide the local sponsor costs for the following USGS gages to the Commission for reimbursement to the USGS:

01472620: EBPC near Dublin, PA (Bucks Road)

01468500: Schuylkill River at Landingville, PA (conductivity probe costs only)

01472000: Schuylkill River at Pottstown, PA. The docket holder shall request and contract with the USGS so that approximately monthly rating curves at the Pottstown USGS gage are developed/confirmed from May through October.

The docket holder shall submit such payment as prepared by the USGS to the Commission within 60 days of invoice.

OPERATING CONDITIONS – WITHDRAWALS: SCHUYLKILL RIVER

x. Surface water withdrawals from the Schuylkill River shall not exceed 1.7422 bgm and 58.2 mgd (44 mgd consumptive plus 14.2 non-consumptive) to supply the consumptive and non-consumptive needs of the LGS; except that on days when the ambient air temperature is 87˚F or greater, the consumptive use shall not exceed 47.3 mgd, with no increase in the maximum monthly (1.7422 bgm) or daily (58.2 mgd) total surface water withdrawals from the Schuylkill River and no increase in daily non-consumptive use (14.2 mgd).

y. With one unit in operation, when the 24-hour average flow in the Schuylkill River, as measured at the Pottstown Gaging station (USGS Gage No. 01472000), is **greater than 530 cfs**, the **unaugmented** surface water withdrawal for consumptive use is restricted to 24 mgd and to 14.2 mgd non-consumptive use, with the total not to exceed 1.7422 bgm. However, on days when the ambient air temperature is 87˚F or greater, the consumptive use is restricted to 25.5 mgd. As set forth in DECISION Condition II.x., total surface water withdrawals from the Schuylkill River may not exceed 1.7422 bgm and 58.2 mgd; and non-consumptive use may not exceed 14.2 mgd. Any and all consumptive use above 24 mgd must be replaced with commensurate augmentation releases from either the WMP, Tamaqua Reservoirs, and/or with water diverted from the Delaware River via the Perkiomen Creek. Such replacements must be made on a 1:1 gpd basis over the 24-hour period beginning on the day after a consumptive use in excess of 24 mgd when Schuylkill River flows at USGS Gage No. 01472000 are less than or equal to 1,980 cfs.

z. With two units in operation, when the 24-hour average flow in the Schuylkill River, as measured at the Pottstown Gaging station (USGS Gage No. 01472000), is **greater than 560 cfs**, the **unaugmented** surface water withdrawal for consumptive use is restricted to 44 mgd and 14.2 mgd non-consumptive use, with the total not to exceed 1.7422 bgm. However, on days when the ambient air temperature is 87˚F or greater, the consumptive use is restricted to 47.3 mgd. As set forth in DECISION Condition II.x., total surface water withdrawals from the Schuylkill River may not exceed 1.7422 bgm and 58.2 mgd; and non-consumptive use may not exceed 14.2 mgd. Any and all consumptive use above 44 mgd must be replaced with commensurate augmentation releases from either the WMP, Tamaqua Reservoirs, and/or with water diverted from the Delaware River via the Perkiomen Creek. Such replacements must be made on a 1:1 gpd basis over the 24-hour period beginning on the day after a consumptive use in excess of 44 mgd when Schuylkill River flows at USGS Gage No. 01472000 are less than or equal to 1,980 cfs.

aa. With one unit in operation, when the 24-hour average flow in the Schuylkill River, as measured at the Pottstown Gaging station (USGS Gage No. 01472000), is **less than or equal to 530 cfs**, the **augmented** surface water withdrawal for consumptive use is

restricted to 24 mgd and to 14.2 mgd non-consumptive use, with the total not to exceed 1.7422 bgm. All consumptive use will be augmented on a 1:1 gpd basis. However, on days when the ambient air temperature is 87˚F or greater, the consumptive use is restricted to 25.5 mgd. As set forth in DECISION Condition II.x., total surface water withdrawals from the Schuylkill River may not exceed 1.7422 bgm and 58.2 mgd; and non-consumptive use may not exceed 14.2 mgd. Any and all consumptive use must be replaced with commensurate augmentation releases from either the WMP, Tamaqua Reservoirs, and/or with water diverted from the Delaware River via the Perkiomen Creek. Such replacements must be made on a 1:1 gpd basis in accordance with augmentation requirements specific to each of the sources used.

bb. With two units in operation, when the 24-hour average flow in the Schuylkill River, as measured at the Pottstown Gaging station (USGS Gage No. 01472000), is **less than or equal to 560 cfs**, the **augmented** surface water withdrawal for consumptive use is restricted to 44 mgd and to 14.2 mgd non-consumptive use, with the total not to exceed 1.7422 bgm. All consumptive use will be augmented on a 1:1 gpd basis. However, on days when the ambient air temperature is 87˚F or greater, the consumptive use is restricted to 47.3 mgd. As set forth in DECISION Condition II.x., total surface water withdrawals from the Schuylkill River may not exceed 1.7422 bgm and 58.2 mgd; and non-consumptive use may not exceed 14.2 mgd. Any and all consumptive use must be replaced with commensurate augmentation releases from either the WMP, Tamaqua Reservoirs, and/or with water diverted from the Delaware River via the Perkiomen Creek. Such replacements must be made on a 1:1 gpd basis in accordance with augmentation requirements specific to each of the sources used.

cc. LGS's Schuylkill River intake withdrawal must not cause the flow in the Schuylkill River to be less than 313 cfs (202.3 mgd) at the point where Outfall 001 discharges. Whenever the natural streamflow in the Schuylkill River immediately downstream of Outfall 001 is less than 313 cfs (202.3 mgd), the Schuylkill River consumptive withdrawal for LGS shall be reduced until a Schuylkill River flow of 313 cfs (202.3 mgd) is achieved. This does not preclude LGS from using available *augmentation water* or the Schuylkill River for non-consumptive use. If the docket holder exhausts its Schuylkill River *augmentation water* supplies, the docket holder must obtain its consumptive use supply from Perkiomen Creek in accordance with the conditions in this docket.

OPERATING CONDITIONS – GROUNDWATER WITHDRAWALS: LGS

dd. During any month, the withdrawals from the following wells shall not exceed (except during fire emergencies or other plant emergencies):

WELL NO.	INSTANTANEOUS ALLOCATION (GPM)	MONTHLY ALLOCATION (MILLION GALLONS)
Well 1 – Alley	90	3.1
Well 3 – Batch Plant	65	2.8

WELL NO.	INSTANTANEOUS ALLOCATION (GPM)	MONTHLY ALLOCATION (MILLION GALLONS)
LTC Well	52	0.1
LEIC Well	30	0.1

OPERATING CONDITIONS – WITHDRAWALS: PERKIOMEN CREEK

ee. Exelon Generation may withdraw up to 24 mgd of water from the Perkiomen Creek for consumptive cooling water needs when the natural 24-hour average creek flow is at least 180 cfs /116 mgd (with one unit in operation) or up to 42 mgd when the natural 24-hour average creek flow is at least 210 cfs/136 mgd (with two units in operation) as measured at the USGS Graterford gaging station and the use of the Schuylkill River is limited or restricted. However, on days when the ambient air temperature is 87˚F or greater, the consumptive use is restricted to 25.5 mgd with one unit operating and 47.3 mgd with two units operating. As set forth in DECISION Condition II.x., total surface water withdrawals from the Schuylkill River may not exceed 1.7422 bgm and 58.2 mgd; and non-consumptive use may not exceed 14.2 mgd. Any and all consumptive use above 24 mgd (with one unit operating) and 44 mgd (with two units operating) must be replaced with commensurate augmentation releases from either the WMP, Tamaqua Reservoirs, and/or with water diverted from the Delaware River via the Perkiomen Creek. Such replacements must be made on a 1:1 gpd basis in accordance with augmentation requirements specific to each of the sources used. Exelon Generation also is approved to use Perkiomen Creek water to supply the small auxiliary pump, which operates as needed to: (1) maintain system operability by keeping the discharge pipelines and storage tank sufficiently full to prevent water hammer when the intake pumps are started; (2) maintain level in the storage tank when the system is not in use; and (3) provide freeze protection by agitating the storage tank water during frigid weather conditions. The approval to withdraw water from the Perkiomen Creek (via natural flow or intrabasin transfer) for use at LGS also applies when the natural flow criteria for the Schuylkill River are met provided that (1) an abnormal condition exists that prevents withdrawal from the Schuylkill River (e.g., the Schuylkill Pumphouse is out of service, an ice jam on the river prevents withdrawal, or an upstream spill causes severe intake water quality impairment which could result in equipment damage); (2) a plant operational/maintenance condition exists that that could be mitigated by the selective use of Perkiomen Creek water (e.g., using Perkiomen Creek water having lower total dissolved solids than the Schuylkill River, when a condenser chemistry issue is detected until such issue can be resolved), or (3) LGS has already switched over to using the Perkiomen Creek intake when use of the Schuylkill River is restricted, but the Schuylkill River then cycles between meeting and not meeting its flow criteria, which would otherwise require LGS to repeatedly start up and shut down both intake pump houses over a relatively short period of time. In order to withdraw from the Perkiomen Creek when the natural flow criteria for the Schuylkill River are met, Exelon shall notify the DRBC in accordance with the approved O&M Plan within 24 hours (or the next business day) after such use starts, which shall include an estimate of the duration of such use. Operation of the small auxiliary pump is exempt from this notification requirement. Exelon shall

also provide notification to the DRBC in accordance with the approved O&M Plan when normal operations are back in effect. The DRBC Executive Director reserves the right to modify water supply operations under such conditions.

ff. Exelon Generation shall maintain a minimum flow of at least 10 cfs in the EBPC at all times in accordance with the O&M Plan (Attachment No. 2). After consultation with the PFBC and PADEP, the Executive Director may approve requests by Exelon Generation to increase flows in the EBPC above 10 cfs from the Bradshaw Reservoir to support short-term recreational events. Such approval will be granted only after the review and approval by the Executive Director of a written request by Exelon Generation. Exelon Generation shall submit its written request (along with a flow management plan) at least 60 days in advance of the proposed release date. Copies of such plans will be sent by Exelon Generation to the PFBC and PADEP.

gg. Condition II. C. of Docket No. D-79-52 CP (approved February 18, 1981) required PECO (Exelon Generation's predecessor) to maintain 27 cfs in the EBPC while LGS was in operation and 10 cfs at all other times. Condition II. P. of Docket No. D-79-52 CP reserves the right of the Commission to open said docket at any time, and to reconsider its decision and any and all conditions imposed hereunder in light of further information developed by, or decisions rendered in, pending or future proceedings conducted by other State and Federal agencies concerning the development and operation of LGS and related facilities. Condition II.P. also allowed the Commission to, at any time, modify existing conditions, or impose additional conditions, upon the construction and operation of this facility to reflect new or changed information or to conform to requirements imposed on the project by other agencies. By approval of this docket, the Commission is modifying Condition II. C. of Docket No. D-79-52 to read as follows:

> *"C. Exelon Generation shall maintain a minimum of 10 cfs (6.5 mgd) in the East Branch Perkiomen Creek at the Bucks Road stream gage at all times except for times when a condition arises (e.g., loss of pumping capability at Bradshaw Reservoir) that prevents minimum flow maintenance as required. Such conditions and provisions for DRBC notification shall be outlined in the DRBC-approved* O&M Plan *applicable to LGS's Water Supply Program."*

hh. In accordance with Condition III. a. of Docket D-1977-110 CP - Amendment 1 (MCOG docket), "Compensation Releases", in lieu of curtailment, shall be made for all "Designated Units" listed in Table A of the MCOG docket whenever the Commission's Drought Management Plan (present or future) causes the flow objective at the Trenton gage to drop below 3,000 cfs and the "Equivalent Flow" at Trenton drops below 3,000 cfs. In addition, "Compensation Releases" will be required if and when the "Equivalent Flow" at Trenton drops below 3,000 cfs for five consecutive days due to reasons beyond the control of the DRBC. In accordance with Condition III. b. of the MCOG docket, "Designated Units" (LGS Units 1 and 2 are both "Designated Units") shall be exempt from curtailment by the DRBC as long as the freshwater equivalent consumptive use resulting from the operation of the units is being replaced by "Compensation Releases" from the Merrill Creek Reservoir

Project. However, such releases from the Merrill Creek Reservoir are not required for any portion released for LGS from the Still Creek Reservoir.

ii. Water diverted via the Point Pleasant Pumping Station is restricted to the use, conditions and service area set forth in Docket No. D-65-76 CP (8) and cannot be used for any other purposes unless approved by the Commission.

