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10 CFR 50.4

**SUSQUEHANNA STEAM ELECTRIC STATION
2018 ANNUAL ENVIRONMENTAL OPERATING REPORT
(NONRADIOLOGICAL)
PLA-7768**

**Docket No. 50-387
and No. 50-388**

The Susquehanna Steam Electric Station (SSES) Annual Environmental Operating Report (Nonradiological) is hereby submitted for the calendar year 2018 in accordance with the SSES Environmental Protection Plan, Section 5.4.1.

There are no new or revised regulatory commitments contained in this submittal.

Should you have any questions regarding this submittal, please contact Ms. Melisa Krick, Manager – Nuclear Regulatory Affairs, at (570) 542-1818.

A handwritten signature in black ink, appearing to read "K. Cimorelli", written in a cursive style.

Kevin Cimorelli

Attachment: 2018 Annual Environmental Operating Report (Nonradiological)

Copy: NRC Region I
Ms. T. E. Hood, NRC Project Manager
Ms. J. Tobin, NRC Project Manager
Ms. L. H. Micewski, NRC Sr. Resident Inspector
Mr. M. Shields, PA DEP/BRP
Mr. R. Anderson, US Department of Interior, Fish and Wildlife Service

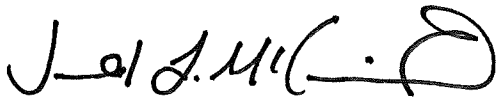
Attachment to PLA-7768

**2018 Annual Environmental Operating Report
(Nonradiological)**

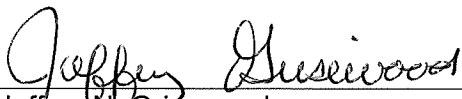
SUSQUEHANNA STEAM ELECTRIC STATION

ANNUAL ENVIRONMENTAL OPERATING REPORT (NONRADIOLOGICAL)


2018

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Date: 3/28/19



**Susquehanna Steam Electric Station
Units 1 & 2**

**2018
ANNUAL ENVIRONMENTAL OPERATING REPORT
(NONRADIOLOGICAL)**

**Facility Operating License Nos. NPF-14 & NPF-22
Docket Nos. 50-387 & 50-388**

**Prepared by
Chemistry – Environmental Services
Susquehanna Nuclear, LLC
Berwick, PA
April 2019**

FOREWORD

The Susquehanna Steam Electric Station is a nuclear electrical generating facility with two boiling-water reactors and generators located just west of the Susquehanna River, approximately 5 miles northeast of Berwick, in Luzerne County, Pennsylvania. The station was constructed in the 1970's, with Unit 1 beginning commercial operation on June 8, 1983, and Unit 2 beginning commercial operation on February 12, 1985. Units 1 and 2 each generate a net 1,350 megawatts (MWe), for a total station output of 2,700 MWe.

In total Susquehanna Nuclear, LLC presently owns 2,347 acres of land on both sides of the Susquehanna River. Generally, this land is characterized by open deciduous woodlands interspersed with grasslands and orchards.

On the west side of the river, 1,605 (1670 minus 65 acre Gould Island) acres of land is jointly owned between Susquehanna Nuclear, LLC (90%) and Allegheny Electric Cooperative (10%). The land uses on the west side of the river include generation & associated maintenance facilities, laydown areas, parking lots, roads, a nature preserve (the Susquehanna Riverlands), and agricultural leases to local farmers.

To the north of the station along the river, Susquehanna Nuclear, LLC owns 100% of the 65-acre Gould Island. On the east side of the river, and across the river from the station, Susquehanna Nuclear, LLC is the 100% owner of 677 acres that are maintained as undeveloped land, natural recreational areas, wildlife areas, and leases to local farmers.

This report discusses environmental commitments and impacts from January 1, 2018 through December 31, 2018. In summary, the report documents that Susquehanna Nuclear's environmental commitments were met and that there was no significant adverse environmental impact from station operation.

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1.0 OBJECTIVE

The Licensee has developed procedures and guidelines to ensure that operation of Susquehanna Steam Electric Station (SES) does not adversely affect the environment in the vicinity of the station. Also, these procedures allocate responsibilities and define interfaces necessary to monitor environmental impacts. They include coordination of U.S. Nuclear Regulatory Commission (NRC) requirements with other federal, state, and local requirements for environmental protection.

