

**Brunner Island, LLC
REGULATORY DELIVERABLE
SUBMITTAL COVER SHEET**

Date:		Transmittal No.:	
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CONSENT DECREE REFERENCE:		Paragraph No.:	
BRIEF DESCRIPTION OF OUTLINED REQUIREMENT:			
RECIPIENT(S):			
NAME:		ORGANIZATION:	
Brunner Island, LLC Contact Name:			
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December 20, 2019

Ms. Marcia Thiess
Regulatory Affairs Senior Professional
Talen Energy
PO Box 221
York Haven, Pennsylvania

Re: 2019 Annual Progress Report
Section 316(a) Variance Demonstration Study at Brunner Island Steam Electric Station

Dear Ms. Thiess:

Brunner Island, LLC is conducting a Section (§) 316(a) variance demonstration study at the Brunner Island Steam Electric Station in York County, Pennsylvania in accordance with the *Section 316(a) Demonstration Work Plan for the Brunner Island Steam Electric Station* (Work Plan) submitted on February 14, 2019 to the Pennsylvania Department of Environmental Protection (PADEP) and approved on February 27, 2019. This study is being conducted to demonstrate to PADEP that the existing alternative effluent limitations for BISES Outfall 001 will assure the protection and propagation of a balanced, indigenous community (BIC) of shellfish, fish, and wildlife downstream of the 5,000-foot compliance point in the Susquehanna River.

Annual progress reports will be provided to PADEP describing the components of the Work Plan that have been implemented and a preliminary summary of data collected, if available and appropriate. The BISES § 316(a) variance demonstration study, as outlined in the approved Work Plan, consists of six major components: 1) winter fish sampling; 2) an evaluation of aquatic habitat within the discharge channel and Susquehanna River; 3) supplemental water quality monitoring; 4) an onsite observation of surface water temperature and potential biological effects within the discharge channel; 5) use of a thermal model to estimate monthly thermal plume characteristics under different operating scenarios; and 6) an evaluation of species-specific thermal tolerance characteristics for representative important species (RIS) known to occur within the vicinity of BISES (including shutdowns).

Preliminary results of the study components, or portions thereof, that were conducted to date are summarized below. Interpretation and the final evaluation of these results is dependent on additional information and data to be acquired during the remainder of this study and will be presented in the final § 316(a) variance demonstration study report.

Winter Fish Sampling

The Work Plan included winter fish sampling to be conducted once in the winter season (December through February) in 2018-2019 and once in winter season in 2019-2020. At the request of PADEP, winter fish sampling occurred on March 13, 2019. PADEP approved a delay

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in the start of the cooling tower operation until March 15 and waived the heat rejection requirement for March 1 – 15 so that the fish sampling could take place.

Fish sampling was conducted on March 13, 2019 using boat electrofishing within the discharge channel and backpack electrofishing at the two sampling locations in the Susquehanna River, upstream and downstream of the discharge channel. A total of 75 individuals representing 18 species were collected during the sampling event and are identified in the table below.

Table 1: 2019 Winter Sampling Fish Species Collected

Common Name	Scientific Name	Upstream	Discharge	Downstream	Total
Comely shiner	<i>Notropis amoenus</i>	7		5	12
Channel catfish	<i>Ictalurus punctatus</i>		10		10
Bluegill	<i>Lepomis macrochirus</i>		6		6
Rock bass	<i>Ambloplites rupestris</i>		4	2	6
Tessellated darter	<i>Etheostoma olmstedi</i>	2		4	6
Smallmouth bass	<i>Micropterus dolomieu</i>		4	1	5
Bluntnose minnow	<i>Pimephales notatus</i>	4	1		5
White sucker	<i>Catostomus commersonii</i>		5		5
Spottail shiner	<i>Notropis hudsonius</i>			4	4
Spotfin shiner	<i>Cyprinella spiloptera</i>	2	1		3
Common carp	<i>Cyprinus carpio</i>		3		3
Banded killifish	<i>Fundulus diaphanus</i>	1		1	2
Flathead catfish	<i>Pylodictis olivaris</i>		2		2
Green sunfish	<i>Lepomis cyanellus</i>			2	2
Northern hogsucker	<i>Hypentelium nigricans</i>			1	1
Walleye	<i>Sander vitreus</i>		1		1
Fantail darter	<i>Etheostoma flabellare</i>			1	1
Muskellunge	<i>Esox masquinongy</i>		1		1
Total		16	38	21	75

The second of two winter fish sampling events is anticipated to be completed prior to March 1, 2020.

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Aquatic Habitat Evaluation

The Work Plan included the completion of a comprehensive update of aquatic habitats present within the vicinity of BISES as part of this demonstration study.

Brunner Island, LLC completed the aquatic habitat evaluation on May 22 and 23, 2019, which included habitat mapping and a bathymetric survey. Habitats were mapped within the vicinity of BISES using substrate and river flow classifications. Habitat classifications were consistent with the initial 1981 study, which were based primarily on river flow (e.g. riffle, run, glide, pool), substrate (e.g. gravel, cobble, boulder), and presence/absence of vegetation. Substrate data were collected based on visual observations in shallow water and via a copper pole in deep-water habitats. Observations of habitat structure such as undercut banks, woody debris, and submerged vegetation were also made. River flow classifications included direct observations of stream morphology (e.g. riffle, pool, glide) where possible using field indicators (e.g. water surface flow patterns). River flow characteristics will be derived from river depth data obtained from the bathymetric survey of the study area.