OPERATING CONDITIONS – WITHDRAWALS: STILL CREEK RESERVOIR

jj. Exelon Generation may use up to 1,342 mgm (43.3 mgd) of water from the Tamaqua Reservoirs as an *augmentation* source.

kk. To assure reliability and to allow for operational flexibility, Schuylkill River flows may continue to be *augmented* by releases from the Tamaqua Reservoirs, increased by the quantity of water lost en route to LGS through evaporation (3%), for LGS consumptive cooling water needs in accordance with the approved O&M Plan. No release from the Tamaqua Reservoirs is allowed for LGS consumptive cooling water use whenever the water level in the reservoir pools are below the Operating Rule Curve shown in the O&M Plan or an updated Operating Rule Curve approved by the DRBC Executive Director.

ll. During the term of this docket, in any period beginning three days after initiation of releases from the Tamaqua Reservoirs and ending two days after cessation of releases from the reservoirs, Exelon Generation is authorized to withdraw Schuylkill River water at its LGS intake in a quantity equal to 97% of the water released for Schuylkill River augmentation from the Tamaqua Reservoirs.

mm. In the event that conditions exist that require the water diversion system to be in service to supply water for LGS's consumptive use, but the system is unavailable or of diminished capacity, an equal volume of water, up to 43.3 mgd (peak daily withdrawal) and 1.342 bgm, may be released from the Tamaqua Reservoirs, subject to the Operating Rule Curves and allowing an additional three percent for in-transit evaporative losses, and withdrawn for consumptive use at LGS. Notification of such releases to the Commission should occur as soon as possible but no later than 48 hours after the event occurs.

OPERATING CONDITIONS – WITHDRAWALS: WADESVILLE

nn. Exelon Generation may use the WMP as an *augmentation* source to provide up to 446.4 mg/month (10,000 gpm, 14.4 mgd, 22.4 cfs) of water, as appropriate to augment the Schuylkill River to meet its LGS consumptive use demands as identified above at times when the 24-hour average flow in the Schuylkill River as measured at the gaging station at Pottstown is less than or equal to 530 cfs with one unit in operation and 560 cfs with two units in operation.

oo.

i. Upon the Executive Director's written approval of the relationship between TDS and conductivity at Landingville (See DECISION Condition II.u. above), and the ability to assess/access conductivity data real-time via the USGS website, within 72 hours of crossing the 24-hour average conductivity threshold established above for TDS exceeding 500 mg/l at the Landingville USGS gaging station (USGS Gage No. 01468500), the docket holder will discontinue *augmentation* releases from the WMP. During the term of this docket, the docket holder may submit to the Executive Director a written request for an alternative monitoring program required in Condition II.u. above and an alternative to the Landingville TDS threshold location provided herein. Until such time as the Executive Director provides written approval of an alternate monitoring and/or an alternate equivalent conductivity reading, the docket holder will continue to comply with the requirements contained in DECISION Condition II.u. above.

ii. The docket holder may resume the use of WMP water when the TDS at the Landingville USGS gaging station (USGS Gage No. 01468500) is less than 500 mg/l, or the alternate equivalent conductivity, for three consecutive days and the docket holder calculates that the quantity of the WMP water being utilized will not cause TDS or equivalent conductivity reading at the Landingville USGS gaging station to exceed 500 mg/l.

pp. During the term of this docket Exelon Generation shall perform a maintenance inspection for erosion prior to the startup of *augmentation* from the WMP for the first time in each year. The channel from the discharge point to approximately 50 feet downstream of the New Wadesville Road shall be inspected and repaired if any erosion problems have occurred that inhibit the discharge or are as a result of the discharge.

qq. Exelon Generation shall maintain detailed, accurate records of WMP water discharges when water is released on LGS's behalf. Exelon Generation shall notify DRBC of initiation and cessation of WMP water discharges each augmentation season in accordance with the approved O&M Plan (Attachment No. 2).

rr. The Executive Director may modify or suspend WMP water discharges and/or reservoir releases if evidence indicates that either is causing violations of water quality standards and/or causing unacceptable impacts to the aquatic biota of the receiving waters.

ss. There shall be no increase in the installed depth of the WMP pump casings greater than 600 feet on behalf of Exelon Generation for consumptive use *augmentation* without prior notification to DRBC and approval by the Executive Director. Exelon Generation shall not draw the mine pool down below 600 feet for consumptive use make-up without permission from the DRBC. Exelon Generation may request and the Executive Director may approve changes to the O&M Plan.

tt. During the term of this docket, in any period beginning three days after initiation of pumping from the WMP and ending two days after cessation of pumping from the WMP, Exelon Generation is authorized to withdraw Schuylkill River water at its LGS intake in an amount equal to 97% of its pumpage rate from the mine pool.

uu. The required monitoring information, including the report on the erosion inspection required above, shall be compiled and submitted to the DRBC in an annual assessment report by January 31st of each year.

vv. During an emergency, if normal constraints on withdrawals cannot be met, the docket holder may use surface water from the sources, designated herein as necessary, to address the emergency until it has been stabilized, in accordance with the O&M Plan and/or emergency shutdown procedures established by the NRC. Notification of and consultation with the Executive Director should occur as soon as possible but no later than 24 hours after the emergency is known by the docket holder.

OTHER CONDITIONS

ww. Exelon Generation shall comply with O&M Plan (Attachment No. 2) approved by the Executive Director. The O&M Plan specifies monitoring parties and locations, monitoring parameters and frequencies, and reporting requirements for compliance by Exelon Generation and other designated parties during the term of this docket. Applicable data collected as part of the project conducted under Docket No. D-69-210 CP-11 and 12 will continue to be used as baseline data. The O&M Plan includes the following operating and monitoring requirements: 1) for releases from the WMP including East Norwegian Creek, Norwegian Creek and Schuylkill River 2) for releases from Tamaqua Reservoirs including Still Creek 3) for DO downstream of LGS 4) for the diversions from the Delaware River to the EBPC 5) for the calculation and reporting of Exelon Generation's contributions to the restoration and monitoring fund 6) notification, *augmentation*/*makeup* accounting, and contingency procedures and 7) roles and responsibilities for all involved parties.

xx. Based on the monitoring data collected in accordance with Condition II.uu. above, Exelon Generation shall prepare and file ten hard copies and two CD-ROM electronic copies of its assessment report with DRBC prior to January 31st of each year. The first report shall be in 2013. DRBC and Exelon Generation will meet at least annually to discuss the progress of the project. Unless the Executive Director, in consultation with Exelon Generation, chooses otherwise, these meetings shall take place in connection with submittal of the annual assessment report.

yy. The Executive Director may modify the O&M Plan (Attachment No. 2) if the results indicate a change is required or appropriate. Exelon Generation may also request modifications to the O&M Plan. Exelon Generation has the right to request a hearing if it disagrees with a decision of the Executive Director with respect to the O&M Plan.

zz. The Executive Director may also direct the docket holder to resume makeup water operations *via* the Delaware River diversion if the conditions warrant it. Exelon Generation will comply with the Executive Director written directive within 48 hours of

its receipt. Under Article 6 of the Rules of Practice and Procedure, Exelon Generation has the right to request a hearing if it disagrees with a decision of the Executive Director, but must comply with the directive during the period of the appeal process.

aaa. Exelon Generation shall record daily releases from the WMP and Still Creek Reservoir, as totalized and reported by RAC and TAWA, respectively, and Bradshaw Reservoir, as measured and recorded by Exelon Generation, and include the daily data for such releases in the annual report.

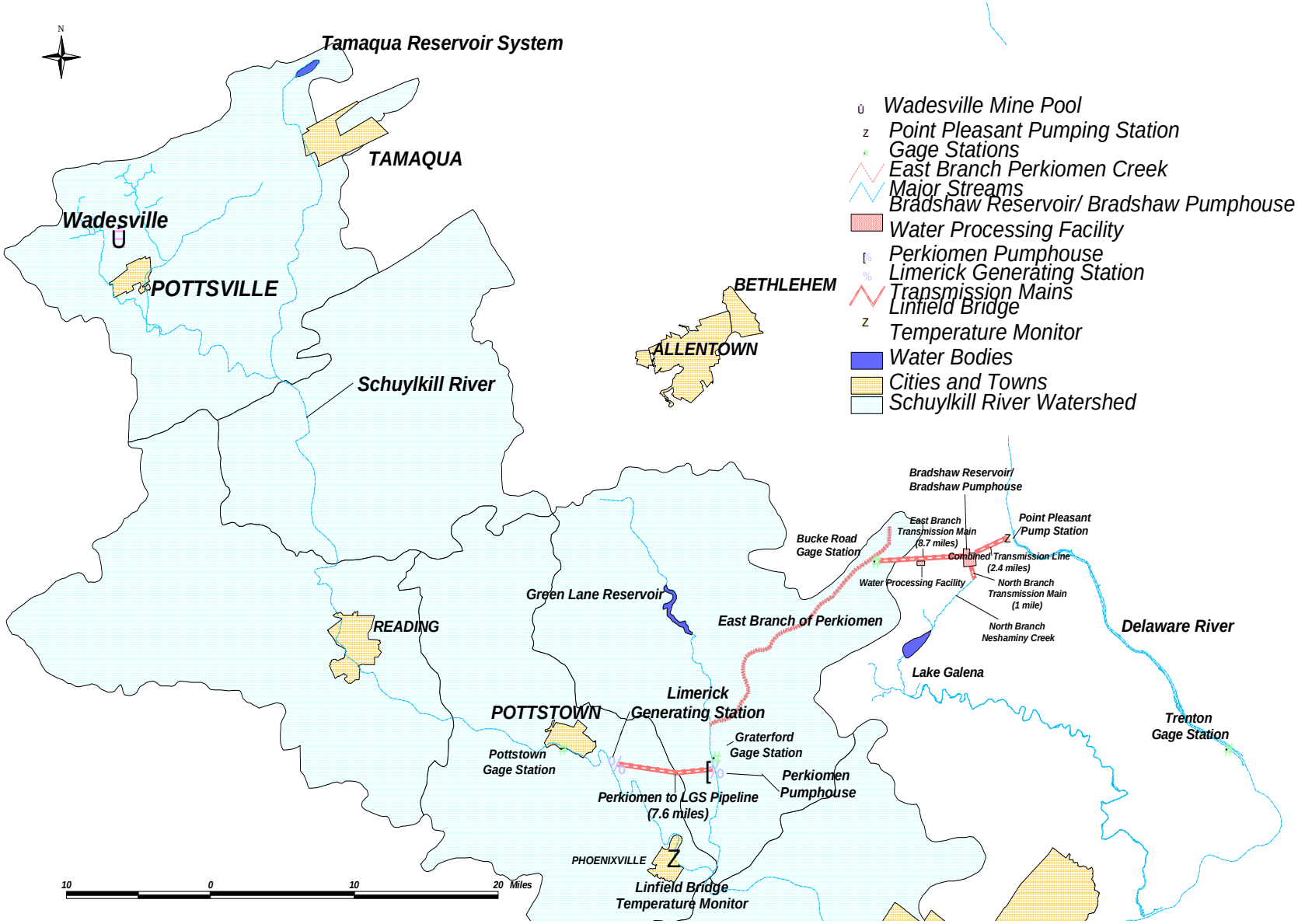
bbb. Based in part upon the results of the American eel survey that was submitted to the Commission on December 24, 2014, the Executive Director may direct the docket holder to submit an engineering feasibility report to the Executive Director which will provide alternatives and recommendations to facilitate fish and eel passage at the Perkiomen Pumphouse location. Copies of the feasibility report shall also be submitted to the PFBC and PADEP. Based on the results of the engineering feasibility report, the Executive Director may direct the docket holder to complete designs and specifications for the recommended alternative for fish and eel passage at the Perkiomen Pumphouse location and to proceed with implementing the recommended alternative.