The objective of this 2018 Annual Environmental Operating Report (Nonradiological) is to provide a summary of both environmental programs and procedures. This report is required by the Final Environmental Statement (FES) for the operation of the Susquehanna SES, Unit 1 and 2, NUREG-0564 June 1981, and Appendix B - Environmental Protection Plan (EPP) to Operating Licenses No. NPF-14 and No. NPF-22. The 2018 report is the 37th Annual Environmental Operating Report (Nonradiological) submitted to meet EPP requirements.

The Licensee submitted an Environmental Report-Operating License Stage for Susquehanna SES to the NRC in May 1978. This report reviewed the results of the preoperational environmental programs and described the preoperational and proposed operational environmental monitoring programs. The NRC and other agencies reviewed this report and made recommendations for operational environmental monitoring programs which were listed in the FES.

2.0 ENVIRONMENTAL ISSUES

2.1 Aquatic Issues

The aquatic monitoring program for operation of the Susquehanna SES is divided into two parts.

Part 1 includes effluent monitoring required by a National Pollutant Discharge Elimination System (NPDES) permit issued by the Pennsylvania Department of Environmental Protection (PaDEP).

The PaDEP is responsible for regulating the water quality permit for the Susquehanna SES. The station's operational NPDES Permit No. PA-0047325 deals with discharge parameters for the Susquehanna SES Sewage Treatment Plant, Cooling Tower blowdown, and miscellaneous low volume waste discharges. The Cooling Tower blowdown also includes in-plant process streams which discharge to the Susquehanna River. Various low volume waste sumps discharge to the station's stormwater system, which flows into Lake Took-a-while, and eventually into the Susquehanna River. The permit requires the station to submit monthly Discharge Monitoring Reports for these outfalls to the PaDEP.

Susquehanna SES's NPDES Permit was reissued on September 1, 2011, and expired on August 31, 2016. The station submitted its NPDES Permit renewal application (PLE-025782) to PaDEP on February 9, 2016. PaDEP has since confirmed that the submitted renewal application was administratively complete, but has not yet provided the station a new NPDES Permit. Until a new permit is issued to the station, the conditions of the most recently expired NPDES Permit will apply.

NOTE: A copy of the NPDES Permit renewal application (PLE-025782) was provided to the NRC in 2016 as part of the submittal process.

Part 2 of the aquatic monitoring program deals with programs listed in the FES, or recommended by the PaDEP or U.S. Fish and Wildlife Service.

American Shad

On June 4, 2018, the Pennsylvania Fish and Boat Commission (PAFBC) stocked approximately 425,000 American shad fry (*Alosa sapidissima*) in the Susquehanna River at Tunkhannock, PA. The stocking occurred at the Tunkhannock Park Boat Access, approximately 50 miles upriver from the Susquehanna SES. As a result, environmental lab personnel sampled the wash-water from the trash bars and traveling screens at the intake building during September and October to see if any shad migrating downriver were impinged by the Susquehanna SES.

Fish sampling containers, made from aluminum-framed boxes sided with wire mesh, were suspended by jib cranes at the ends of each of the wash-water canals from the trash bars and traveling screens. The sampling containers were deployed from September 4 through October 31, 2018, and checked daily (Monday-Friday). No American shad were collected during this period or during any previous sampling year. However, 75 fish of 16 other species were collected (Table 2.1-1). Most of these fish were juvenile channel catfish (*Ictalurus punctatus*; 30 specimen total). Additionally, 29 Allegheny crayfish (*Faxonius obscurus*) were also collected, along with two eastern dobsonflies (*Corydalus cornutus*), and one live wood frog (*Lithobates sylvaticus*), which was released to the nearby riparian wetlands.

Biofouling Mollusk Monitoring

The biofouling mollusk monitoring program continued at the Susquehanna SES in 2018. The purpose of this monitoring is to survey the Susquehanna River and the ESSW Spray Pond for the presence of live Asian clams (*Corbicula fluminea*) and zebra mussels (*Dreissena polymorpha*) that could affect the operation of Susquehanna Nuclear, LLC. This monitoring is generally performed through a combination of scuba diving, wading, and examination of natural or removed structures or substrates in the river and the spray pond.

