January 15, 2025

Maria D. Bebenek, P.E.
Program Manage
Department of Environmental Protection – Clean Water Program
Southcentral Regional Office
909 Elmerton Avenue
Harrisburg, PA 17110

Re: Supplemental Information to Support TMI-1 2012 NPDES (PA0009920) Renewal Permit Application

Dear Ms. Bebenek:

Constellation Energy Generation, LLC (Constellation) is providing the attached cross reference to the original 2012 National Pollutant Discharge Elimination System (NPDES) permit renewal application[1] and the Pennsylvania Department of Environmental Protection's (PADEP) updated 2024 NPDES Application (Form 3800-PM-BCW0008b) regarding Three Mile Island Nuclear Station, Unit 1 (TMI-1). Further, supplemental information is being provided to address identified changes to PADEP's application requirements.

Following the separation of Exelon's regulated utility business from its generation business, effective February 2, 2022, Constellation was formed to pursue competitive generation and customer-facing energy businesses. Constellation notified PADEP of the ownership change in April 2022. In May 2012, prior to the formation of Constellation, Exelon Corporation (Exelon) submitted a NPDES renewal application more than 180 days prior to the expiration of its 2007 NPDES permit and the PADEP deemed the application administratively complete. Since submission of the original 2012 application, some of the NPDES application information needs and Clean Water Act (CWA) 316(b) requirements have changed. Given the changes at Constellation and the minor changes to the NPDES renewal application, Constellation is submitting this cross reference and supplemental information to assist PADEP with its application review and draft permit issuance efforts.

[1] Letter from M. M. Newcomer (Exelon Generation Company, LLC) to Maria Bebenek (Pennsylvania Department of Environmental Protection), Re: Permit Renewal Application National Pollutant Discharge Elimination System (NPDES) Permit No. PA 0009920 Three Mile Island Nuclear Station (TMI), May 3, 2012.

This supplement includes the following:

1. The 2024 NPDES Application to 2012 NPDES Application Cross Reference Table – This table lists the key elements of the 2024 application and where in the 2012 application that information may be found.

2. CWA 316(b) Information – The current Module 5 was not a part of the NPDES renewal application in 2012. Constellation (then Exelon) submitted a completed Module 5 in September 2015. The attached Module 5 includes updates since 2015. Additionally, Constellation is providing a narrative of TMI-1 utilizing Best Technology Available consistent with the 2014 CWA 316(b) rule for impingement mortality and entrainment compliance.

3. Information on Chemicals and Additives – All chemicals and additives used at TMI-1 have been approved by PADEP (in a prior permit or by letter). Use of some of the chemicals and additives started before 2007, before PADEP implemented the current Toxics Management Spreadsheet or published the Approved List of Chemical Additives. As such, some of the chemicals used at TMI-1 are not on PADEP's Approved List of Chemical Additives. Some others are on the list, but their allowable usage has not been established using Water Quality Based Effluent Limits (WQBEL). Constellation is therefore submitting two sets of forms.

    a. New Chemical Additives Request Forms – for chemicals previously approved for use at TMI-1 but not on PADEP's Approved List of Chemical Additives.

    b. Chemical Additives Usage Forms – for chemicals previously approved for use at TMI-1 and on PADEP's Approved List of Chemical Additives, but whose usages have not been established with WQBEL calculations.

Please do not hesitate to reach out to me by email at Zigmund.Karpa@constellation.com or telephone at (267) 533-5659. Alternatively, you can reach out to Alyssa Hockaday by email at Alyssa.Hockaday@constellation.com or telephone at (267) 533-5679, or Debra Musser at Debra.Musser@constellation.com or (267) 533-7308 with any questions.

Sincerely yours,

Zigmund A Karpa

Zigmund Karpa
Director Environmental Programs
Constellation Energy Generation, LLC

Enclosures:

1. TMI-1 Nuclear Station NPDES Application Updates January 2025, including:
    a. 2024 NPDES Application to 2012 NPDES Application Cross Reference Table
    b. CWA 316(b) Information
    c. Module 5 – Cooling Water Intake Structure
    d. Information on Chemical Additives
2. DEP Toxics Management Spreadsheet updated with maximum allowable usage rate calculations for each chemical.

CC:

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2024 to 2012 NPDES Application Information Cross Reference

Table 1 Information Cross Reference 2012 NPDES Application and 2024 Industrial NPDES Permit Application (3800-PM-WFSR0008)

Information Category	2024 Application	2012 Application
Checklist	Site plan and features	Section 2 pg 19-20 in PDF
	Discharge Information: line drawing showing flow of water and wastewater	Module 1 pg 36 of PDF (3800-PM-WSFR0008d Rev. 3/2006) may need to be updated
	Preparedness, prevention and contingency plan (PPC) plan	Module 1 pg 2 (pg 23 of PDF) and Module 12 pg 2 (pg 79 in PDF) (3800-PM-WSFR0008o Rev. 3/2006)
Application	Site Identification Information	General Information Form (GIF) page 1 of 7 (8000-PM-IT0001 Rev 10/2009) and Section 2 (Application pg 1)
	[1]Sewage Treatment Information	Section 2 (Application pg 2, pg 15 in PDF). Water Use Schematic Module 1 pg 35 of PDF and Module 2 pg 1 (3800-PM-WSFR0008e Rev. 3/2006)
	Chemical Additives Information	Module 1 (pg 3 pg 24 in PDF). ASA suggests updating this information
	Discharge Characterization	Module 1 (pg 1, pg 22 of PDF)
Module 1	Stormwater	Module 12 (pg 78 of PDF)
	Stormwater Sampling Results	Module 13 (pg 80 of PDF) 3800-PM-WSFR0008p Rev. 3/2006
Module 2	Groundwater remediation	NA
Module 5	Cooling Water Intake Structure	Not included in 2012. Included in this package.