BY THE COMMISSION

DATE APPROVED: March 11, 2015

EXPIRATION DATE: April 1, 2018

ATTACHMENT 1: Exelon Limerick Generating Station Map (D-1969-210 CP-13)



ATTACHMENT 2

EXELON GENERATION COMPANY, LLC

Limerick Generating Station (LGS)

Water Supply Program

Operation and Monitoring Plan

Prepared in accordance with:

Delaware River Basin Commission (DRBC) Docket No. D-1969-210 CP-14

Approved March 2015

Effective March 2015

This Operation and Monitoring Plan, upon DRBC's acceptance and docket approval, and implementation in accordance with DRBC's compliance schedule, replaces the LGS Water Supply Program Operation and Monitoring Plan, Approved May 2013, Effective January 2014, Amended August 2014, in its entirety.

TABLE OF CONTENTS

LIST OF ABBREVIATIONS AND ACRONYMS

bgm	billion gallons per month
BWPF	Bedminster Water Processing Facility
cfs	cubic feet per second
DRBC or Commission	Delaware River Basin Commission
EBPC	East Branch Perkiomen Creek
EBTM	East Branch Transmission Main
Exelon Generation	Exelon Generation Company, LLC
FPWA	Forest Park Water Authority
gpm	gallons per minute
LGS	Limerick Generating Station
LSR	Little Schuylkill River
MCOG	Merrill Creek Owner's Group
mg	million gallons
mgd	million gallons per day
mg/l	milligrams per liter
mgm	million gallons per month
msl	above mean sea level
NPDES	National Pollutant Discharge Elimination System
O&M Plan	Operation & Monitoring Plan
PADEP	Pennsylvania Department of Environmental Protection
PFBC	Pennsylvania Fish & Boat Commission
RAC	Reading Anthracite Company
RMF	Restoration and Monitoring Fund
TAWA	Tamaqua Area Water Authority
TDS	total dissolved solids
USGS	United States Geological Survey
WMP	Wadesville Mine Pool

1 INTRODUCTION

1.1 LGS WATER SUPPLY PROGRAM OPERATION AND MONITORING PLAN

This Limerick Generating Station (LGS) Water Supply Program Operation and Monitoring Plan (O&M Plan) provides the rules and requirements that will govern Exelon Generation Company, LLC (Exelon Generation) use of approved surface water sources to supply makeup water for use at LGS, as well as associated monitoring/reporting requirements.

These rules and requirements are intended to implement applicable Delaware River Basin Commission (DRBC or Commission) docket decisions meant to protect regional water resources while providing LGS with a reliable makeup water supply and the flexibility to optimize the use of the available sources to suit its operational needs. Exelon Generation may request DRBC Executive Director approval of modifications to this O&M Plan.

The DRBC dockets listed below contain the decisions applicable to the LGS Water Supply Program that are implemented in this O&M Plan:

- D-1969-210 CP-13 (Limerick Generating Station and Surface Water Augmentation)
- D-65-76 CP (8) (Neshaminy Watershed Plan – Water Supply)
- Docket No. D-79-52 CP (Bradshaw Reservoir, Pumping Station, and Transmission Main)
- Docket D-77-110 CP (Amendment 1) (Merrill Creek Reservoir Project)

DRBC Compliance Schedule: This O&M Plan shall be fully implemented no later than January 1, 2014.

1.2 LGS WATER SUPPLY PROGRAM DEFINITIONS AND DESCRIPTION

1.2.1 Definitions of Key Terms

Augmentation water: Water supplied by Exelon Generation from DRBC-approved sources to the Schuylkill River and Perkiomen Creek during periods of low natural stream flow to compensate for LGS's surface water withdrawals for consumptive use. The approved sources of augmentation water for the Schuylkill River are the Wadesville Mine Pool (WMP) and Still Creek Reservoir in combination with Owl Creek Reservoirs. The approved source of augmentation water for Perkiomen Creek is the Delaware River (via the water diversion system). Augmentation water also may be used for LGS non-consumptive use only under limited circumstances set forth in this O&M Plan.

Makeup water: Surface water pumped from LGS's Schuylkill River intake and/or Perkiomen Creek intake for consumptive and non-consumptive use at LGS.

Natural flow: The naturally-occurring flow in the source waterbody not augmented by releases from Commission sponsored reservoir storage projects (Blue Marsh).

Travel time: The estimated time for water to travel via stream flow from the release location to the withdrawal location and then may be considered available for use. For this O&M Plan, Schuylkill River augmentation water is considered to be available for use at LGS three days after its release from the WMP and Still Creek/Owl Creek Reservoirs and for two days after stopping the releases at the end of the augmentation season. The water travel time from Bradshaw Reservoir to the Perkiomen Creek intake is estimated to be 18 hours. To ease daily water accounting yet still account for water travel time, the quantity of water pumped from Bradshaw Reservoir yesterday will be considered the amount available for use at LGS today. This method is considered more conservative than applying an 18-hour travel time. Exelon Generation applies a 12-hour travel time for releases from Blue Marsh Reservoir after timely notification by DRBC of the release.

Unit operation: The restrictions on surface water withdrawals applicable to two-Unit operation will be followed whenever the total LGS reactor thermal output (as expressed in percent power) is greater than one Unit's reactor thermal output reading of 100 percent and/or the initiation of start-up procedures. The restrictions applicable to one-Unit operation will be followed whenever the total LGS reactor thermal output (as expressed in percent power) is equal to or less than one Unit's reactor thermal output reading of 100 percent.

Water diversion system: The system that diverts water from the Delaware River to the East Branch Perkiomen Creek (EBPC) for use at LGS or for maintaining a DRBC-prescribed minimum flow in the creek. The components of the system include the Delaware River intake screens and pipelines, the Point Pleasant Pumping Station, the Combined Transmission Main, the Bradshaw Reservoir, the Bradshaw Reservoir Pumping Station, the Bedminster Water Processing Facility (BWPF), and the East Branch Transmission Main (EBTM) ending at the outfall to the EBPC. System components from the Delaware River intake to Bradshaw Reservoir also are used for public water supplies, which are discharged by gravity from Bradshaw Reservoir into the North Branch Neshaminy Creek via the North Branch Transmission Main; this other use and the North Branch Transmission Main are excluded, however, from this definition.

1.2.2 Water Supply Program Description

Exelon Generation withdraws surface water from DRBC-approved sources within the Delaware River Basin to make up for non-consumptive and consumptive use at LGS. Non-consumptive use results from the return ("blowdown") of cooling and service/process water used at the facility to the Schuylkill River through Outfall 001. Cooling tower blowdown is needed in LGS's closed-cycle cooling system to maintain suitable circulating water chemistry. Consumptive use results primarily from cooling tower evaporative losses.

The primary source of LGS's makeup water is the Schuylkill River. Water from the Schuylkill River enters an intake (the "Schuylkill Pumphouse") located at the LGS plant site through bar racks and flows through traveling screens into a pump well. The auxiliary source of LGS's makeup water is Perkiomen Creek. Water from Perkiomen Creek enters a series of fixed screens located mid-stream and passes through pipelines into the Perkiomen Pumphouse. The Perkiomen Creek intake is located about eight miles east of the LGS plant site. The makeup water is pumped through a pipeline from each intake pumphouse to the LGS cooling tower area.

Normally, water for non-consumptive use at LGS is withdrawn from the Schuylkill River. Under limited circumstances, which are set forth in this O&M Plan, this water may be withdrawn from Perkiomen Creek.

Water for consumptive use at LGS is withdrawn from the Schuylkill River when its flow is greater than DRBC-prescribed amounts (typically from November to June of each year). For the other months (typically July to October), when the flows tend to be at or less than these amounts, the water is withdrawn from the Schuylkill River and/or the Perkiomen Creek, subject to flow augmentation requirements. In order to continue using the Schuylkill River consumptively during low flow periods, Exelon Generation must supply augmentation water to the Schuylkill River from the DRBC-approved augmentation sources upstream of LGS (i.e., from Still Creek Reservoir, Owl Creek Reservoirs, and/or the WMP) by an amount equivalent to the consumptive use (i.e., the LGS consumptive use amount plus a 3% allowance for water assumed lost in transit via in-stream evaporation from the release location to the withdrawal location). When Schuylkill River flows are low, consumptive use makeup water (and, under limited circumstances set forth later in this O&M Plan, non-consumptive use makeup water) may be withdrawn from Perkiomen Creek when its natural flow is at or greater than a DRBC-prescribed amount or, if not, when creek flow is augmented by water diverted from the Delaware River to the EBPC in an amount equivalent to the consumptive use (i.e., the consumptive use quantity plus a 3% allowance to account for possible in-stream (evaporative and leakage) losses during open channel transport). Because the amounts of available Schuylkill River augmentation water may not be sufficient to cover the entire LGS consumptive use, split source withdrawals (i.e., withdrawals from both intakes) are permitted, subject to the rules that apply to each individual source.

The availability of multiple water sources for LGS's withdrawals and use provides operational reliability and flexibility, particularly during low stream flow conditions; at the same time, the use of these sources are limited in a manner such that in-stream and downstream uses are protected.

Attachment 1 is a system map showing the locations and interrelationships of the water sources and major components included in the LGS Water Supply Program.

Water withdrawals from the Delaware River are made using an intake that consists of a series of fixed screens located in-stream and pipelines that convey water to the Point Pleasant Pumping Station located near the riverbank. The quantity of water that may be diverted to the EBPC for Exelon Generation's use is limited by DRBC to 46.2 mgd. The water is pumped through the Combined Transmission Main, as needed to maintain Bradshaw Reservoir water levels within a defined range. Water is pumped, when needed, from the Bradshaw Reservoir Pumping Station through the EBTM to the EBPC as augmentation water or to maintain a 10 cfs minimum creek flow. The water released to the EBPC flows downstream to Exelon Generation's Perkiomen Creek intake. The Forest Park Water Authority (FPWA) owns and operates the Delaware River intake, Point Pleasant Pumping Station, and the Combined Transmission Main as well as those components used to transfer water from Bradshaw Reservoir to the North Branch Neshaminy Creek, while Exelon Generation owns and operates Bradshaw Reservoir, the Bradshaw Reservoir Pumping Station, the BWPF, and the EBTM ending at the outfall to the EBPC.

Withdrawals and releases for LGS are subject to operating rules (see Section 2.2), which are designed to protect in-stream and downstream uses. The operating rules state, for each water source, the maximum quantities (peak daily and monthly) that may be withdrawn for consumptive and non-consumptive use at LGS, and the stream flow thresholds for unaugmented and augmented withdrawals for one-Unit or two-Unit operation; the rules also state, for each augmentation source, the maximum quantities (peak daily and monthly) that may be released, allowances that must be applied to account for in-stream losses from the release location to the withdrawal location, and other conditions that allow or restrict releases of augmentation water.

During an emergency at LGS, unlimited use of Delaware River basin water may be made, as necessary, until the emergency has been stabilized.

1.3 ROLES AND RESPONSIBILITIES OF INVOLVED PARTIES

Because of the complexity of the system and the many involved parties, each party is identified, and its role in the supply of water for LGS is described.

1.3.1 Forest Park Water Authority (FPWA)

FPWA (or the current owner) is the owner and operator of the Point Pleasant Pumping Station (including the in-stream intake screens and pipelines) and Combined Transmission Main. FPWA has a contract with Exelon Generation to pump water from the Delaware River to the Bradshaw Reservoir via the pumping station and transmission main for use as makeup water at LGS. FPWA also supplies water for public use to the Bradshaw Reservoir for release to the North Branch Neshaminy Creek and subsequently to its water treatment plant in Chalfont. Exelon Generation allows this water to pass through the Bradshaw Reservoir to the North Branch Neshaminy Creek via the North Branch Transmission Main owned by FPWA.

