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U. S. Nuclear Regulatory Commission
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10 CFR 50.4

SUSQUEHANNA STEAM ELECTRIC STATION
2021 ANNUAL ENVIRONMENTAL OPERATING REPORT
(NONRADIOLOGICAL)
PLA-7986

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 2021 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.

K. Cimorelli

Attachment: 2021 Annual Environmental Operating Report (Nonradiological)

Copy: NRC Region I
Ms. A. Klett, NRC Project Manager
Mr. C. Highley, NRC Senior Resident Inspector
Mr. M. Shields, PA DEP/BRP

Attachment to PLA-7986

2021 Annual Environmental Operating Report (Nonradiological)

SUSQUEHANNA STEAM ELECTRIC STATION

ANNUAL ENVIRONMENTAL OPERATING REPORT (NONRADIOLOGICAL)

2021

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Susquehanna Steam Electric Station
Units 1 & 2

2021
ANNUAL ENVIRONMENTAL OPERATING REPORT
(NONRADIOLOGICAL)

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

Prepared by
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Berwick, PA
March 2022

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 1,152 acres of land on the west side 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, 1,087 (1,152 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. The property on the east side of the river, across from the station was transferred to other Talen Energy entities in 2021.

This report discusses environmental commitments and impacts from January 1, 2021 through December 31, 2021. 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 2021 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 2021 report is the 40th 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 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

Environmental lab personnel sampled wash-water from the trash bars and traveling screens at the intake building during August, September, and October to see if American shad 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 23 August through 20 October, 2021, and checked daily. No American shad were collected during this period or during any previous sampling year. However, 117 fish of 13 other species were collected (Table 2.1-1). Most of these fish were juvenile channel catfish and yellow bullhead (Ictalurus punctatus, 41 specimens, and Ameiurus natalis, 38 specimens, respectively).

Biofouling Mollusk Monitoring

The biofouling mollusk monitoring program continued at the Susquehanna SES in 2021. The purpose of this monitoring is to survey the Susquehanna River and the Emergency Service Water (ESW) 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 artificial substrates in the river and the ESW 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 pathway for zebra mussel introduction to the river. 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, but no specimens were found in 2021. At this time there is no evidence of a reproductive population of zebra mussels in the Susquehanna River near Susquehanna Nuclear LLC.

A scuba inspection for biofoulers in the ESW Spray Pond was completed on 12 July 2021 by divers from Applied Ecoscience environmental laboratory. No live specimens were observed during that inspection. Four of the ESW pump house screens were removed in October 2021 for cleaning and examined for biofoulers, and three live zebra mussels were found attached to the screens.

At present, zebra mussels in the Susquehanna River do not appear to pose an immediate threat to plant operation. However, monitoring continues for mussels in the ESW Spray Pond, the river intake area, plant cooling systems, and Lake Took-a-While.

The ESW Spray Pond was most recently treated with a non-oxidizing biocide for mollusk control on 31 August 2020. Inspections during 2019 of ESW Spray Pond substrates by scuba and the pond's intake screens

during an annual cleaning cycle, revealed the presence of 320 live zebra mussels and 15 Asian clams.

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 2021.

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. PPL-Electric Utilities reported that they did not conduct any herbicide treatments of the SSES bulk transmission corridors during 2021. There were no adverse environmental impacts to transmission corridors reported in 2021. 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.

Per the Foreword to this report, Susquehanna Nuclear, LLC transferred numerous land parcels surrounding the station to other Talen entities over the course of 2021. One of those transferred parcels was parcel 19SL which contains site 36LU43. As required, Susquehanna Nuclear consulted with the Pa. Historic Museum Commission (PHMC) regarding this real estate transfer, and the PHMC stated that the requirement to protect site 36LU43 becomes the responsibility of the new owner – regardless of whether the new owner is a federally-licensed entity or not. Therefore, moving forward, the responsibility for mitigating anthropogenic impacts to site 36LU43 will no longer reside with Susquehanna Nuclear, LLC.