Asian clams are now abundant in the Susquehanna River near the Susquehanna SES, and zebra mussels are also abundant in Lake Took-a-while, a 24-acre recreational lake owned by Talen Energy. The lake drains to the Susquehanna River through a remnant of the North Branch Canal, and presents a significant possibility that zebra mussels could be introduced to the river from the lake. As a result, this area has been monitored closely since zebra mussels were discovered in Lake Took-a-while in 2016. Three adult mussels were observed in the outfall area of the river in 2017. Unfortunately, the outfall could not be monitored in 2018 because of continuous high water in the river during the summer and fall.

The ESSW pump house screens were not removed for cleaning or examination of biofoulers in 2018. A scuba inspection for biofoulers in the ESSW Spray Pond was done on July 9, 2018, and no live specimens were observed during that inspection.

At this time there is no evidence of a reproductive population of zebra mussels in the Susquehanna River near Susquehanna Nuclear, LLC.

2.2 Terrestrial Issues

2.2.1 Studies Previously Completed

Terrestrial environmental studies, including Cooling Tower Bird Impaction, were completed prior to 1989.

2.2.2 Sound Level Survey

Sound level surveys were conducted during pre-operation and operational periods and are completed. No noise complaints due to station operation received during 2018.

2.2.3 Maintenance of Transmission Line Corridors

Transmission line corridor vegetation maintenance and inspection records are maintained by PPL-Electric Utilities Vegetation Management and are available upon request. There were no adverse environmental impacts to transmission corridors reported in 2018. Records will be maintained for five years.

2.3 Cultural Resources Issues

Environmental Protection Plan actions required to satisfy Title 36, Code of Federal Regulations Part 800, relating to archeological sites were completed in 1987. The Advisory Council on Historic Preservation (ACHP), in accordance with 36 CFR 800.6 (a)(1), approved the NRC's determination of "no adverse effect" for archeological sites SES-3 (36LU15), SES-6 (36LU16), SES-8 (36LU49), and SES-11 (36LU51) located on the Licensee's property (NRC letter dated October 28, 1987, to ACHP).

As part of the determination-of-effect process, the Licensee committed to and is taking appropriate measures to mitigate impacts from station maintenance and operation to sites 36LU15, 36LU16, 36LU49, 36LU51, 36LU43, and 36LU105. There was no impact to these sites from station maintenance and operation in 2018. Furthermore, station activities did not impact any previously unknown cultural resources in 2018.

3.0 CONSISTENCY REQUIREMENTS

3.1 Plant Design and Operation

In accordance with the Environmental Protection Plan (EPP), the Licensee shall prepare and record an environmental evaluation of proposed changes in plant design, operation, or performance of any test or experiment which may significantly affect the environment. Before initiating such activities, the Licensee shall provide a written evaluation and obtain prior approval from the Director, Office of Nuclear Reactor Regulation.

Criteria for the need to perform an environmental evaluation include:

- (1) A significant increase in any adverse environmental impact previously evaluated by the NRC or Atomic Safety and Licensing Board;
- (2) A significant change in effluent or power level; or
- (3) A matter not previously evaluated which may have a significant adverse environmental impact.

The EPP requires that an environmental evaluation be completed and the NRC be notified if an activity meets any of the criteria. If the change, test, or experiment does not meet any of these criteria, the Licensee will document the evaluation and allow the activity to occur.

During operation of the Susquehanna SES in 2018, there were proposed activities that the Licensee reviewed as part of the Unreviewed Environmental Question program. None of these activities were determined to involve an Unreviewed Environmental Question or require prior NRC notification. The activities reviewed were:

1. Excavation to support replacement of Fire Hydrant 1FH134
2. Excavation to support repair of 0PI102
3. Excavation to support installation of concrete pad for new temperature monitoring shed for the Independent Spent Fuel Storage Facility
4. Excavation to support installation of Open Phase Detection System for T-20 Transformer
5. Excavation to support License Renewal / Aging Management Program Inspections
6. Installation of automatic sump pumps for Emergency Service Water Vaults VA011 and VA012
7. 2018 Stormwater O&M Work
8. Excavation to support replacement of APF 7D Transformer

3.2 Reporting Related to NPDES Permits and State Certifications

There were no significant non-compliances or special reporting requirements associated with implementation of NPDES Permit No. PA0047325.