1.3.2 Reading Anthracite Company (RAC)

RAC (or the current owner) is the owner of the property that includes the WMP. RAC is under contract with Exelon Generation to operate the mine pool pumping system when Exelon Generation requests pumping from the WMP for use as augmentation water. RAC also provides operation and maintenance services for the WMP pumping and conveyance system, and performs discharge monitoring in accordance with its National Pollutant Discharge Elimination System (NPDES) permits.

1.3.3 Tamaqua Area Water Authority (TAWA)/Tamaqua Borough

TAWA (or the current entity) is the owner of Still Creek Reservoir. Tamaqua Borough (or the current entity) is the owner of the Owl Creek Reservoirs. Tamaqua Borough (TB) operates the Still Creek and Owl Creek Reservoirs (Tamaqua Reservoirs). DRBC Docket No. D-2010-028 CP-1 granted TAWA and TB approval to release water from the Tamaqua Reservoirs to be used as augmentation water by Exelon Generation at the LGS upon request of Exelon Generation.

1.3.4 Exelon Generation

Exelon Generation is the owner and operator of the Schuylkill Pumphouse, which supplies makeup water withdrawn from the Schuylkill River to LGS. Exelon Generation also owns and operates the Bradshaw Reservoir, the EBTM, the BWPF, the Perkiomen Creek intake (including

the Perkiomen Pumphouse), and the Perkiomen Pumphouse-to-LGS pipeline. These components enable Exelon Generation to convey water stored in the Bradshaw Reservoir for use at LGS. The dividing point between FPWA and Exelon Generation is where the Combined Transmission main enters Bradshaw Reservoir (except that FPWA also owns/operates the components associated with the public water supplies to the North Branch Neshaminy Creek). Exelon Generation is a customer of FPWA, TAWA, and RAC, and has no direct control over operation of the Point Pleasant Pumping Station, Still Creek/Owl Creek Reservoirs, or the WMP. Exelon Generation makes annual contributions to the Restoration and Monitoring Fund (see Section 3) and selects a third party not-for-profit or non-profit organization (both herein referred to as NPO) to administer and manage the fund with DRBC Executive Director oversight.

1.3.5 United States Geological Survey (USGS)

The USGS is contracted by Exelon Generation through DRBC to operate river gaging stations on the Schuylkill River at Pottstown and on the EBPC at Bucks Road, near Dublin, PA, and to operate a conductivity monitor on the Schuylkill River at Landingville. Exelon Generation uses information from these gages and the monitor to support implementation of this O&M Plan.

1.3.6 Merrill Creek Owner's Group (MCOG)

The MCOG is a group of companies (including Exelon Generation) that have pooled their resources to construct, own, and operate the Merrill Creek Reservoir. The reservoir releases stored water directly or indirectly to the Delaware River to compensate for power station freshwater equivalent consumptive use during periods of drought and low Delaware River flow. Such releases compensate for LGS consumptive use of water withdrawn from the Schuylkill River intake (less the amount(s) released from the WMP and/or Tamaqua Reservoirs) and/or Perkiomen Creek intake.

1.3.7 Delaware River Basin Commission

The DRBC informs Exelon Generation when releases from Blue Marsh Reservoir start/stop and of the quantities that are being released. Exelon Generation applies a 12-hour travel time from when notified by DRBC for Blue Marsh releases when calculating Schuylkill River flows at the Pottstown Gaging Station (USGS Gage No. 01472000).

1.4 OPERATION OF MAJOR SYSTEM COMPONENTS

The following section describes each major component of the LGS water supply and intake system, including monitoring components.

1.4.1 Schuylkill Pumphouse

The Schuylkill Pumphouse serves as an intake to supply makeup water from the Schuylkill River to LGS. Makeup water pumps are operated to provide LGS with water for non-consumptive use and, when the prescribed river conditions for consumptive use withdrawals are met, for consumptive use. Any combination of pumps may be used to supply the total quantity needed. Control valves in the makeup water pipes are used to regulate flow of water to the cooling tower basins. Schuylkill River availability for LGS consumptive use is generally determined by the Schuylkill River flow rate data collected from the Pottstown Gaging Station (USGS Gage No.

01472000) and augmentation water source operations. 24-hour average flow data are used to determine the river's availability.

1.4.2 Perkiomen Pumphouse

The Perkiomen Pumphouse (along with in-stream submerged screens and pipelines connected to the pumphouse) serves as the auxiliary intake to supply makeup water from Perkiomen Creek to LGS. During periods when LGS is using Perkiomen Creek water, the discharge header pressure of the Perkiomen makeup water pumps is adjusted to maintain a relatively constant level in the Perkiomen makeup water storage tank (located at the LGS plant site). Water then flows by gravity from this tank through control valves to the cooling tower basins. These valves are remotely controlled from the LGS Main Control Room. Perkiomen Creek flow rate data is collected from the Graterford Gaging Station (USGS Gage No. 01473000). 24-hour average natural flow data are used to determine creek availability.

1.4.3 Tamaqua Reservoirs

TAWA's 2.7 billion-gallon Still Creek Reservoir supplies drinking water for Tamaqua Borough and surrounding communities. Additionally Still Creek Reservoir can be used to make releases of augmentation water on behalf of the LGS. Releases from the reservoir flow through Still Creek into the Little Schuylkill River (LSR). The LSR flows south and joins the Schuylkill River near Port Clinton, PA. LGS withdraws makeup water from the Schuylkill River approximately 54 miles downriver of Port Clinton. The Still Creek Reservoir is at full capacity when the water reaches its spillway elevation of 1,182 feet above mean sea level (msl). The Owl Creek Reservoirs have a 332 million-gallon combined capacity and are owned and operated by TB. When available, the reservoirs discharge through Owl Creek into the LSR approximately eight miles downstream from where Still Creek flows into the LSR.

1.4.4 Wadesville Mine Pool

A pumphouse at the Wadesville Mine shaft contains the equipment necessary for WMP dewatering for RAC's coal mining operations and, when requested by Exelon Generation, for pumping augmentation water on behalf of LGS. Capacity for two vertical pumps is provided in the shaft with the bottom of the casings at or below 500 feet below the surface. The pumps are manually controlled with a total pumping capacity of up to 10,000 gpm.

The discharge from the pumps flows through energy dissipation chambers and an open channel, and released into an unnamed tributary of the East Norwegian Creek. The East and West Norwegian Creeks combine into Norwegian Creek, which runs to the northern end of Pottsville. An underground conduit conveys the water across Pottsville, emerging on the southern end of Pottsville, where it discharges into the Schuylkill River. LGS withdraws water from the Schuylkill River approximately 65 miles downriver of Pottsville.

1.4.5 East Branch Perkiomen Creek

The EBPC serves as a channel to transport the diverted Delaware River water from the outfall of the EBTM to Perkiomen Creek (main stem).

The Bucks Road Gaging Station (USGS Gage No. 01472620), located downstream of the EBTM outfall, monitors the flow for both minimum flow compliance as well as a maximum flow that

restricts pumping from the Bradshaw Reservoir so as not to add more flow to the stream when it is at or close to flooding. Data from this station are collected, displayed, and alarmed in the LGS Main Control Room via commercial telephone lines. As a backup to this system, Exelon Generation installed flood level instrumentation at the gage station to immediately alert the control room of flood conditions in the EBPC.

1.4.6 Bedminster Water Processing Facility

The BWPF, located along the EBTM, houses an ozone generator system, which supplies ozone into mixing chambers to disinfect the water prior to discharging into the EBPC from May 1 to September 30 each year, as needed to meet the conditions in the NPDES permit associated with the facility.

1.4.7 Point Pleasant Pumping Station

Pumping rates at the Point Pleasant Pumping Station are adjusted by FPWA based on water level (elevation) at Bradshaw Reservoir. The water level in Bradshaw Reservoir falls when releases are made to the North Branch Neshaminy Creek for public water supply needs, or when pumped to the EBPC for LGS makeup water requirements or minimum steam flow maintenance. A Forest Park operator operates pump(s) at the Point Pleasant Pumping Station, as necessary, to transfer water from the Delaware River to maintain Bradshaw Reservoir levels within a prescribed range.

1.4.8 Bradshaw Reservoir and Pumping Station

The Bradshaw Reservoir is designed to control the release and distribution of water diverted from the Delaware River into the Perkiomen and Neshaminy watersheds. Of the reservoir's total operating capacity of 23 million gallons (mg), approximately 14 mg is held in reserve for Exelon Generation’s use if the Point Pleasant Pumping Station pumps are out of service.

LGS operators control pumping rates from the Bradshaw Reservoir to the EBPC. The Bradshaw Reservoir pumps have variable speed drives allowing the actual pumping rate to be closely matched with LGS water demands. The pump control circuits regulate the rate of flow change to the EBPC to prevent rapid changes to the flow rate in the stream. The pumps can also be operated at their full motor speed (i.e., no speed control) if the variable speed controls are out of service for any reason. In this mode of operation, the rate of change to the EBPC can only be controlled by the time delay between pump starts. Operating procedures dictate the required time pause between pump starts/stops. Certain protective trips cause the pump station to shut down instantaneously and do not allow for gradual ramp-downs in pumping. The pumping rates from Bradshaw Reservoir are continuously monitored by a venturi-type flow meter installed in the EBTM.

The water from Bradshaw Reservoir that is distributed by FPWA to its Chalfont water treatment plant is released from Bradshaw Reservoir by gravity through a valve. The flow rate is measured using a venturi-type flow meter. The release rate set point for this valve is provided through a remote signal from the water treatment plant. Flow is automatically stopped if the water level in Bradshaw Reservoir drops below the normal range of operating levels. This is to conserve the 14 mg of reserve storage for Exelon Generation’s use.

2 OPERATION AND MONITORING PLAN

The following sections provide an overview of the plan of operation of the LGS Water Supply Program, the specific operating rules, the monitoring and reporting requirements, the contingency plans, and the flow augmentation requirements for planned recreational events.

2.1 OVERVIEW

LGS is designed with the capability of pumping makeup water from either of two approved surface water sources: the Schuylkill River and Perkiomen Creek. Periodic low flow conditions in the Schuylkill River restrict its use as a source of consumptive use makeup water from approximately July to October in most years; however, water augmentation may be used to mitigate these low flow conditions. LGS currently has multiple approved sources of Schuylkill River flow augmentation available for use: Tamaqua Reservoirs and the WMP. Because Perkiomen Creek flows tend to be low during the same periods as the Schuylkill River, the use of Perkiomen Creek also tends to be limited during the same yearly time period.

Each year in early summer as the stream flows start to decrease and then reach DRBC-prescribed low flow limits, consumptive use of the two sources becomes conditional upon flow augmentation. During these low flow periods, LGS operators must take actions to provide for consumptive use makeup water via augmentation of the Schuylkill River and/or Perkiomen Creek (augmented with water diverted from the Delaware River).

The operating rules and limits governing the use of the approved water sources are detailed in Section 2.2.

In conjunction with the operating rules, LGS is subject to monitoring and reporting requirements, contingency plans for unplanned events, and augmenting flow to support planned recreational events in Perkiomen Creek. The details of these requirements are contained in Sections 2.3, 2.4, and 2.5, respectively.

2.2 OPERATING RULES

2.2.1 General Rule for Use of Sources

In order to optimize LGS operating flexibility and the available water resources in the Delaware River Basin, LGS may utilize any of the approved sources (or combinations thereof) identified in Sections 2.2.2 and 2.2.3 for non-consumptive and consumptive use makeup water, while meeting certain constraints/restrictions governed by the operating rules presented in this section. No hierarchy of use is implied by the order of these operating rules.