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 2021, 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 following activities were reviewed:

1. Data Center Support; Tree Removals for new 230 kV Line
2. Data Center Support; Excavation and Construction of New 500 kV line and Substation
3. Excavation and Replacement of 2PI112 and 2FH106
4. Excavation & Repair of U1B ESW / RHR Piping
5. Construction of Supporting Electrical Infrastructure for Data Center; Relocation of Offsite Salt Shed
6. Construction of New Onsite Salt Shed
7. Relocation of Reactivator Chemical Treatment Skid (EC 2383701)
8. Excavation of 3 Proposed Pier Foundation Locations (PCWO 2454369)
9. Susquehanna Nuclear to Susquehanna Data Center Land Transfers and New SSES Property Boundary
10. Installation of Shield Walls at ISFSI Pad and impact on Stormwater Drainage (EC 2373129)

3.2 Reporting Related to NPDES Permits and State Certifications

During the Unit 1 circulating water biocide treatment on 28 June, Susquehanna personnel attempted to secure the sodium bisulfite dechlorination pump and found it to be inoperable. Normally, the dechlorination pump would be left in service until after the circulating water total chlorine concentration is measured to be <0.05 mg/L. However, during this particular biocide treatment, it was determined that the dechlorination pump had failed sometime during the biocide treatment. While free or total chlorine measurements were never in excess of an NPDES limit, it was presumed that measurable concentrations of total chlorine were discharged for greater than two hours from Unit 1 during the 28 June biocide.

There were no other non-compliances or special reporting requirements associated with implementation of NPDES Permit No. PA0047325 during 2021.

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

The following regulatory changes were incorporated into Susquehanna SES's nonradiologoical environmental compliance program in 2021:

- On June 25, 2021 PaDEP issued Request For Determination (RFD) #9271 authorizing the operation of a temporary non-road engine needed to support the transfer of electrical fluids during the Station's transformer replacement, thereby exempting these gen sets from GP-11 permitting.

4.0 ENVIRONMENTAL CONDITIONS

4.1 Unusual or Important Environmental Events

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 2021, PPL Electric Utilities Vegetation Management maintained transmission line vegetation maintenance and inspection records. NOTE: PPL-Electric Utilities reported that they did not conduct any herbicide treatments of the SSES bulk transmission corridors during 2021.

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 2021 as part of a regularly scheduled Chemistry Program Audit.

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 2021.

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 2021. 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 2021.

6.0 ATTACHMENTS

Table 2.1-1

American Shad Impingement Monitoring (2021)

Figure 5.1-1

Auditing Organization Chart (2021)

TABLE 2.1-1

SUSQUEHANNA STEAM ELECTRIC STATION
2021 AMERICAN SHAD IMPINGEMENT PROGRAM
23 August – 20 October 2021

Date	Time	Items Found on Trash Bar/Traveling Screen				
2021		Shad	Fish	Crayfish	Other	Comments
Fish baskets were deployed on 23 Aug @ 1000.						
23 Aug	1400	0	1 channel catfish 1 yellow bullhead	0	0	Light leaves/debris
24 Aug	1600	0	1 fallfish 1 margined madtom 1 yellow bullhead	2	0	Light leaves/debris
25 Aug	1415	0	2 yellow bullhead 1 fallfish	0	0	Light leaves/debris
26 Aug	1530	0	1 spotfin shiner 1 yellow bullhead	3	0	Light leaves/debris
27 Aug	1715	0	3 channel catfish 1 rock bass 1 yellow bullhead 1 yellow perch	2	1 Chinese mystery snail	Light leaves/debris
30 Aug	1630	0	1 bluegill 1 channel catfish 1 spottail shiner 1 yellow bullhead	0	0	Light leaves/debris
31 Aug	1530	0	2 spottail shiner 1 spotfin shiner 1 yellow bullhead	1	0	Light leaves/debris
01 Sep	1615	0	2 bluntnose minnow 2 spotfin shiner 1 bluegill 1 channel catfish 1 yellow bullhead	4	0	Light leaves/debris
02 Sep	1500	0	0	2	0	Light leaves/ Heavy debris
03 Sep	1530	0	1 bluegill	2	0	Light leaves/debris
06 Sep	1600	0	2 yellow bullhead 1 rockbass 1 spottail shiner	2	0	Light leaves/debris
07 Sep	1530	0	1 channel catfish 1 spottail shiner 1 yellow bullhead	4	0	Light leaves/debris
08 Sep	1500	0	1 channel catfish 1 yellow bullhead	2	0	Light leaves/debris

TABLE 2.1-1 (cont.)