Since Susquehanna SES has an NPDES permit, state certification pursuant to Section 401 of the Clean Water Act is not required.

3.3 Changes Required for Compliance with Other Environmental Regulations

On March 5, 2018 PaDEP issued General Operating Permit GP11-40-020 to authorize the operation of temporary non-road engines needed to support the station's 2018 refueling outage.

On August 14, 2018 PaDEP issued General Operating Permit GP11-40-021 to authorize the operation of temporary non-road engines needed to power a Sequester Area in the event of a work stoppage.

4.0 ENVIRONMENTAL CONDITIONS

4.1 Unusual or Important Environmental Events

During 2018, there were four operating occurrences reviewed as part of the Significant Environmental Event evaluation program.

1. On January 3, 2018 a Significant Environmental Event review was initiated due to the recovery of a banded Homing Pigeon (*Columba livia domestica*) leg found in the immediate vicinity of the 2C Main Transformer. The pigeon likely died due to getting caught in the transformer fan assembly, or due to a Peregrine Falcon attack. Homing Pigeons are not a species of concern for regulators.
2. On May 18, 2018 a Significant Environmental Event review was initiated due to the discovery of a bird nest atop a cooling fan of the T-10 transformer immediately north of the Circulating Water Pump House. The nest exhibited a compact design characteristic of the American Robin (*Turdus migratorius*). The conclusion was that the location of this nest and the materials comprising the nest presented a safety risk to the transformer equipment, personnel who might need to work with the transformer, and the birds associated with the nest; therefore, the nest was removed immediately.
3. On May 21, 2018 a Significant Environmental Event review was initiated due to the station receiving a notification from Riverlands / Wetlands maintenance personnel that numerous dead fish were present near the drainage area of the Wetlands Canal along Hicks Ferry Road. Upon investigation of the area by Environmental Lab personnel, numerous sunfish specimens were collected and returned to the environmental lab for enumeration and identification. Results indicated that this fish kill consisted of 15 Bluegills (*Lepomis macrochirus*). There were no obvious signs of disease or trauma visible on the specimens, and given their proximity to the Wetlands Canal drain and the buildup of debris in the drain over the weekend due to heavy rain, it was concluded that the kill was likely due to the fish becoming trapped in a vortex of water that had been created by the debris and high flow. Maintenance personnel quickly cleared the debris and returned the drain to normal service. The investigation concluded that the fishkill found along Hick's Ferry Road was an isolated incident with no connection to station operation. A maintenance task has since been established to routinely verify that the Wetlands Canal drain is free-flowing to minimize the likelihood of recurrence.

4. Between April 1st and November 16, bat inspections were conducted on 30 trees qualifying as Indiana bat habitat that had fallen in the vicinity of the station. These trees were located within Talen Energy's Susquehanna Riverlands / Wetlands Nature Areas and most of them fell due to storm events, or because they were in advanced states of decay. Station management determined that the fallen trees posed a safety risk to station personnel and the public, so the trees were cut and removed from immediate vicinity of the trail. A biologist surveyed the trees both prior and after their removal with no signs of bats in or near them.

In summary, there were no significant or adverse environmental effects related to station operation, and there were no EPP non-compliances.

4.2 Environmental Monitoring

4.2.1 General Monitoring

With the exception of ongoing water quality monitoring required for compliance with the NPDES permit, all monitoring of station operational impacts on aquatic and terrestrial biota listed in the FES and Appendix B of the operating license have been completed.

4.2.2 Maintenance of Transmission Line Corridors

In 2018, PPL Electric Utilities Vegetation Management maintained transmission line vegetation maintenance and inspection records.

5.0 ENVIRONMENTAL PROTECTION PLAN REPORTING REQUIREMENTS

5.1 Review and Audit

The Licensee has established procedures for an independent group to review and audit compliance with the EPP. Audits of EPP compliance are conducted by Nuclear Oversight. The Manager-Nuclear Oversight is responsible for verifying compliance with the EPP. The Site VP – Susquehanna is responsible for environmental monitoring and for providing any related support concerning licensing. The Manager – Plant Chemistry / Environmental is responsible for day-to-day environmental monitoring.