2.2.2 Rules for Non-Consumptive Use

LGS normally uses the Schuylkill River as its source of non-consumptive use makeup water at a rate of up to 14.2 mgd. During limited circumstances (see 2.2.3.2.c. below) and subject to the prescribed withdrawal limits, LGS may withdraw water for such use from Perkiomen Creek.

2.2.3 Rules for Consumptive Use

Unless stated otherwise in this O&M Plan, numerical river flow and conductivity values (surrogate for TDS) are 24-hour averages.

1. Withdrawals of consumptive use makeup water from the Schuylkill River for one-Unit or two-Unit operation at LGS are allowed under the following circumstances:

    a. When the Schuylkill River flow measured at the Pottstown Gaging Station (USGS Gage No. 01472000) is greater than 560 cubic feet per second (cfs) for two-Unit operation or 530 cfs for one-Unit operation, up to 44 mgd (peak daily) with two LGS Units in operation, or up to 24 mgd with one LGS Unit in operation may be withdrawn. However, on days when the ambient air temperature is 87˚F. or greater, the consumptive use is restricted to 47.3 mgd with two LGS units in operation and 25.5 mgd with one LGS unit in operation, and the total surface water withdrawals from the Schuylkill River may not exceed 1.7422 bgm and 58.2 mgd. Non-consumptive use is restricted to 14.2 mgd. Any and all consumptive use above 44 mgd (with two units operating) and 24 mgd (with one unit operating) must be replaced with commensurate augmentation releases from either WMP, Tamaqua Reservoirs, and/or with water diverted from the Delaware River via the Perkiomen Creek. Such releases must be made on a 1:1 gpd basis over the 24-hour period beginning on the day after consumptive use in excess of 24 mgd (one-unit operation) or 44 mgd (two-unit operation) when Schuylkill River flows at USGS Gage No. 01472000 are less than or equal to 1,980 cfs. When the river flow is equal to or less than the threshold amounts set forth in this paragraph (560 cfs for two-unit operation and 530 cfs for one-unit operation), then b, c, and d, immediately below, apply for such withdrawals.

    b. When augmentation water from the available volumes of the Tamaqua Reservoirs (up to 36 mgd from Still Creek Reservoir and up to 8 mgd from Owl Creek Reservoirs) is released on behalf of LGS with the release rate not to exceed 43.3 mgd (peak daily) and a total augmentation volume limit of 1.342 bgm; withdrawal rates associated with the reservoir releases are subject to a 3% reduction (the assumed quantity of water assumed lost in transit from the reservoirs to the point of withdrawal).

        i. The Tamaqua Reservoirs' releases are subject to current Operating Rule Curve limitations established in this O&M Plan (See Attachment 2), whereby no release shall be permitted for consumptive use water if the reservoir level is below this curve.

        ii. Except as provided in Section 2.2.3.1.a. of this O&M Plan, the Tamaqua Reservoirs' releases are subject to a three-day travel time requirement before the released water is considered available for withdrawal; when releases are stopped at the end of the augmentation season, withdrawal of the released water may continue for two days.

    c. When augmentation water from the WMP is pumped and released on behalf of LGS (DRBC will be notified each augmentation season when the first WMP release is being initiated and again when the last WMP release ceases) with the pumping rate

not to exceed 10,000 gpm (14.4 mgd peak daily), the mine pool drawdown not to exceed 600 feet below grade elevation, and a total augmentation volume limit of 446.4 mgm; withdrawal rates associated with the releases from the WMP are subject to a 3% reduction (the assumed quantity of water lost in transit from the release point to the withdrawal point).

i. The pumping rate, volume limit, drawdown limit, and/or installed depth of the pump casings may be increased by approval of the DRBC Executive Director to reflect a pump rebuild or replacement by RAC.

ii. Except as provided in Section 2.2.3.1.a. of this O&M Plan, releases of the water pumped from the WMP are subject to a three-day travel time requirement before the released water is considered available for withdrawal; when pumping is stopped at the end of the augmentation season, withdrawal of the released water may continue for two days.

iii. Prerequisite upon installation of a real-time conductivity monitor at the Landingville Gaging Station (USGS Gage No. 01469500), completion of in-stream sampling at Landingville to establish the statistical relationship between total dissolved solids (TDS) and conductivity, and DRBC Executive Director approval of the TDS/conductivity statistical relationship, if the TDS concentration in the Schuylkill River at the Landingville Gaging Station (USGS Gage No. 01469500) exceeds 500 mg/l (implemented via the corresponding conductivity limit), WMP augmentation releases must be discontinued within 24 hours of reaching this threshold for as long as the excessive TDS concentration at Landingville remains.

d. When augmentation water from the available volumes of the Tamaqua Reservoirs (up to 36 mgd from Still Creek Reservoir and up to 8 mgd from Owl Creek Reservoirs) is released on behalf of LGS with the release rate not to exceed 43.3 mgd (peak daily) and a total augmentation volume limit of 1.342 bgm, with associated withdrawals reduced by 3% (the assumed quantity of water assumed lost in transit from the reservoirs to the point of withdrawal), and with the augmentation water considered immediately available for consumptive use at LGS under the following circumstances: when (1) flows in both the Schuylkill River and Perkiomen Creek do not meet the DRBC thresholds for one-Unit or two-Unit operation and (2) sufficient water diversion system capacity is unavailable and expected to remain so for more than 24 hours.

i. At the start of such withdrawals, Exelon Generation will notify public water suppliers with intakes on the Schuylkill River between the LGS intake and the confluence of the Schuylkill River and Perkiomen Creek (i.e., PA American Water Company in Royersford and the Phoenixville Water Department).

ii. Exelon Generation will promptly notify DRBC of such use, but no later than 24 hours (or next business day), which shall include an estimate of the duration of such use. Exelon Generation will then provide prompt notification to DRBC, but within 24 hours, when normal operations are restored.

e. In the event that the water diversion system is available and conditions are such that pumping from Bradshaw Reservoir to the EBPC is required, but the Perkiomen Pumphouse is unavailable, Exelon Generation may withdraw water for consumptive use, as required, from the Schuylkill River, while continuing to pump from Bradshaw Reservoir. In this case, Bradshaw pumping will mitigate Schuylkill River consumptive use via augmentation downstream of LGS at the confluence of the Schuylkill River and Perkiomen Creek until operations at the Perkiomen Pumphouse are restored.

2. Withdrawals of consumptive use makeup water (and additionally, under limited circumstances defined in c and d below, makeup water for non-consumptive and auxiliary use) from Perkiomen Creek for one-Unit or two-Unit operation at LGS are allowed under the following circumstances:

   a. When natural flows of Perkiomen Creek, measured at the Graterford Gaging Station (USGS Gage No. 01473000), are equal to or greater than 210 cfs for two-Unit operation or 180 cfs for one-Unit operation, up to 42 mgd (peak daily) and 1.302 billion gallons per month (bgm) with two LGS Units in operation, or up to 24 mgd and 1.302 bgm with one LGS Unit in operation may be withdrawn. When the flow is less than these threshold amounts, then b, immediately below, applies for such withdrawals.

   b. When augmentation water is pumped from Bradshaw Reservoir and released into the EBPC, with the pumping rate not to exceed 43.3 mgd (peak daily) and a total augmentation volume limit of 1.342 bgm; withdrawal rates associated with releases into the EBPC are subject to a 3% reduction (to account for possible instream losses during open channel transport). To account for the approximately 18-hour water travel time from Bradshaw Reservoir to the Perkiomen Creek intake, the quantity of water pumped from Bradshaw Reservoir yesterday is considered the amount available for use at LGS today.

   c. Subject to a and b above, when Schuylkill River flows meet DRBC-prescribed flow criteria, but:

      i. The Schuylkill River intake is not available when an abnormal condition exists that prevents withdrawal (e.g., ice jam on river, Schuylkill Pumphouse outage; upstream spill causes a severe water quality impairment); or

      ii. A plant/operational condition exists that could be mitigated by the selective use of Perkiomen Creek water (e.g., the use of Perkiomen Creek water having lower TDS than Schuylkill River water when a condenser chemistry issue is detected and until such issue can be resolved); or

      iii. LGS has already switched over to using the Perkiomen Creek intake when use of the Schuylkill River is restricted, but the Schuylkill River flow then cycles between meeting and not meeting its flow criteria, which would otherwise require LGS to repeatedly start up and shut down both intake pumphouses over a relatively short period of time.

Exelon Generation will notify the DRBC within 24 hours of such use (or next business day), which shall include an estimate of the duration of such use. Operation of the Perkiomen Pumphouse auxiliary pump (see d below) is exempt from this notification requirement. Exelon shall also provide notification to the DRBC within 24 hours (or next business day) when normal operations are restored.

d. For operation of the relatively small-capacity (approximately 400 gallons per minute or gpm) auxiliary pump located in the Perkiomen Pumphouse as needed to maintain system operability by keeping the discharge pipeline full to avoid water hammer when the makeup pumps start, maintaining water level in the makeup water storage tank located at the LGS plant site, and providing freeze protection during frigid weather conditions.

3. During an emergency at LGS, unlimited use of Delaware River Basin waters, as necessary, until the emergency has been stabilized.

4. Simultaneous withdrawals of makeup water for consumptive use from the Schuylkill River and Perkiomen Creek (i.e., split withdrawals) for one-Unit or two-Unit operation at LGS are allowed under the above circumstances applicable to each individual source. However, the total of such withdrawals taken from the Schuylkill River and Perkiomen Creek together for consumptive use at LGS may not exceed 44 mgd (peak daily), with no more than 42 mgd or 1.302 bgm withdrawn from Perkiomen Creek. However, on days when the ambient air temperatures is 87˚F or greater, the total combined withdrawals from the Schuylkill River and Perkiomen Creek for consumptive use at LGS may not exceed 47.3 mgd (peak daily), with no more than 42 mgd withdrawn from Perkiomen Creek.

5. Water withdrawals from the Delaware River for consumptive water use at LGS are subject to specific conditions dictated within DRBC Docket No. D-77-110 CP and the Merrill Creek Operating Plan. Such withdrawals are allowed, when required, but are subject to DRBC-declared drought and low Delaware River flow conditions, when the withdrawals must be curtailed or compensated for by releases made from the Merrill Creek Reservoir. The DRBC and the MCOG have approved the operating plan for the reservoir, and the rules and conditions in that operating plan are used to control reservoir operations. Releases from the WMP and/or Tamaqua Reservoirs on behalf of LGS may offset an equivalent amount of required releases from the Merrill Creek Reservoir.

2.2.4 Rules for Minimum or Maximum Schuylkill River and EBPC Streamflow

1. In order to avoid the natural streamflow immediately downstream of Outfall 001 from decreasing to less than the $Q_{7\text{-}10}$ value measured at the Pottstown Gaging Station (313 cfs [202.3 mgd] or updated value), consumptive use withdrawals from the Schuylkill River must be reduced whenever Schuylkill River augmentation rates (factoring in travel times) are less than the consumptive use rates; in this case, Exelon Generation must obtain the balance of its consumptive use supply from Perkiomen Creek.

2. Conditions imposed by DRBC and the Pennsylvania Department of Environmental Protection (PADEP) require that, at all times of the year, Exelon Generation must pump water from Bradshaw Reservoir, as available, in order to maintain a minimum streamflow

of no less than 10 cfs in the EBPC, measured at the Bucks Road Gaging Station (USGS Gage No. 01472620). When the natural streamflow at the gage is greater than 10 cfs, no pumping from Bradshaw Reservoir is required (other than that for augmentation water when allowed/required by this O&M Plan).

a. Exelon Generation will promptly notify DRBC during business hours (or next business day) when an event occurs (e.g., loss of pumping capability at Bradshaw Reservoir) that prevents minimum flow maintenance when required for more than 24 hours, along with an estimate of when normal operations will be restored. Exelon Generation will then provide notification to DRBC promptly during business hours (or next business day) after normal operations are restored.