[1]The following information was not required in the 2012 application: Report whether the facility is operated by operator(s) certified in compliance with the Water and Wastewater Systems Operators Certification Act (63 P.S. §§ 1001-1015.1) The answer is YES.

CWA 316(b) Best Technology Available

Executive Summary

The Three Mile Island (TMI) Nuclear Station is located in Londonderry Township, Dauphin County, Pennsylvania. This station is comprised of two pressurized water reactor units. Constellation Energy Corporation owns Unit 1 (TMI-1). Energy Solutions owns Unit 2 (TMI-2). Neither unit is presently in operation. Unit 2 was shut down in 1979 and is in the process of being decommissioned, and the TMI-1 generator was shutdown in 2019 due to economic reasons. In an effort to restart TMI-1, Constellation and Microsoft have teamed together to launch the Crane Clean Energy Center (CCEC) which is expected to be online in 2027/2028. A nuclear unit takes many decades to decommission. TMI-1 facility's support services have, therefore, remained operational continuously and TMI-1 has remained compliant with NPDES permit-related requirements following the generator shutdown. Constellation will pursue a license renewal that will extend plant operations to at least 2054.

TMI-1 has a closed-cycle recirculating cooling tower system. Before shutting down, Unit 1 had a gross generating capacity of 885-megawatts (MW) and the station's design intake flow was 40.4 million gallons per day (MGD).

TMI-1 first became operational before 2002, therefore, it is an existing facility subject to the final Clean Water Act (CWA) §316(b) rule for existing facilities (the Rule) that became effective on October 14, 2014.The Rule requires that the location, design, construction and capacity of cooling water intake structures (CWIS) reflect best technology available (BTA) for minimizing adverse environmental impacts. The Rule applies to existing facilities that are designed to withdraw more than 2 million gallons per day (MGD) from Waters of the United States, use at least 25 percent of that water exclusively for cooling purposes, and have or require an NPDES permit.

As discussed below, TMI-1 utilizes BTA for both impingement mortality and entrainment reduction.

Threatened or Endangered Species and Critical Habitats

According to the U.S. Fish and Wildlife Service (USFWS) Information for Planning and Conservation (IPAC) database (USFWS 2024a) and the Pennsylvania Ecological Services Field Office, (PESFO) there are several federally listed species in the vicinity of TMI-1. However, after conducting a review of the IPAC database and engaging in discussions with the PESFO, it has been determined that none of these listed species is an aquatic species. Furthermore, there are no critical habitats within the project area, whether they be on land or in water.

Impingement BTA

The Rule at Title 40 CFR §125.94(c) requires that existing facilities employ one of seven impingement BTA alternatives[1]. TMI-1 has a closed-cycle recirculating cooling tower system meeting the definition at 40 CFR §125.92(c)(1) for condenser cooling. Therefore, TMI-1 fulfills

[1] Or under specific circumstances, one of nine alternatives, which includes §125.94(c)(11) and (12) in addition to §125.94(c)(1)-(7).

the BTA standard for impingement mortality at §125.94(a)(1) and does not require any other impingement mortality reduction measure.

The water withdrawn from the Susquehanna River is used (a) to replenish water (make-up) loss from the existing cooling tower due to evaporation, blowdown and drift; (b) to wash the make-up water traveling screen; and (c) as service water. The use of closed-cycle cooling reduces the water withdrawal rate at TMI-1 by approximately 94 percent and impingement is expected to be reduced proportionately.

Entrainment BTA

Use of Closed-Cycle Cooling

The Rule does not prescribe BTA for entrainment; therefore, it must be determined on a site-specific basis. This submittal demonstrates that TMI-1 meets BTA for entrainment based on the following:

- TMI-1 uses closed-cycle cooling technology, which minimizes entrainment through flow reduction. The circulating water flow rate at TMI-1 is 430,000 gpm and the makeup water flow rate is 14,500 gpm. The reduction in cooling water withdrawal rate is 415,500 gpm or 97 percent. If TMI-1 condensers had been once-through cooled, the total water withdrawal rate would have been approximately 443,550 gpm. But because it has a closed-cycle system its total maximum withdrawal rate is 28,050 gpm. The reduction in total water withdrawal rate from utilizing a closed-cycle system is 415,500 gpm or 94 percent.

- If TMI-1 were to be classified as a new facility (under Phase 1) or as a new unit at an existing facility (under the 2014 Rule), it would be in compliance with the more stringent requirements stated at 40 CFR §125.84(c) and §125.94(e), respectively. Regulatory compliance requirements applicable to new units or new facilities are more stringent than those applicable to an existing unit or an existing facility. The TMI-1 closed-cycle cooling system would be considered BTA for entrainment at a new unit at an existing facility or for entrainment at a new facility. Therefore, the existing closed-cycle system at TMI-1 may be determined BTA for entrainment.

- Statements made by the United States Environmental Protection Agency (USEPA) in the preamble to the 2014 Rule[2] and in the Responses to Public Comments[3] clarify USEPA's intent for considering closed-cycle cooling as BTA for entrainment.