The Auditing Organization Chart (Fig. 5.1-1) lists the groups utilized in reviewing and auditing of the Susquehanna SES environmental programs as well as those responsible for managing these programs.

An audit of compliance with the EPP program was conducted during 2018 as part of a regularly scheduled Chemistry Program Audit. The next Chemistry Program Audit is currently scheduled to be conducted in 2020.

5.2 Records Retention

Records and logs relative to environmental aspects of plant operation and audit activities are retained in the Nuclear Records System. This system provides for review and inspection of environmental documents, which are available to the NRC upon request.

All records concerning modifications of plant structures, systems, and components which are determined to potentially affect the continued protection of the environment are retained for the life of the plant. All other records, data, and logs relating to the environmental programs and monitoring are retained for at least five years or, where applicable, in accordance with the requirements of other agencies. Transmission line corridor vegetation maintenance records are maintained by PPL Electrical Utilities per section 2.2.3 of this report.

5.3 Changes in Environmental Protection Plan

No changes were made to the EPP during 2018.

5.4 Plant Reporting Requirements

5.4.1 Routine Reports

This Annual Environmental Operating Report (Nonradiological) was prepared to meet routine reporting requirements of the EPP for 2018. It provides summaries and analyses of environmental protection activities required in Subsection 4.2 of the EPP for the reporting period.

5.4.2 Non-routine Reports

There were no Unusual or Important Environmental Events as defined by the Environmental Protection Plan that required reporting in 2018.

6.0 ATTACHMENTS

Table 2.1-1

American Shad Impingement Monitoring (2018)

Figure 5.1-1

Auditing Organization Chart (2018)

TABLE 2.1-1

**SUSQUEHANNA STEAM ELECTRIC STATION
2018 AMERICAN SHAD IMPINGEMENT PROGRAM
04 September – 31 October 2018**

Date	Time	Items Found on Trash Bar/Traveling Screen				Comments
2018		Shad	Fish	Crayfish	Other	
Fish baskets were deployed on 04 Sep @ 0830.						
04 Sep	1600	0	1 spotfin shiner	0	0	Light leaves/debris
05 Sep	1400	0	1 walleye	4	0	Light leaves/debris
06 Sep	1430	0	1 brown bullhead 1 rock bass	2	0	Light leaves/debris
07 Sep	1430	0	1 channel catfish	2	0	Moderate leaves/debris
Baskets withdrawn for the weekend on 07 Sep @1430 and were redeployed on 10 Sep @ 0830.						
10 Sep	1500	0	0	0	0	Light leaves/debris
11 Sep	1600	0	1 margined madtom	0	0	Moderate leaves/debris
12 Sep	1530	0	0	3	0	Moderate leaves/debris
13 Sep	1530	0	3 channel catfish 3 pumpkinseed	1	0	Light leaves/debris
14 Sep	1500	0	7 channel catfish 2 spottail shiners 1 bluegill 1 pumpkinseed 1 green sunfish 1 gizzard shad	1	1 hellgrammite	Moderate leaves/debris
Baskets withdrawn for the weekend on 14 Sep @1500 and were redeployed on 17 Sep @ 0815.						
17 Sep	1430	0	1 channel catfish	0	0	Light leaves/debris
18 Sep	1600	0	3 channel catfish 1 green sunfish	3	0	Light leaves/debris
19 Sep	1600	0	0	1	0	Moderate leaves/debris
Baskets were withdrawn due to high water volume (River level > 20 ft) and large amounts of debris on 19 Sep @ 1600. Baskets were redeployed on 20 Sep @ 0900.						
20 Sep	1600	0	0	1	1 hellgrammite	Moderate leaves/debris
Baskets were withdrawn due to high water volume (River level > 20 ft) and large amounts of debris on 20 Sep @ 1600. Baskets were redeployed on 21 Sep @ 0700.						
21 Sep	1300	0	2 green sunfish	1	0	Light leaves/debris

TABLE 2.1-1 (cont.)