3. Exelon Generation must terminate pumping from Bradshaw Reservoir to the EBPC when EBPC flow, measured at the Bucks Road Gaging Station (USGS Gage No. 01472620), exceeds 125 cfs, the level which occurs naturally during flood periods. This is in order to avoid possible channel erosion associated with higher stream velocities generated by pumping. Pumping may be restarted when the flows have subsided to levels at which pumping will not cause the flow to exceed 125 cfs. In the unlikely event that Bradshaw Reservoir releases are terminated due to EBPC flows greater than 125 cfs at the Bucks Road Gaging Station, and the flow at the Graterford Gaging Station (USGS Gage No. 01473000) has not reached the limit for withdrawal from natural Perkiomen flow, withdrawals from Perkiomen Creek may continue. When flood flows subside, pumping to the EBPC may recommence.

4. Upon written request from Exelon Generation to DRBC at least 60 days in advance, the DRBC Executive Director may approve higher diversion flows during preplanned short-term recreational events in the EBPC. The request shall include a flow management plan; copies of the request and plan also shall be sent to PADEP and the Pennsylvania Fish & Boat Commission (PFBC).

2.2.5 Rules for Accounting for the Flow

From All Approved Sources

1. For accounting purposes, a day is considered to be a 24-hour period, starting at midnight (12:00 a.m.) to 11:59 p.m. The monthly period starts and ends at midnight on the first and last day of the calendar month. The augmentation season starts and ends when Exelon Generation provides notification to the DRBC to this effect. Typically, there will be one augmentation season from about July to October. However, unique environmental conditions could occur outside the typical period requiring more than one season in a year.

2. To the extent allowed/required by this O&M Plan, Exelon Generation must provide sufficient augmentation water to the Schuylkill River, sufficient makeup water from Perkiomen Creek (with flow augmentation, when required, from Bradshaw Reservoir), or a combination of both, for each monthly period such that no shortage of augmentation results at the end of each calendar month. Excesses of augmentation may be accrued and carried over as augmentation credit for the following monthly periods. Credit carryover

may not exceed 250 mg (which is equivalent to approximately six days of consumptive use at the maximum allowed consumptive usage rate) and expires at the end of the augmentation season.

3. In order to compensate for assumed in-transit water losses, consumptive use by LGS is limited to 97% of releases from Still Creek/Owl Creek Reservoirs, the WMP, and/or Bradshaw Reservoir.

4. Exelon Generation must mobilize the appropriate alternate makeup water source(s) within 24 hours of reaching the applicable Schuylkill River low flow restriction. If the flow at the Pottstown Gaging Station (USGS Gage No. 01472000) increases to greater than the low flow limit within the 24-hour period, the 24-hour clock to mobilize the appropriate alternate water source(s) may be reset. LGS may continue to consumptively use Schuylkill River flows within the 24-hour period following the Schuylkill River flow dropping below the prescribed limit while the appropriate water sources are being placed in service. The mobilization of augmentation water sources is subject to the same rules and, in addition, must also take into account travel time requirements (see below).

5. Once the augmentation season starts, should the Schuylkill River flow become unrestricted for any period of time (due to higher ambient river flow), Exelon Generation may withdraw all LGS's makeup water (subject to withdrawal limits) from the Schuylkill River instead of providing augmentation water to the river and/or makeup water through the Perkiomen Creek intake. However, Exelon Generation must continue to pump water from the Bradshaw Reservoir, as available, when needed to satisfy the EBPC minimum flow requirement of 10 cfs.

Augmentation from the WMP

6. Water pumped from the WMP as augmentation water on behalf of LGS may be considered to be available at LGS during a period beginning three days after initiation of those releases and ending two days after the releases are stopped at the end of the augmentation season.

7. Pumping from the WMP, when used as augmentation water on behalf of LGS, may be credited towards the total augmentation and is subject to the cumulative accounting method that is described in Rule 2, above.

Augmentation from the Tamaqua Reservoirs

8. Water released from the Tamaqua Reservoirs' combined available capacity as augmentation water on behalf of LGS may be considered to be available at LGS during a period beginning three days after initiation of those releases and ending two days after the releases are stopped at the end of the augmentation season.

9. In the case when sufficient water diversion system capacity is unavailable when needed, water released from the Tamaqua Reservoirs' combined available capacity as augmentation water may be considered immediately available at LGS (see 2.2.3.1.d).

10. Releases from the Tamaqua Reservoirs, when used as augmentation water on behalf of LGS, may be credited towards the total augmentation and are subject to the cumulative accounting method that is described in Rule 2, above.

Pumping from Bradshaw Reservoir with the Perkiomen Creek Intake Supplying Makeup Water to the Plant

The following four-day rolling average system is intended to (1) minimize the number of calls to the TAWA operators to request small amounts of releases of augmentation water from Still Creek/Owl Creek Reservoirs to compensate for under-pumping of water from Bradshaw Reservoir; and (2) to allow for travel time requirements when the augmentation sources are used for this purpose.

11. Exelon Generation will use a four-day rolling average system (current day plus up to three additional days) to take credit either for over-pumping in previous days or additional water pumped in future days to make up for shortfalls. The four-day rolling averaging method will use excess water pumped from any combination of consecutive days immediately preceding or following the current day shortage. In the event of such an unexpected shortfall, increased pumping to make up for this shortfall will be made as soon as possible. If the shortfall cannot be made up within a four-day rolling average, TB operators will be notified to make the necessary releases from the Tamaqua Reservoirs over subsequent days to cover any shortfalls. To account for water travel time from Bradshaw Reservoir to the Perkiomen Creek intake, the quantity of water pumped from Bradshaw Reservoir yesterday is considered the amount available for use at LGS today.

12. Shortfalls in the water diversion system capacity per criterion 2.2.3.1.d will be handled as follows. Daily release quantities from the Tamaqua Reservoirs and Schuylkill River water withdrawals will be made to match the daily shortages as closely as possible, based upon Docket limits, reservoir levels, and reservoir release system capabilities. Releases may continue past the end of the water diversion system under-pumping period for up to a maximum of ten days to ensure all of the shortage is made up. This extra period of release is not likely to be needed except for an extended period of total or near-total water diversion system unavailability.

13. As an operating practice, Exelon Generation will not intentionally under-pump based upon previous days' over-pumping. In no case will the daily pumping from Bradshaw Reservoir or released from the Tamaqua Reservoirs on behalf of LGS exceed the maximum amounts authorized by the Docket (see Section 2.2.3).

USGS Retroactive Revisions to Flow Data

14. In the event that the USGS retroactively revises flow measurement data at the Pottstown Gaging Station due to inaccuracy of the rating curve found during USGS's approximately monthly development/confirmation of the rating curve during the yearly period of July through October, Exelon Generation will apply such revised data to flow accounting going forward only (i.e., no revisions to past water and travel time accounting). If the Schuylkill River becomes restricted based on a change to the rating curve, augmentation

releases from the WMP and the Tamaqua Reservoirs may be considered immediately available for use at LGS if flow accounting rule 2.2.5.2 cannot be used to mitigate the situation.

Appendix 4.1 provides sample water accounting calculations.

2.3 REPORTING AND MONITORING REQUIREMENTS

2.3.1 Reports to DRBC

Using data on stream flows, intake withdrawals, blowdown flow, and augmentation releases (see Items 1 through 4 below), Exelon Generation will include daily flow data (see Item 5 below) as well as other recurring monitoring data (see Appendix 4.2) in a monthly report (see Item 6 below). Exelon Generation also will submit quarterly and annual written reports to the DRBC (see Items 7 through 9 below), and reports for additional DRBC requirements (see Items 10 through 12 below).

1. Each day, the daily average flows are recorded in the LGS operating logs. These numbers are calculated by the plant computer from readings taken of the Schuylkill River at the Pottstown Gaging Station (USGS Gage No. 01472000), Perkiomen Creek at the Graterford Gaging Station (USGS Gage No. 01473000), and the EBPC at the Bucks Road Gaging Station (USGS Gage No. 01472620).

2. Withdrawals from the Schuylkill River and Perkiomen Creek, as well as the cooling tower blowdown to the Schuylkill River, are monitored using flow measurement devices. The monitored flows are totalized and daily quantities recorded in the LGS operating logs.

3. The totalized daily augmentation water pumped from the Bradshaw Reservoir to the EBPC is monitored and recorded in the LGS operating logs.

4. The totalized daily augmentation water released to the Schuylkill River from the WMP and Tamaqua Reservoirs for Exelon Generation is monitored and recorded in the LGS operating logs.

5. Using the information developed above, Exelon Generation records the following parameters each day (the maximum daily ambient temperature is monitored using onsite or local ambient air temperature data):

    a. Daily average flow - Schuylkill River (adjusted for Blue Marsh releases, when timely notification of such releases provided by DRBC)

    b. Daily average flow - Perkiomen Creek

    c. Daily average flow - EBPC

    d. Daily Schuylkill River withdrawal

    e. Daily discharge to the Schuylkill River

    f. Daily Perkiomen Creek withdrawal

g. Daily quantity pumped from the Bradshaw Reservoir to the EBPC

h. Daily quantity pumped from the WMP for Exelon Generation

i. Daily quantity released from the Still Creek Reservoir for Exelon Generation

j. Daily quantity released from the Owl Creek Reservoirs for Exelon Generation

k. Daily quantity released from the Merrill Creek Reservoir

l. Daily maximum ambient air temperature

6. At the end of each month, a summary of LGS usage and water withdrawal rates from all sources as well as recurring monitoring data (see Appendix 4.2) will be included in a monthly report. The report will be transmitted to DRBC by 30 days after the end of the monthly period, with a copy to PADEP. The monthly report will include the following:

    a. A summary of the following parameters that are recorded daily:

        i. Daily average flow - EBPC

        ii. Daily Schuylkill River withdrawal for consumptive use

        iii. Daily Schuylkill River withdrawal for non-consumptive use

        iv. Daily Perkiomen Creek withdrawal

        v. Daily quantity released from the Merrill Creek Reservoir

        vi. Daily quantity pumped from the Bradshaw Reservoir to the EBPC

        vii. Daily total LGS consumption

        viii. Daily quantity pumped from the WMP for Exelon Generation

        ix. Daily quantity released from the Still Creek Reservoir for Exelon Generation

        x. Daily quantity released from the Owl Creek Reservoirs for Exelon Generation

        xi. Daily maximum ambient air temperature

    b. A summary of flow augmentation accounting for the reporting period.

    c. A summary of the recurring monitoring data (see Appendix 4.2).

7. Exelon Generation will transmit a quarterly report to DRBC by 30 days after the end of each quarter indicating the payment calculation for water use at LGS in accordance with DRBC regulations and docket, and the amount of contributions to be made to the Restoration and Monitoring Fund based on consumptive water use at LGS (see Section 3.2).

8. Exelon Generation will file with DRBC an annual assessment report (ten hard copies and two CD-ROM electronic copies) by January 31st of each year.

9. Exelon Generation will include in the above annual assessment report monitoring results for DRBC parameters included in the NPDES permit, as shown in Effluent Table A below.

    a. If a DRBC effluent limit is violated, Exelon Generation will submit the results along with an explanation and corrective actions taken within 30 days of the violation.

EFFLUENT TABLE A: DRBC Parameters Included in the NPDES Permit

OUTFALL 001 (Non-Contact cooling water and industrial waste)		
PARAMETER	**LIMIT**	**MONITORING**
pH (Standard units)	6 (min) to 9 (Max) at all times	As required by NPDES permit
Total Suspended Solids	Monitor & Report as required by NPDES permit	As required by NPDES permit
Temperature	110°F (Max)	As required by NPDES permit
Total Dissolved Solids	Monitor & Report	As required by NPDES permit

10. Exelon Generation will transmit a report to the DRBC by July 1, 2016that provides TDS and conductivity monitoring data representing Outfall 001, which includes (at least) 48 TDS samples, along with an analysis that summarizes their statistical relationship. Based on monitoring results, the report may include a request for approval by the DRBC Executive Director to substitute conductivity for TDS monitoring.