[2] "Although this rule leaves the BTA entrainment determination to the Director, with the possible BTA decisions ranging from no additional controls to closed-cycle recirculating systems plus additional controls as warranted, EPA expects that the Director, in the site-specific permitting proceeding, will determine that facilities with properly operated closed-cycle recirculating systems do not require additional entrainment reduction control measures." (emphasis added).

[3] "EPA has made it clear that a facility that uses a closed-cycle recirculating system, as defined in the rule, would meet the rule requirements for impingement mortality at §125.94(c)(1). This rule language specifically identifies closed-cycle as a compliance alternative for the [impingement mortality] performance standards.

TMI-1 Withdrawal Rate is Less Than 5 Percent of the Susquehanna River Discharge

The now-remanded Phase 2 rule provided exemption for facilities that withdrew less than 5 percent of the mean annual flow of the source waterbody. When TMI-1 design intake rate of 28,050 gpm (40.4 MGD) is compared with the Susquehanna River flow rate from October 2004-September 2024, TMI-1 withdrawal rate is approximately 0.16 percent of the mean annual flow (cfs). TMI-1 design intake rate compared to Susquehanna River monthly averaged rates are provided in the below table.

Month	Average Susquehanna Discharge Rate (2007-2024)	Percent
January	56,310	0.11%
February	54,011	0.12%
March	66,061	0.09%
April	62,676	0.10%
May	49,382	0.13%
June	24,555	0.25%
July	19,977	0.31%
August	18,696	0.33%
September	23,410	0.27%
October	21,294	0.29%
November	30,015	0.21%
December	47,657	0.13%

TMI-1 water withdrawal rate (make-up water, service water, and screenwash water) is less than 5 percent of the source waterbody flow.

Considering the regulatory precedent with new facilities and new units, and uncontested provisions in the now remanded Phase 2 rule, use of closed-cycle cooling is BTA for entrainment compliance. As such, TMI-1 is BTA for entrainment.

Summary

Overall, impingement mortality and entrainment at the facility have been reduced to the maximum extent practicable; water withdrawal by TMI-1 is not expected to impact federally or state-protected species or their designated critical habitats. Constellation Energy therefore respectfully submits that TMI-1 is BTA for both impingement mortality and entrainment, and that no additional control measures to reduce impingement or entrainment mortality are warranted.

EPA expects the Director would conclude that such a facility would not be subject to additional entrainment controls to meet BTA." (emphasis added).

Module 5 – Cooling Water Intake Structure

NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM

APPLICATION FOR INDIVIDUAL PERMIT TO DISCHARGE

INDUSTRIAL WASTEWATER

MODULE 5 – COOLING WATER INTAKE STRUCTURE

New Facilities –TMI-1 is an Existing Facility. This section is not applicable.

1. Identify the Track chosen to comply with 316(b) requirements:
   - ☐ Track I – 40 CFR 125.84(b) (facilities that withdraw greater than or equal to 10 MGD)
   - ☐ Track I – 40 CFR 125.84(c) (facilities that withdraw greater than 2 MGD and less than 10 MGD)
   - ☐ Track II – 40 CFR 125.84(d) (comparable to Track I)

2. Provide a narrative description of the system that has been designed to reduce intake flow to a level commensurate with that that can be attained by a closed-cycle recirculating cooling water system and any engineering calculations, including documentation that make-up and blowdown flows have been minimized.

3. If the flow reduction requirement is met entirely, or in part, by reusing or recycling water withdrawn for cooling purposes in subsequent industrial processes, provide documentation that the amount of cooling water that is not reused or recycled has been minimized.

4. Provide a narrative description of the design, structure, equipment and operation used to meet the maximum through-screen design intake velocity requirement of no more than 0.5 fps.

5. Provide design calculations showing that the velocity requirement will be met at minimum ambient source water surface elevations and maximum head loss across the screens or other device.

6. Track I – Attach a Design and Construction Technology Plan. Attached: Yes No

7. Flow Requirements – Report the annual mean flow, mean low water tidal excursion distance, or a narrative description of the water body thermal stratification, with supporting documentation and engineering calculations, as applicable (see instructions).

8. Track II – Attach a Comprehensive Demonstration Study. Attached: Yes No

Source Water Physical Data

9. List the name(s) of the water body(ies) from which cooling water is or will be withdrawn.

Susquehanna River

10. Provide a narrative description of the physical configuration of all source water bodies and attach scaled drawings.

The facility is located on Three Mile Island, a midstream island in the Susquehanna River. The Susquehanna River originates near Cooperstown, New York at Otsego Lake and flows for about 444 miles to the Chesapeake Bay at Havre de Grace, Maryland. The TMI-1 intake is located adjacent to the station on the western shore of Three Mile Island. Three Mile Island, and Shelley Island to the immediate west, divides the river into west, main, and east channels.

The total river width is approximately 1.6 miles at the location of the intake and the main channel width, between Three Mile Island and Shelley Island, is about 1,200 feet. The Susquehanna River is a wide and shallow river, however, and the river depth increases at the TMI-1 facility due to the York Haven Dam (Met Ed / JCP&L 1971), which is located approximately 3 miles downstream of TMI-1 at river mile (RM) 56.1.

References:

Met Ed (Metropolitan Edison Company / Jersey Central Power & Light Company). 1971. Environmental Report. Operating License Stage. Three Mile Island Nuclear Station Unit 1 and Unit 2.

11. Identify and characterize the source water body's hydrological and geomorphological features and methods used to determine the intake's area of influence and results of such studies.