Data collected during the habitat survey are being used in a Geographic Information System (GIS) for quantifying habitat types within the study area and for developing aquatic habitat and bathymetric maps. The aquatic habitat evaluation is ongoing, but preliminary results indicate the aquatic habitat within the vicinity of BISES is consistent with previous habitat surveys. The habitat type results of this study will be evaluated for their importance to RIS during spawning, growth, and adult maintenance life stages.

Supplemental Water Quality Monitoring

The Work Plan included the installation and maintenance of six temperature and three dissolved oxygen dataloggers in the discharge channel and in the Susquehanna River.

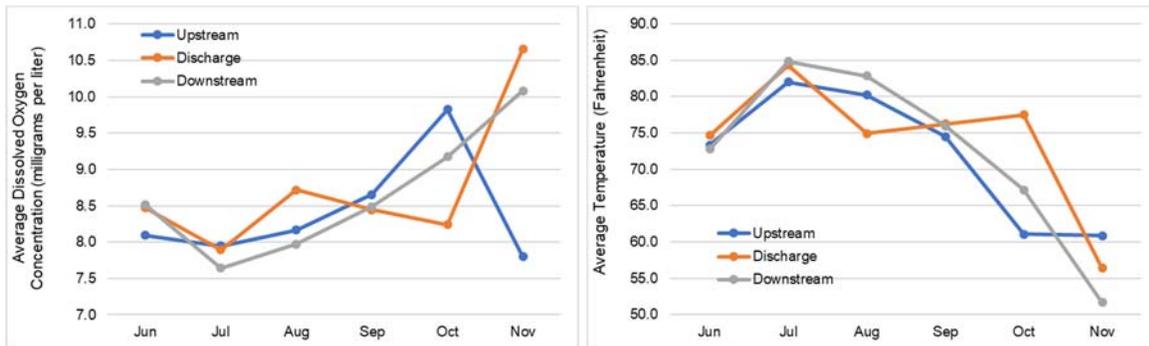
Brunner Island, LLC installed additional temperature and dissolved oxygen dataloggers to support the evaluation of the potential effects of the BISES thermal discharge on the protection and propagation of a BIC. These dataloggers were installed consistent with the locations identified in the approved Work Plan and will be used to supplement the existing array of temperature dataloggers deployed within the vicinity of BISES since 2007.

Six additional temperature dataloggers were installed between the discharge channel and the 5,000-foot compliance point. These dataloggers were deployed, in pairs, at approximately 650 feet, 1,300 feet, and 2,600 feet downstream of the confluence of the discharge channel and Susquehanna River. Each pair consists of one datalogger deployed near the river bottom and one

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deployed near the surface. Dataloggers record measurements at 15-minute intervals. Temperature dataloggers will be monitored monthly until they are removed during the 2020 summer season.

Dissolved oxygen dataloggers were installed at three locations in the vicinity of BISES. One datalogger is located upstream of the discharge channel at the BISES cooling water intake structure to provide a reference condition (or ‘control’). The second dissolved oxygen datalogger is located at the downstream end of the discharge channel, and the third is coincident with an additional temperature datalogger (i.e., at 2,600 feet downstream of the confluence of the discharge channel with the Susquehanna River). Dataloggers record measurements at 15-minute intervals. Dissolved oxygen dataloggers will be monitored monthly through the 2020 summer season. Preliminary dissolved oxygen and temperature data from the dataloggers located at the cooling water intake structure (Upstream), downstream end of the discharge channel (Discharge), and 2,600 feet downstream of the confluence of the discharge channel (Downstream) are summarized in the figures below.



Unit Shutdown Monitoring

To address the potential impact of the sudden shutdown of a generating unit on aquatic life, The Work Plan included the completion of two onsite monitoring events during a planned unit shutdown. The monitoring events will occur during the winter months when the helper cooling tower is not in operation (approximately December 1 through February). The goal of the shutdown monitoring is to measure thermal plume characteristics during a planned unit shutdown in winter when the delta temperature between the effluent temperature and ambient river temperature is greatest.

Unit shutdown monitoring has not been conducted as of preparation of this progress report but is anticipated prior to March 1, 2020.

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Thermal Plume Model

The Work Plan included the characterization of the thermal effluent plume from Outfall 001 during various operations, including periods with shutdowns. BISES will use a hydrodynamic thermal model to predict the thermal plume characteristics under other environmental and operational parameters of interest.

Thermal plume modeling has not been conducted to date as the model has not yet been calibrated with temperature data. Model calibration will be performed using the thermal data captured during the unit shutdown monitoring event as well as temperature data recorded using thermistor dataloggers located within the discharge channel and Susquehanna River.

Thermal Tolerance Assessment

The Work Plan included the completion of a thermal tolerance assessment of aquatic life susceptible to potential harm from the BISES thermal plume, particularly during rapid unit shutdowns, using published data and existing biomonitoring data.

Thermal tolerance data and research is being compiled to support an evaluation of the continued applicability of the existing § 316 (a) variance and will be presented in the § 316(a) demonstration study report. This thermal tolerance assessment will focus on fish species identified within the vicinity of the BISES thermal discharge from biomonitoring data, species data from fish kills attributed to BISES, as well as RIS.

Burns & McDonnell appreciates this opportunity to be of continued service to Talen Energy. If you have any questions regarding this 2019 Annual Progress Report, please do not hesitate to contact me at (610) 348-7439 or cwwiggins@burnsmcd.com.

Sincerely,



Chris Wiggins
Project Manager