11. In conjunction with Docket D-1969-210 CP-13 approval, Exelon Generation will transmit a report to DRBC that provides TDS and conductivity monitoring data for the Landingville USGS Gaging Station (up to 100 paired samples) taken in a range of low flows (i.e., when the 24-hour average flow is less than 110 cfs at the Landingville Gaging Station), along with an analysis performed with DRBC participation that summarizes their statistical relationship. The report will be transmitted to DRBC within 6 months after Exelon Generation and DRBC agree that data collection is sufficient.

12. Exelon Generation will submit a scope of work and schedule to DRBC (with a copy to PADEP and PFBC) within 180 days of Docket No. D-1969-210 CP-13 approval for conducting an American eel survey to assess the impact of the weir/dam at the Perkiomen Pumphouse location. The schedule will include the transmittal of a report with eel survey results.

2.3.2 Monitoring

Exelon Generation will perform (or contract for performance) monitoring of parameters that are necessary for:

1. Routine system operation and reporting;
2. Docket compliance; and
3. Additional DRBC requirements.

Appendix 4.2 lists the frequency and location of parameters monitored and recorded as necessary for LGS water supply program operation and reporting.

The monitoring requirements derived from NPDES, dam safety, and encroachment permits applicable to activities associated with the LGS water supply program are provided in each of those permits and are not necessarily repeated in this O&M Plan.

2.4 Contingency Plans

2.4.1 Monitoring Systems

Various contingency plans have been developed to define Exelon Generation's actions in the event of the loss of equipment or instruments associated with the makeup water system. Below is a listing of relevant monitoring systems and contingency plans for each:

Stream Gages

Pottstown Gaging Station (USGS Gage No. 01472000) — a telemark system is installed as a manual backup to the automatic data collection system. The USGS website for Real Time Stream Flow Data is another available backup.

Graterford Gaging Station (USGS Gage No. 01473000) — a telemark system is installed as a manual backup to the automatic data collection system. The USGS website for Real Time Stream Flow Data is another available backup.

Bucks Road Gaging Station (USGS Gage No. 01472620) — a telemark system is installed as a manual backup to the automatic data collection system. The USGS website for Real Time Stream Flow Data is another available backup. Exelon Generation also has installed flood level instrumentation to transmit EBPC flooding alarms to LGS.

In the event of a loss of all of the above options at a particular gaging station, best estimates (from visual observations, nearby gage station data, weather conditions, etc.) will be used until USGS resolves the condition. Exelon Generation will notify DRBC if a station is out of service for longer than seven days.

Flow Monitoring from Bradshaw Reservoir

If the continuous monitoring and totaling of flow from Bradshaw Reservoir to the EBPC is out of service, flow will be estimated daily by use of a pump curve, the flow meter at the BWPF, or other methods.

Point Pleasant Pumping Station

In the event that the pumps at the Point Pleasant Pumping Station cannot pump to Bradshaw Reservoir, estimates will be made for the time to return the Point Pleasant Pumping Station to service. If the stored quantity of water in the Bradshaw Reservoir is sufficient to last throughout the outage, operations will continue normally. If the length of the outage is unknown or is greater than what the Bradshaw Reservoir can supply, the pumping rate from the Bradshaw Reservoir Pumphouse will be reduced to maintain a minimum flow of 10 cfs/6.5 mgd in the EBPC and releases to the North Branch Transmission Main (by FPWA) will be halted. This will minimize the reservoir depletion rate and maximize the length of time some flow could be maintained in the EBPC to protect creek aquatic life.

In case of equipment problems or to support certain maintenance activities, the Point Pleasant pumps may be infrequently out of service. If such activities prevent Exelon from being able to discharge from the Bradshaw Reservoir and maintain minimum flow requirements in the EBPC for a period of more than 24 hours, the DRBC will be notified promptly within 24 hours (or the next business day).

Bradshaw Reservoir/Pumping Station

Exelon Generation can accommodate a required outage of the Bradshaw Reservoir (e.g., for silt removal) by passing the minimum conservation flows (10 cfs) for the EBPC as well as the flows for FPWA through the reservoir bypass pipe. The loss of the Bradshaw Pumping Station pumps will result in no pumping to the EBPC until a pump can be returned to service. In case of equipment problems or to support certain maintenance activities, the pumps may be infrequently out of service for up to 24 hours. The design of the pump station provides redundant power feeds and equipment such as pumps, transformers, and air compressors to ensure high reliability. The actions to be taken in the event of an embankment failure are described in the Bradshaw Reservoir Emergency Action Plan. For trips of the Bradshaw Pumping Station, the equipment will be restarted as soon as possible. If the EBPC minimum conservation flow requirement cannot be maintained, when required, for a period of more than 24 hours, the DRBC will be notified promptly within 24 hours (or the next business day).

Perkiomen Pumphouse

The Perkiomen Pumphouse has been designed with redundant components much like the Bradshaw Reservoir Pumping Station. In the event that the water diversion system can supply sufficient water to the Perkiomen Pumphouse, but equipment problems prevent the operation of sufficient Perkiomen Pumphouse pumps, the diverted water will be allowed to flow past the Perkiomen Pumphouse and the Schuylkill Pumphouse pumps will be operated. Due to the time factor urgency in the event of a loss of Perkiomen Pumphouse pumps, the Schuylkill Pumphouse pumps will be operated to avoid a plant operational transient. The DRBC will be notified promptly within 24 hours (or the next business day) when this action is taken.

WMP Discharge

To measure the rate of the WMP discharge flow and record total gallons pumped, a flow meter with flow totalizer is used. If the meter is out of service, RAC may document pump operating

times and use the known pump capacities to compute total gallons pumped, which has provided the basis for past reporting of withdrawals.

2.5 FLOW AUGMENTATION FOR RECREATIONAL EVENTS

Planned releases from the Bradshaw Reservoir to support recreational events on the EBPC are made when requested by stakeholder groups and when conditions permit. Stakeholder groups must submit requests for recreational releases to Exelon Generation, which determines whether the requests for releases can be met operationally with respect to time, quantity, and length. Exelon Generation then requests from the DRBC, at least 60 days prior to the planned event, the authority to implement each planned release. All recreational releases are pre-planned events and limited to a small number per year.

3 EXELON GENERATION RESTORATION AND MONITORING FUND CALCULATIONS

3.1 INTRODUCTION

Exelon Generation has established a Restoration and Monitoring Fund (RMF) that is intended for use in funding restoration and water quality monitoring projects of third party organizations. These projects are intended to provide long-lasting water quality improvements in the Schuylkill River watershed, consistent with Exelon Generation's interest in enhancing the watershed that it uses.

3.2 RMF CONTRIBUTIONS

Exelon Generation will continue contributions to the RMF. Payments will be made annually by March 31st of the following year, in an amount determined by multiplying LGS's annual surface water consumptive use, as reported to DRBC, by a rate of $0.015 per thousand gallons.

For example, if LGS's consumptive use for each day of a given year, as reported to DRBC, adds up to a total of 12,775,000,000 gallons (this amount is equivalent to 35 mgd for 365 days), then the Exelon Generation payment to the RMF would be:

12,775,000,000 gallons per year x $0.015 / 1,000 gallons = $191,625 for that year payable by March 31st of the following year.

Exelon shall provide the RMF funds directly to a watershed-related NPO of Exelon Generation's choosing, with which it has entered into an agreement for management and administration of the RMF. Exelon Generation may be a member of the Board of the NPO, but it may not control the organization. The agreement between Exelon Generation and the NPO shall provide that RMF monies are to be used solely for the purpose of funding projects in the Schuylkill River watershed that are consistent with restoration and water management goals for the Schuylkill River. It shall further provide that consultation with and concurrence of the DRBC's Executive Director shall be required prior to commitment of RMF funds to any project. Exelon Generation may participate in the generation of a list of potential projects and may, if it chooses, participate in implementation of such projects.

4 APPENDICES

4.1 Sample Water Accounting Calculations

The assumed in-transit water losses have already been factored into these examples.

<u>Example 1</u>: Cumulative methodology, using augmentation sources subject to the 3-day travel time condition (WMP and Still Creek/Owl Creek Reservoirs) [Quantities are in mgd**.]**

	Monday	Tuesday	Wednesday (End of month)	Thursday	Friday
Pumped/released three days prior (WMP/Still Creek/Owl Creek Reservoirs)	32	32	32	32	34
Available today	32	32	32	32	34
LGS Consumptive Use	31.75	31.5	31.5	33.5**	32
Over(+)/under(-) for given day	+0.25	+0.5	+0.5	-1.5	+2
Allowable water balance	+0.25*	+0.75	+1.25 (carry over)	-0.25	+1.75

* Assumes cumulative zero balance from beginning of month.

** LGS consumptive use makeup rate greater than anticipated.

<u>Example 2</u>: Illustrations of the four-day averaging methodology for Bradshaw Reservoir pumping to support pumping from Perkiomen Creek to LGS [Quantities are in mgd.]

2a. Averaging using water already pumped

	Monday	Tuesday	Wednesday	Thursday	Friday
Bradshaw Reservoir pumped today	32	32	32	32	
Available today		32	32	32	32
Water pumped from Perkiomen Creek to LGS		31.75	31.5	31.5	33.25*
Over(+)/under(-) Pump		+0.25	+0.5	+0.5	-1.25
		==========→			

* LGS consumptive use makeup rate greater than anticipated. Carry forward for Friday shortage.

2b. Averaging using water already pumped and water to be pumped

	Monday	Tuesday	Wednesday	Thursday	Friday
Bradshaw Reservoir pumped today	32	32	26*	36**	
Available today		32	32	26	36
Water pumped from Perkiomen Creek to LGS		31.5	31.5	31.5	31.5
Over(+)/under(-) Pump		+0.5	+0.5	-5.5	+4.5
		==========→	←==========		

* Under-pumping caused by equipment malfunction. Apply forward and backward for Thursday shortage.

** Bradshaw Reservoir pumping increased to account for anticipated shortfall.

If the Bradshaw Reservoir pumping shortage cannot all be made up through the 4-day averaging methodology, then augmentation from one or both approved augmentation source (WMP and/or Still Creek/Owl Creek Reservoirs) must be made in sufficient quantities to cover any leftover shortfall.

Additional Water Accounting Example:

The following example show how the consumptive use makeup water accounting may be managed with various Schuylkill River and operational conditions. Depending on environmental conditions, water source conditions, plant equipment variables, economic considerations, and consumptive use requirements, the mix and combinations of the water sources will vary.

Example 3:

Daily Conditions (Two-Unit Operation)

When use of the Schuylkill River is restricted for consumptive use, typically, use of the Perkiomen Creek also is restricted.

Schuylkill River flow at Pottstown	<560 cfs
Perkiomen Creek natural flow at Graterford	<210 cfs
EBPC natural flow at Bucks Road	<10 cfs
Total LGS consumptive use for the day	38 mg
WMP/Still Creek/Owl Creek augmentation available* at LGS	25 mg
Bradshaw pumping available	20 mg
Pumped from Perkiomen Creek to LGS	18 mg

Use of Sources (Split sources used)

Unrestricted Schuylkill River water withdrawal	0 mg
Augmented Perkiomen Creek withdrawal	18 mg
Augmentation via the WMP and/or/Tamaqua Reservoirs	20 mg

Water Accounting (Total LGS consumptive use for the day minus sources used)

Net use 38 mg – 18 mg – 20 mg = 0 mg

*Water is available three days after pumping/release to allow for travel time to withdrawal point.