The drainage area of the Susquehanna River is 27,510 square miles (mi^2) total (SRBC 2005). At TMI-1, the Susquehanna River has a drainage area of approximately 25,000 mi^2 (Met Ed / JCP&L 1976).

The United States Geological Survey (USGS) operates gage station 01570500 on the Susquehanna River at Harrisburg, Pennsylvania, approximately 11 miles upstream of TMI-1. The average annual mean stream flow for 2007 through 2024 at this station is 38,213 cubic feet per second (cfs) (computed from available USGS water data).

No physical studies were performed to determine the TMI-1 intake's area of influence within the waterbody. A desktop analysis was performed to define the approximate area of influence within the 0.5 feet per second (fps) velocity contour. The United States Environmental Protection Agency (USEPA) considers this velocity to be a *de minimis* value relative to significant impingement concerns. Based on the physical dimensions of the screen structure, the DIF, the minimum river water elevation, and the bathymetry of the Susquehanna River in the vicinity of the screen structure, velocities have been computed at the face of the intake structure and at the traveling screens. See attached. Based on these calculations, the maximum approach velocity at the face of the skimmer wall is 0.09 fps, while the maximum approach velocity at the face of the bar racks is 0.15 fps. The hydraulic zone of influence at TMI-1 does not extend beyond the bar racks or the skimmer wall of the intake, and does not extend beyond the CWIS into the Susquehanna River.

References:

Met Ed (Metropolitan Edison Company / Pennsylvania Electric Company / Jersey Central Power & Light Company). 1976. Final Environmental Statement. Related to Operation of Three Mile Island Nuclear Station Unit 2. December.

Susquehanna River Basin Commission (SRBC). 2005. SRBC Overview. URL: http://www.srbc.net/geninfo.htm. Accessed February 2005

12. Attach locational maps showing the source waters. Attached: Yes No

Cooling Water Intake Structure Data

13. Provide a narrative description of the configuration of each CWIS and where it is located in the water body and in the water column.

The Unit 1 Pumphouse withdraws makeup and service from the Susquehanna River for the Unit 1 cooling towers and service needs. The following are the major components of the CWIS:

- Screenhouse Structure:
  - o Skimmer wall with two (2) openings equipped with bar grids;

- o Three (3) intake bays;
- o Three (3) vertical bar racks;
- o Three (3) through-flow traveling water screens

• Pump Suction Bay "Wetwell" for pumps:

- o Three (3) Secondary Service Water Pumps;
- o Three (3) Nuclear Service Pumps;
- o Two (2) Decay Heat River Water Pumps;
- o Two (2) Reactor Building Emergency Cooling Pumps;
- o Two (2) Screen Wash Pumps
- o Two (2) Fire Pumps
- o Two (2) Intake Ventilation Pumps

The Unit 1 intake structure and pumphouse is situated adjacent to the Susquehanna River along the western shore on the northern portion of Three Mile Island and is oriented parallel to the shoreline. See Figure 1 in Attachment A. The enclosure is approximately 96.5 feet wide by 134 feet long. The intake structure has two operating levels, consisting of a lower 'wetted' area and upper level that provides housing for the screen drive mechanisms, pump motors and support equipment. The upper operating floor is at elevation 308'-0" above MSL, and the intake bay floor bottom is at 265'-0" above MSL. Screened water discharges into a common pump suction bay or 'wetwell'. The wetwell floor is at elevation 262'-6" above MSL (2.5 feet below the intake bay floor). On the river side, the structure occupies the water column from the water surface down to the level of the bottom of the trash racks, at an elevation of 265'-0" above MSL. The invert of the excavated intake channel is at elevation 264'-0" above MSL. Normal water elevation is 278'-0" above MSL. See "As-Built General Arrangement Intake Screen and Pump House", Drawing No. IE-16B-02- 002 in Attachment C.

TMI-1 intake is located in a fresh waterbody. York Haven Dam is downstream of TMI-1 and forms an impoundment that extends 3.5 miles upstream (FERC 2000). The TMI-1 CWIS is located within this reach of the river (also called Lake Frederic). The York Haven Project operates as a run-of-the river facility. Over 17,000 cfs the facility cannot control water levels and spills over the main dam, east channel dam and headrace walls when crest elevations are exceeded (FERC 2015). See Figure 1 in Attachment A, which provides a scaled drawing of the source water body by the Facility and the location of the cooling water intake structure. The normal river level is at elevation 278'-0" above mean sea level (MSL) (Met Ed / JCP&L 1976). High water level is at elevation 303'-6" above MSL, and low water level is at elevation 276'-10" above MSL (YHPC 2012). The Susquehanna River invert elevation in the vicinity of the intake is 264'-0" above MSL and the intake floor elevation is 265'-0" above MSL (GPU Nuclear 1981).

Water enters the intake structure under a skimmer wall through two openings that are equipped with fixed grid panels with vertical bars spaced 2-feet on center, into three intake bays. This first set of vertical bars help keep out tree trunks, vehicles and other large debris. Each intake bay has an automated bar rack assembly, a vertical traveling water screen, with stop logs before the bar rack and after the traveling water screen. The second set of bar racks are equipped with vertical bars spaced 1-inch apart. The traveling water screen baskets have 3/8-inch square mesh openings. The two screen wash pumps intermittently clean the traveling water screens of debris. Debris from the screens is sluiced to a trash pit on the south side of the CWIS and hauled away for off-site landfill disposal. The wetwell serves as a sump to supply the sixteen (16) pumps identified in the table below.