Date	Time	Items Found on Trash Bar/Traveling Screen				
2018		Shad	Fish	Crayfish	Other	Comments
Baskets withdrawn for the weekend on 21 Sep @1300 and were redeployed on 24 Sep @ 0530.						
24 Sep	1600	0	1 channel catfish 1 brown bullhead 1 gizzard shad	1	0	Light leaves/debris
25 Sep	1600	0	2 channel catfish 2 yellow bullheads 1 margined madtom 1 yellow perch 1 gizzard shad	2	0	Light leaves/debris
26 Sep	1530	0	3 channel catfish 1 common carp 1 spotfin shiner 1 pumpkinseed 1 yellow perch	0	0	Light leaves/debris
27 Sep	1530	0	0	0	0	Moderate leaves/debris
28 Sep	1600	0	0	2	0	Light leaves/debris
Baskets withdrawn for the weekend on 28 Sep @1600 and were redeployed on 01 Oct @ 0800.						
01 Oct	1600	0	2 pumpkinseed 1 bluegill	1	0	Light leaves/debris
02 Oct	1430	0	2 bluegill 1 channel catfish 1 smallmouth bass 1 yellow perch	0	0	Light leaves/debris
03 Oct	1530	0	1 bluegill 1 gizzard shad	0	0	Moderate leaves/debris
04 Oct	1500	0	1 rock bass	0	0	Moderate leaves/debris
05 Oct	1530	0	0	0	0	Light leaves/debris
Baskets withdrawn for the weekend on 05 Oct @1530 and were redeployed on 08 Oct @ 0800.						
08 Oct	1530	0	0	0	0	Light leaves/debris
09 Oct	1500	0	2 channel catfish	0	0	Light leaves/debris
10 Oct	1500	0	0	1	0	Light leaves/debris
11 Oct	1500	0	1 yellow bullhead	1	0	Moderate leaves/debris
12 Oct	1500	0	1 yellow perch	1	0	Moderate leaves/debris
Baskets withdrawn for the weekend on 12 Oct @1500 and were redeployed on 15 Oct @						
15 Oct	1530	0	2 channel catfish 1 gizzard shad	0	0	Light leaves/debris
16 Oct	1530	0	2 channel catfish 1 rock bass 1 smallmouth bass	0	1 wood frog	Moderate leaves/debris

Date	Time	Items Found on Trash Bar/Traveling Screen				
2018		Shad	Fish	Crayfish	Other	Comments
17 Oct	1530	0	1 channel catfish	0	0	Light leaves/debris
18 Oct	1530	0	1 channel catfish	0	0	Light leaves/debris
19 Oct	2300	0	0	0	0	Moderate leaves/debris
Baskets withdrawn for the weekend on 19 Oct @2300 and were redeployed on 22 Oct @ 0900.						
22 Oct	1500	0	0	0	0	Light leaves/debris
23 Oct	1330	0	0	0	0	Light leaves/debris
24 Oct	1400	0	0	1	0	Light leaves/debris
25 Oct	1500	0	0	0	0	Light leaves/debris
26 Oct	1400	0	1 white crappie	0	0	Moderate leaves/debris
Baskets withdrawn for the weekend on 26 Oct @1400 and were redeployed on 29 Oct @ 0800.						
29 Oct	1300	0	0	0	0	Heavy leaves/debris
30 Oct	1600	0	0	0	0	Heavy leaves/debris
31 Oct	1600	0	1 rock bass	0	0	Heavy leaves/debris
Baskets withdrawn on 31 Oct @ 1600; 2018 American Shad Impingement monitoring complete.						

Date	Time	Items Found on Trash Bar/Traveling Screen				
2018		Shad	Fish	Crayfish	Other	Comments
TOTALS		0	75 fish - 16 species	29*	3	
			30 channel catfish 7 pumpkinseed 5 bluegill 5 gizzard shad 4 green sunfish 4 rock bass 4 yellow perch 3 yellow bullhead 2 smallmouth bass 2 spotfin shiners 2 margined madtom 2 brown bullhead 2 spottail shiners 1 common carp 1 walleye 1 white crappie		1 wood frog 2 hellgrammites	

*All crayfish collected were *Faxonius obscurus*.

FIGURE 5.1-1 AUDITING ORGANIZATION CHART (2018)