4.2 Monitoring Requirements

Waterbody	Parameter	Monitoring Party/Location	Monitoring Frequency	Reporting Basis (Note 1)	Reporting Frequency
Bradshaw Reservoir	Quantity of water pumped to the EBPC	Exelon Generation/EBTM	Continuous	Daily Total	Monthly and Annually
EBPC	Average flow	Exelon Generation/USGS Bucks Road Gaging Station	Once every 15 minutes	Daily	Monthly
EBPC	pH, Conductivity, Dissolved Oxygen, and Temperature	Exelon Generation/one station each in vicinity of two fishery stations and two benthos stations	Once per fish and benthos survey	Yearly/Every two years	Annually
EBPC	Fish	Exelon Generation/upper two fishery stations (EEF 36235 above Dublin USGS Gage and EEF 30700 below Callowhill Road)	Once per year (during mid- to late fall periods, conditions permitting)	Yearly	Annually
EBPC	Benthos	Exelon Generation/upper two fishery stations (E36725 at Elephant Road and E29910 at Callowhill Road)	Once per two years during fish surveys (conditions permitting)	Every two years	Annually
Merrill Creek Reservoir	Quantity of water released to Delaware River	MCOG/Merrill Creek Reservoir	Daily*	Daily Total*	Monthly
Perkiomen Creek	Average flow	Exelon Generation/USGS Graterford Gaging Station	Hourly	Daily	Monthly
Perkiomen Creek	Withdrawal for LGS use	Exelon Generation/Perkiomen Pumphouse-to-LGS pipeline	Continuous (makeup); Daily (auxiliary pump)	Daily Total	Monthly
Schuylkill River	Average flow	USGS/Pottstown Gaging Station	Hourly	Daily	Monthly

Waterbody	Parameter	Monitoring Party/Location	Monitoring Frequency	Reporting Basis (Note 1)	Reporting Frequency
Schuylkill River	LGS withdrawal	Exelon Generation/LGS makeup water pipeline	Continuous (cooling tower makeup); Daily calculated (spray pond makeup) and metered (water treatment plant makeup)	Daily Total	Monthly
Schuylkill River	LGS non-consumptive use	Exelon Generation/LGS blowdown pipeline	Continuous (cooling tower blowdown); Daily (hold pond, treated liquid radwaste releases, and spray pond discharges)	Daily Total	Monthly
Schuylkill River	pH, Conductivity, Dissolved Oxygen, and Temperature	Exelon Generation/LGS intake	Once every 15 minutes**	Hourly**	Monthly
Schuylkill River	pH, Total Suspended Solids (TSS), Temperature, and TDS	Exelon Generation/LGS Outfall 001	As required by NPDES permit	As required by NPDES permit	Annually (within 30 days if violation of DRBC limit occurs)
Schuylkill River	TDS	Exelon Generation/LGS Outfall 001	Twice per month (Paired with conductivity sample)***	Once within 30 months after docket effective date	Once
Schuylkill River	Conductivity	USGS/Landingville Gaging Station	Weekly, when 24-hour average flow is <110 cfs at Landingville gage****	Monthly	Once

Waterbody	Parameter	Monitoring Party/Location	Monitoring Frequency	Reporting Basis (Note 1)	Reporting Frequency
Schuylkill River	TDS	USGS/Landingville Gaging Station	Weekly (Paired with above conductivity sample)****	Monthly	Once
Schuylkill River	Conductivity	USGS/Landingville Gaging Station	Monthly, when 24-hour average flow is <110 cfs at Landingville gage*****	Monthly	Monthly
Schuylkill River	TDS	USGS/Landingville Gaging Station	Monthly (Paired with above conductivity sample)*****	Monthly	Monthly
Schuylkill River	pH, Conductivity, Dissolved Oxygen, and Temperature	Exelon Generation/PA American Water Company intake in Royersford (or suitable replacement)	Once every 15 minutes**	Hourly**	Monthly
Schuylkill River	pH, Conductivity, Dissolved Oxygen, Temperature, TDS, Alkalinity, Dissolved Iron, and Total Recoverable Iron	Exelon Generation/Upstream and downstream of Norwegian Creek (Stations 106 and 109)	Monthly*	Monthly*	Monthly
East Norwegian Creek	pH, Conductivity, Dissolved Oxygen, Temperature, TDS, Alkalinity, Dissolved Iron, and Total Recoverable Iron	Exelon Generation/Upstream of confluence with West Norwegian Creek (sampled concurrently with sampling at Stations 106 and 109)	Monthly*	Monthly*	Monthly and Annually

Waterbody	Parameter	Monitoring Party/Location	Monitoring Frequency	Reporting Basis (Note 1)	Reporting Frequency
Upper Schuylkill River	Fish	Exelon Generation/Norwegian Creek upstream and downstream locations (Stations 106 and 109)	Once per year (during summer low-flow periods, conditions permitting)	Yearly	Annually
Upper Schuylkill River	Benthos	Exelon Generation/Norwegian Creek upstream and downstream locations (Stations 106 and 109)	Once per two years during fish surveys (conditions permitting)	Every two years	Annually
Still Creek/Owl Creek Reservoirs	Quantity of water released to LSR	TAWA/Still Creek & Owl Creek Reservoir Outlets	Continuous*	Daily Total*	Monthly and Annually
Still Creek	pH, Conductivity, Dissolved Oxygen, and Temperature	Exelon Generation/Station SC1 upstream o Rt. 309 Bridge	Monthly*	Monthly*	Monthly and Annually
Little Schuylkill River	pH, Conductivity, Dissolved Oxygen, and Temperature	Exelon Generation/two stations above and below confluence with Still Creek (LSR1 just below SR1020 Bridge, LSR2 just below PA Route 54 Bridge)	Monthly*	Monthly*	Monthly and Annually
Little Schuylkill River	pH, Conductivity, Dissolved Oxygen, and Temperature	Exelon Generation/one station in vicinity of confluence with Pine Creek	Once per year during fish surveys	Monthly*	Monthly and Annually
Little Schuylkill River	Fish	Exelon Generation/two fishery stations both below Still Creek with a separation at Neifert Creek	Once per year (during summer low-flow periods, conditions permitting)	Yearly	Annually
Little Schuylkill River	Benthos	Exelon Generation/vicinity of two fishery stations	Once per two years during fish surveys (conditions permitting)	Every two years	Annually

Waterbody	Parameter	Monitoring Party/Location	Monitoring Frequency	Reporting Basis (Note 1)	Reporting Frequency
WMP	Quantity of water pumped for LGS	RAC/Wadesville Pumphouse	Continuous*	Daily Total*	Monthly and Annually
WMP	TDS and Conductivity	Exelon Generation/Wadesville Pumphouse	Monthly*	Monthly*	Monthly and Annually*
WMP	TSS, Total Mn, Total Fe, and pH	RAC/ Wadesville Pumphouse	Monthly NPDES sampling	Monthly*	Monthly*
WMP	Erosion	Exelon Generation/Discharge channel leading to East Norwegian Creek, from the discharge point to approximately 50 feet downstream of the New Wadesville Road	Annually, prior to startup	Annually	Annually
	Ambient Temperature Daily Max.	On-site or local Pottstown ambient temperature monitor	Daily	Monthly	Monthly

Note 1: Reporting Basis refers to how the monitoring data is reported to DRBC.

* Only during periods of releases for LGS.

** Conductivity and Temperature monitored year-round; pH and Dissolved Oxygen monitored only during yearly augmentation season (approx. May to October – See Docket DECISION Condition II.v.); Monitoring frequency once every 15 minutes from May 1 to October 31 and once per hour November 1 to April 30

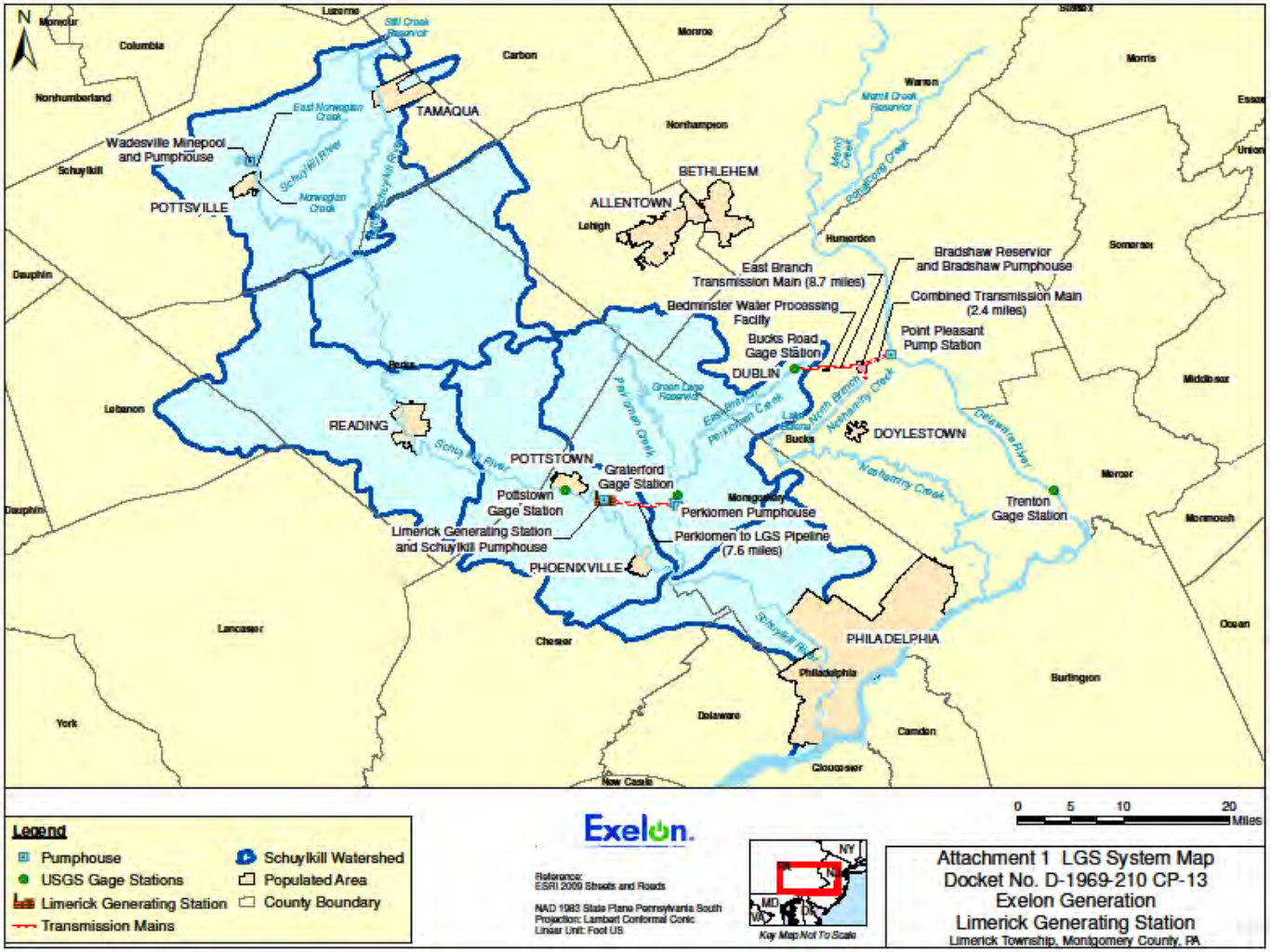
*** Over a 24-month period after docket effective date, at least 48 TDS samples shall be taken along with their corresponding specific conductivity values to establish their statistical relationship.

**** Initially, up to 100 paired samples of TDS and conductivity shall be taken weekly during river low flow conditions at Landingville to develop their statistical relationship. DRBC Executive Director may approve a written request from Exelon Generation for an alternative monitoring program and alternative to the Landingville TDS threshold location.

***** Following the development of a statistical relationship between TDS and conductivity and implementation of the conductivity threshold, monthly paired samples shall be taken during river low flow conditions to validate continued use of the conductivity threshold in place of a TDS requirement. After one full year of paired sample monitoring, the DRBC Executive Director may approve a written request from Exelon Generation to reduce monthly paired samples of TDS and conductivity, based a demonstration that the conductivity/TDS relationship is consistent over time and flow conditions.

5 ATTACHMENTS

5.1 Attachment 1 - LGS System Map (Water Supply Program)



5.2 Attachment 2 – Still Creek Reservoir Operating Rule Curve