	Total Pumps	Duty Pumps	Pump Rating (gpm)	Total Flowrate (gpm)	Total Flowrate (MGD)
Secondary River	3	2	7,250	14,500	20.9
Nuclear River	3	2	6,000	12,000	17.3
Decay River	2	0	7,000	-	-
Reactor Bldg Emer. Cooling	2	0	5,400	-	-
Screen Water Pump	2	1	1,400	1,400	2.0
Fire Protection	2	0	2,500	-	-
Intake ventilation pumps	2	1	150	150	
Design Intake Flow				**28,050**	**40.4**

The Unit 2 Pumphouse was deactivated in 1993, following the decommissioning of the Unit 2 nuclear reactor. The CWIS remains intact and the shared intake channel was not altered. However, all equipment in the Unit 2 Pumphouse was removed. All pump motors, piping, and equipment were removed down to the floor level, all power and switchgear were removed from the building, and all underground piping (greater than 8-inches) was plugged. There is currently no flow into and through the Unit 2 Pumphouse and this CWIS is not included in the remainder of this application form.

References:

FERC 2015. Final Multi-Project Environmental Impact Statement for Hydropower Licenses. Susquehanna River Hydroelectric Projects. FERC/FEIS-0255F. March 2015.

GPU Nuclear. 1981. As Built General Arrangement, Intake Screen and Pump House. Drawing No. IE-16B-02-002, Rev 7. November 1981.

Met Ed (Metropolitan Edison Company / Pennsylvania Electric Company / Jersey Central Power & Light Company). 1976. Final Environmental Statement. Related to Operation of Three Mile Island Nuclear Station Unit 2. December

York Haven Power Company, LLC (YHPC). 2012. York Haven Hydroelectric Project FERC Project No. 1888, Final License Application.

14. Provide the latitude and longitude for each CWIS.

CWIS ID No.	Latitude			Longitude		
	DEG	MIN	SEC	DEG	MIN	SEC
Unit 1 CWIS	40	09	17	76	43	39

15. Provide a narrative description of the operation of each CWIS, including design intake flows, daily hours of operation, number of days per year in operation, and seasonal changes, if applicable.

TMI-1 is a baseload nuclear generating facility that operated nearly all year until its shutdown in 2019. The generating unit is expected to start operating again in 2027/2028 when service and makeup water pumps will start withdrawing water from the Susquehanna River, and discharging blowdown and service water back to the Susquehanna River. Smaller quantities of water will be withdrawn and discharged in the interim for equipment testing purposes.

When TMI-1 is fully operational again, the CWIS will provide a continuous supply of water for:

- Makeup water to TMI-1's cooling system to replace consumptive and non-consumptive losses;
- Non-contact service cooling water for normal and emergency component cooling; and
- Wash and sluice water to maintain the traveling screens located in the CWIS in a clean condition and sluice away debris.

The intake pumps that will operate continuously consist of two of three secondary service pumps for pumping closed-cycle cooling tower makeup water and service water, and two of three nuclear service water pumps. The Unit 1 Pumphouse also houses several pumps that are operated intermittently or infrequently. Decay heat river water pumps will operate when the unit is not generating to remove residual heat during reactor shutdown and about 30 percent of the time for dilution service for rad releases. Reactor building emergency cooling pumps will operate in the event of an accident that necessitates the emergency shutdown of the reactor. Screen wash pumps will operate intermittently to remove debris from the traveling water screens. Fire pumps are on standby and would operate only in the event of a fire or for testing. Ventilation water pumps would operate all the time. However, the ventilation pumps draw water from the screen house pump bay and return the water to the screen house upstream of the bar rakes and are therefore not included in the DIF calculation.

The total DIF (excluding emergency pumps, fire protection pumps, and ventilation pumps) is 40.4 MGD as shown in the above table.

16. **Attach to Module 5 a flow distribution and water balance diagram that includes all sources of water to the facility, recirculating flows, and discharges**. Attached: [Yes] No

17. **Attach to Module 5 engineering drawings of the CWISs**. Attached: [Yes] No

Source Water Baseline Biological Characterization Data

18. Identify all data requested by 40 CFR 122.21(r)(4)(ii) through (vi) that are not available and efforts made to identify sources of the data.

Source water baseline biological characterization data were compiled from three main sources to prepare this report. The rationale for their inclusion is explained below. Ecological studies of the Susquehanna River near TMI-1 performed by RMC (1988, 1989, 1990, and 1991). Although these data are over 20 years old, they represent the most site-specific information available. More recent data available from nearby areas of the Susquehanna River were compared to assess if major changes have occurred in the waterbody. Since no substantial change in the fish population is evident, the historical site-specific data are likely still representative. Aquatic ecology studies of York Haven Pool performed in support of Susquehanna River Hydroelectric Projects licensing (FERC 2014), include the York Haven Hydroelectric Project FERC relicensing (FERC 2012) and fish passage studies at the York Haven Hydroelectric plant (Kleinschmidt Associates, 2022 and 2023). These studies provide more recent information) even if they are not site-specific. Studies include:

- A 2007 angler survey from Fabridam at Sunbury, PA, to the Holtwood Dam at Holtwood, PA. Survey data collected for the "lower Susquehanna River geological strata" include Lake Frederic (Smucker et al. 2009).
- Fish passage data through the East Channel fishway during spring operations from 2000 through 2012 (FERC 2012).
- Mussel survey data conducted by York Haven Power Company, LLC (YHPC 2011) near the York Haven Dam in 2010.Upstream and Downstream Fish Passage study at the York Haven Hydroelectric Project (Kleinschmidt Associates, 2022 and 2023).