Date	Time	Items Found on Trash Bar/Traveling Screen				
2021		Shad	Fish	Crayfish	Other	Comments
09 Sep	1700	0	1 brown trout 1 channel catfish 1 margined madtom 1 yellow bullhead	4	0	Light leaves/debris
10 Sep	1645	0	3 channel catfish 1 smallmouth bass 1 spotfin shiner	1	0	Moderate leaves/debris
13 Sep	1630	0	2 channel catfish 1 yellow bullhead	2	0	Light leaves/debris
14 Sep	1530	0	7 channel catfish 2 yellow bullhead	0	0	Light leaves/debris
15 Sep	2100	0	6 channel catfish 1 yellow bullhead	2	0	Moderate leaves/debris
16 Sep	1515	0	2 channel catfish 2 smallmouth bass 1 bluegill 1 spotfin shiner	0	0	Moderate leaves/debris
17 Sep	1645	0	2 channel catfish 1 spottail shiner	0	0	Moderate leaves/debris
20 Sep	1500	0	1 channel catfish	0	0	Light leaves/debris
21 Sep	1615	0	2 channel catfish	0	0	Light leaves/debris
22 Sep	1530	0	0	2	0	Moderate leaves/debris
23 Sep	1615	0	2 channel catfish 1 bluegill 1 smallmouth bass	1	0	Moderate leaves/debris
24 Sep	1315	0	2 channel catfish	0	0	Moderate leaves/debris
27 Sep	1430	0	0	1	0	Light leaves/debris
28 Sep	1600	0	2 yellow bullhead 1 gizzard shad	0	0	Light leaves/debris
29 Sep	1545	0	3 yellow bullhead 2 gizzard shad 1 bluegill	0	0	Light leaves/debris
30 Sep	1600	0	3 bluegill	0	0	Light leaves/debris
01 Oct	1615	0	0	0	0	Light leaves/debris
04 Oct	1530	0	0	0	0	Moderate leaves/debris

TABLE 2.1-1 (cont.)

Date	Time	Items Found on Trash Bar/Traveling Screen				
2021		Shad	Fish	Crayfish	Other	Comments
05 Oct	1545	0	0	0	0	Moderate leaves/debris
06 Oct	1530	0	1 yellow bullhead	0	0	Moderate leaves/debris
07 Oct	1900	0	2 yellow bullhead	1	0	Moderate leaves/debris
08 Oct	1645	0	0	1	0	Moderate leaves/debris
11 Oct	1630	0	2 yellow bullhead	0	0	Moderate leaves/debris
12 Oct	1445	0	3 channel catfish	0	0	Light leaves/debris
13 Oct	1600	0	2 yellow bullhead	0	0	Light leaves/debris
14 Oct	1345	0	3 yellow bullhead	2	0	Light leaves/debris
15 Oct	1700	0	0	2	0	Moderate leaves/debris
18 Oct	2015	0	0	0	0	Heavy leaves/debris
19 Oct	1615	0	3 yellow bullhead	0	0	Heavy leaves/debris
20 Oct	1400	0	2 yellow bullhead	1	0	Moderate leaves/debris
Baskets withdrawn on 20 Oct @ 1400; 2021 American shad impingement monitoring complete.						

TABLE 2.1-1 (cont.)

Date	Time	Items Found on Trash Bar/Traveling Screen				
2021		Shad	Fish	Crayfish	Other	Comments
TOTALS		**0**	**117 fish - 13 species**	**44***	**1**	
			41 channel catfish 38 yellow bullhead 9 bluegill 6 spotfin shiner 6 spottail shiner 4 smallmouth bass 3 gizzard shad 2 bluntnose minnow 2 fallfish 2 margined madtom 2 rockbass 1 brown trout 1 yellow perch		1 Chinese mystery snail	

FIGURE 5.1-1
AUDITING ORGANIZATIONAL CHART
(2021)