Review of these studies focused on data collected in Lake Frederic or relative to passage of fish into Lake Frederic from Lake Clarke and found a somewhat similar species list as that prepared by RMC (1988, 1989, 1990, and 1991). Therefore, use of data from these nearby studies is representative of conditions at TMI-1. Cursory review of fishery data from the downstream areas suggests that the composition of the fish population is also similar.

Impingement and entrainment studies performed at Peach Bottom Atomic Power Station (PBAPS), which is a nuclear power generating facility located on a downstream impoundment of the Susquehanna River (Normandeau and URS 2008; Normandeau 2013). In the absence of impingement or entrainment data for TMI-1, results of recent impingement or entrainment performed at PBAPS are useful to provide a list of species that could potentially be affected by TMI-1's cooling water system intake with some exceptions due to the three dams located between the two power stations (see Section 4.2 for further explanation). Few site-specific studies have been performed for TMI-1 because the station uses cooling towers which are part of closed-cycle recirculating systems as defined in 40 CFR 125.83.

As explained above, a literature search was performed for additional information, particularly on reproduction and early life stages, to supplement the Susquehanna River aquatic studies. Impingement and entrainment data from a power station downstream of TMI-1 on the Susquehanna River were also used to augment the limited site-specific data available/ References provided in Attachment E.

References:

FERC (Federal Energy Regulatory Commission). 2000. Environmental and Public Use Inspection Report. York Haven. Submitted April 28, 2000.

FERC (Federal Energy Regulatory Commission). 2012. York Haven Hydroelectric Project, FERC Project No. 1888, Final License Application, Volume I, August 2012.

FERC. 2014. Draft Multi-Project Environmental Impact Statement for Hydropower Licenses. Susquehanna River Hydroelectric Projects. July, 2014.

FERC 2015. Final Multi-Project Environmental Impact Statement for Hydropower Licenses. Susquehanna River Hydroelectric Projects. FERC/FEIS-0255F. March 2015

Kleinschmidt Associates. 2022. Summary of Upstream and Downstream Fish Passage at the York Haven Hydroelectric Project in 2021. Prepared for York Haven Power Company. February, 2022.

Kleinschmidt Associates. 2023. Summary of Upstream and Downstream Fish Passage at the York Haven Hydroelectric Project in 2021. Prepared for York Haven Power Company. February, 2023.

Normandeau Associates Inc. and URS Corporation (Normandeau and URS). 2008. Detailed Characterization of the Aquatic Resources and Impingement Mortality at the Peach Bottom Atomic Power Station for Peach Bottom Atomic Power Station. Prepared for Exelon. October, 2008

Normandeau. 2013. Peach Bottom Atomic Power Station Entrainment Characterization Study 2012. Prepared for Exelon Generation. February, 2013

Smucker, B., J. Rosenberger, and D. Shumway. 2009. Juniata/Susquehanna River Creel Survey 2007. Draft Final Report. The Pennsylvania State University Statistical Consulting Center. 92 Pp + appendices. Cited in: FERC (2012).

York Haven Power Company, LLC (YHPC). 2011. Assessment of Aquatic Resources in the Susquehanna River below the York Haven Project Dams Study Report, York Haven Hydroelectric Project, FERC Project No. 1888. Cited in: FERC (2012) as YHPC 2011c.

19. Report species (or relevant taxa) for all life stages and their relative abundance in the vicinity of the CWISs.

TMI-1 is located in the York Haven Pool (Lake Frederic) of the Susquehanna River, just upstream of the York Haven Dam. See Attachment E Table 4-1 for all aquatic species found near TMI-1 within the York Haven Pool of the Susquehanna River. RMC (1990, 1991) are the most recent reports available documenting species specifically found within the vicinity of TMI-1. Species were collected via seine and night electrofishing sampling events. Seine sampling collected a total of 45,980 fish representing 33 species in 1989 and 31,470 fish representing 35 species in 1990 (Attachment E Table 4-2). Electrofishing sampling collected 6,299 fish representing 28 species in 1989 and 5,606 fish representing 36 species in 1990 (Attachment E Table 4-3). RMC (1990, 1991) also collected ichthyoplankton near TMI-1 weekly from April through August in 1990 and 1991 (Attachment E Table 4-4). A total of 9,537 individuals representing 26 taxa were collected in 1989, while 5,433 individuals representing 26 taxa were collected in 1990. Since the completion of these surveys, changes to the aquatic community composition in the Susquehanna River have occurred. The opening of the York Haven fish passage in 2000 allows migratory species the ability to travel further upstream, allowing access to the York Haven Pool. Gizzard shad populations have increased, and American shad, river herring, striped bass, and American eel have been recorded entering the York Haven Pool since the opening of the fish passage (FERC 2014). Flathead catfish were introduced into the Susquehanna River, and have propagated upstream via fish passages (Normandeau 2007). Electrofishing catches near Brunner Island below the York Haven Dam between 2002 and 2005 identified several size classes of flathead catfish, indicating they have reproduced in the basin (Normandeau 2007). References provided in Attachment E.

References;

FERC. 2014. Draft Multi-Project Environmental Impact Statement for Hydropower Licenses. Susquehanna River Hydroelectric Projects. July, 2014.

Normandeau Associates Inc. (Normandeau). 2007. Summary of Environmental Studies Near the Three Mile Island Nuclear Station. Prepared for Exelon Corporation. October 2007.

20. Identify the species and life stages that would be most susceptible to impingement and entrainment.

Susceptibility to impingement or entrainment is dependent on a number of biotic and abiotic factors, as shown in Attachment E Table 4-5. Site-specific studies have not been performed for TMI-1 to assess these factors. Nor have any impingement or entrainment characterization studies been conducted at the station. However, Peach Bottom Atomic Power Station (PBAPS) is a nuclear power generating facility subject to the 316(b) Rule, and is located 48 miles downstream from TMI-1 near the Conowingo Dam (Normandeau 2007). Much like TMI-1, PBAPS withdraws from an impoundment of the Lower Susquehanna River, and may impinge or entrain similar aquatic biota as TMI-1. One exception may be the presence of more migratory species near PBAPS due to its' proximity to the Chesapeake Bay. An impingement characterization study was conducted at PBAPS between August 2005 and November 2006 (Normandeau and URS 2008) and entrainment characterization was performed from March 8 through September 27, 2012 (Normandeau 2013). Although PBAPS has a once-through cooling water system, the impingement and entrainment occurring at its traveling water screens can provide a proxy to assess the species most susceptible to impingement and entrainment at TMI-1. See Attachment E Tables 4-6 and 4-7 for a list of species impinged and entrained at PBAPS.

Gizzard shad was the most impinged species at PBAPS and likely to be impinged at TMI-1. In the Susquehanna River, gizzard shad populations have increased over time particularly since 2000 (FERC 2014). The numbers of gizzard shad to pass through the York Haven Dam in 2013 (106,395) was the third highest since the opening of the fish passage in 2000 (FERC 2014). Peak impingement at PBAPS was observed during the fall (Normandeau and URS 2008). Young-of-year clupeids (including shad, alewife, and herring) migrate downstream in the fall (FERC 2014) and peak impingement may be attributed to the movement of these smaller individuals.

Channel catfish and bluegill, both common species found in the York Haven Pool, were the next most common species collected at PBAPS. Impingement events of channel catfish and bluegill may be attributed to high river flow, as King et al. (2010) found river flow is statistically significant to the impingement of channel catfish and bluegill at multiple facilities on the Ohio River. While survey data (RMC 1988, 1989, 1990, 1991) indicated cyprinids such as spottail shiner, spotfin shiner, and mimic shiner were abundant in the York Haven Pool near TMI-1 in 1990, high abundance does not necessarily indicate high rates of impingement (King et al. 2010). At PBAPS, cyprinids were not often impinged. Comely shiner, spotfin shiner, and spottail shiner only accounted for 0.12 percent of impingement at PBAPS (Normandeau and URS 2008).

The two most entrained species at PBAPS were gizzard shad and tessellated darter (nearly 84 percent of entrained species). All other identified taxa comprised approximately 4 percent of entrained biota, and unidentified species comprised 12 percent.

Species that have the least risk of entrainment are those that are nest builders, lay adhesive, demersal eggs (Normandeau 2013), and protect their larvae until they are free swimming (Wallus and Simon 2006a, Wang and Kernehan 1979, and Auer 1982), such as centrarchids (e.g., smallmouth bass and sunfish) and ictalurids (e.g., channel catfish). These two families are common in the Susquehanna River, as seen in the 1990-1991 ichthyoplankton data (RMC 1990, 1991; Attachment E Table 4- 4). However, entrainment of early lifestages of these families was low at PBAPS (Normandeau 2013; Attachment E Table 4-7). The species most likely to have eggs entrained are broadcast spawners with semi-adhesive, non-demersal eggs (Normandeau 2013), such as cyprinids. Periods of high water flow may cause significant disturbance and wash away larvae and eggs leading to entrainment of species not normally entrained. Availability of spawning habitat near the intake also affects entrainment rates at PBAPS (Normandeau 2013). No information on spawning habitat near TMI-1's intake was found.

References:

Auer, N.A. 1982. Identification of Larval Fishes of the Great Lakes Basin with Emphasis on the Lake Michigan Drainage. Special Publication 82-3. Great Lakes Fishery Commission. Ann Arbor, MI. December.

FERC. 2014. Draft Multi-Project Environmental Impact Statement for Hydropower Licenses. Susquehanna River Hydroelectric Projects. July, 2014.

King, R.G, Seegert, G, Vondruska, J, Perry, E.S, and Dixon, D.A. 2010. Factors Influencing Impingement at 15 Ohio River Power Plants. North American Journal of Fisheries Management. 30:1149-1175.

Normandeau Associates Inc. (Normandeau). 2007. Summary of Environmental Studies Near the Three Mile Island Nuclear Station. Prepared for Exelon Corporation. October 2007

Normandeau Associates Inc. and URS Corporation (Normandeau and URS). 2008. Detailed Characterization of the Aquatic Resources and Impingement Mortality at the Peach Bottom Atomic Power Station for Peach Bottom Atomic Power Station. Prepared for Exelon. October, 2008

Normandeau. 2013. Peach Bottom Atomic Power Station Entrainment Characterization Study 2012. Prepared for Exelon Generation. February, 2013.

RMC Environmental Services (RMC). 1988. An ecological study of the Susquehanna River near the Three Mile Island Nuclear Station. Annual Report for 1987. RMC. Drumore, PA. Cited in: Normandeau (2007).

RMC. 1989. An ecological study of the Susquehanna River near the Three Mile Island Nuclear Station. Annual Report for 1988. RMC. Drumore, PA. Cited in: Normandeau (2007).

RMC. 1990. An ecological study of the Susquehanna River near the Three Mile Island Nuclear Station. Annual Report for 1989. RMC. Drumore, PA.

RMC. 1991. An ecological study of the Susquehanna River near the Three Mile Island Nuclear Station. Annual Report for 1990. RMC. Drumore, PA

Wallus, R and Simon, T.P. 2006a. Reproductive Biology and Early Life History of Fishes in the Ohio River Drainage: Ictaluridae – Catfish and Madtoms. Volume 3. Taylor & Francis Group. Boca Raton, FL

Wang, J.C.S and Kernehan, R.J. 1979. Fishes of the Delaware Estuaries: A Guide to Early Life Histories. EA Communications, Towson, MD. 1979

21. Identify and evaluate the primary period of reproduction, larval recruitment, and period of peak abundance for relevant taxa.

Ichthyoplankton found within the York Haven Pool of the Susquehanna River near TMI-1 were identified by RMC (1990, 1991). Given that the early lifestages of these species are documented in the source waterbody near TMI-1, these species are reproducing in the vicinity. Attachment E Table 4-8 focuses on the life history data for these species.

References:

RMC. 1990. An ecological study of the Susquehanna River near the Three Mile Island Nuclear Station. Annual Report for 1989. RMC. Drumore, PA.

RMC. 1991. An ecological study of the Susquehanna River near the Three Mile Island Nuclear Station. Annual Report for 1990. RMC. Drumore, PA.

22. Report data representative of the seasonal and daily activities of biological organisms in the vicinity of the CWISs.

Abundance data representing seasonality are available for the York Haven Pool of the Susquehanna River from collections made from 1978 through 1990 using seines and electrofishing. Seasonal and diel variability in ichthyoplankton populations can be assessed by using entrainment data from PBAPS as a proxy. These data are summarized below and augmented with general seasonality and diel information from the literature.

Site-Specific Seasonal and Daily Activity Information

No recent studies (within the last 20 years) have been performed to study seasonal and daily activities of fish near TMI-1. Comparison of site-specific historical fish population information to more recent data collected more generally in Susquehanna River suggest that the aquatic population has not changed substantially. Therefore, this section presents the site-specific seasonal and diel information collected by RMC, with a focus on the most recent two years of data from 1989 and 1990.

Seining collections were conducted from 1978 through 1990 (RMC 1991). Catches appeared to vary with reproductive success and natural population cycles (RMC 1991). Total catch was influenced primarily by the abundance of spotfin shiner, spottail shiner, and mimic shiner. Seasonal abundance from seine samples can be attributed to flow patterns in the Susquehanna River, which are normally characterized by high spring flows and lower flows in the summer and fall (RMC 1991). Fluctuations effect intermittent spawners such as spotfin shiner, affecting reproductive year class strength and future abundance (RMC 1991). Attachment E Figures 4-1 and 4-3 present total abundance data by sampling date from the most recent seine study performed near TMI-1 (1989 and 1990). Attachment E Figures 4-2 and 4-4 show the temporal distribution of the six most abundant species collected by seining (channel catfish, tessellated darter, pumpkinseed, bluegill, spotfin shiner, and mimic shiner). These data illustrate the substantial inter-annual variability in total abundance and seasonality of fish collected by seine. Total numbers were much higher in 1989 compared to 1990, and there was a much more pronounced seasonal peak in fall in 1989. Electrofishing studies were conducted from 1978 through 1990 (RMC 1991). Total catches were primarily affected by fluctuations in populations of quillback, pumpkinseed, and smallmouth bass (RMC 1991). Total abundance data for the most recent data available near TMI-1 (1989 and 1990) are presented in Attachment E Figures 4-5 and 4-7. Attachment E Figures 4- 6 and 4-8 show the temporal distribution of the eight most abundant species collected by electrofishing (gizzard shad, walleye, quillback, green sunfish, bluegill, redbreast sunfish, smallmouth bass, and pumpkinseed). Inter-annual variability is not as evident in the electrofishing data as in the seine data.

Ichthyoplankton sampling in the Susquehanna River near TMI-1 was performed weekly from April through August 1989 and 1990 (RMC 1990, 1991). The weekly data can be used to describe seasonality of the potentially entrainable lifestages. Common carp and quillback dominated the ichthyoplankton samples in 1989 and pumpkinseed, bluegill and common carp dominated in 1990. There were slight differences between seasonal peaks in ichthyoplankton abundance between the two years. In 1989, larvae were first collected in mid-April, and were abundant from mid-May through mid-June and mid-July through August (RMC 1990). In 1990, larvae were first collected in early April, and were abundant from late April through early May and late May through August (RMC 1991). RMC (1990) concluded that ichthyoplankton abundance was influenced by water temperature, river flow, and weather conditions.

The older seasonal ichthyoplankton data collected near TMI-1 are similar to recent entrainment data collected at PBAPS downstream of TMI-1. Normandeau (2013) indicated that most entrainment of ichthyoplankton at PBAPS occurred between mid-April through late July with a peak in late April to late May.

General Seasonal and Daily Activity Information

Migratory Species – American shad, blueback herring, alewife and striped bass are anadromous species that are present in the York Haven Pool of the Susquehanna River (Normandeau 2007, FERC 2014, SRAFRC 2010) that have been monitored since the completion of the migratory fish passage facility at the York Haven Dam in 2000. American eel, a catadromous species, are found in the area as well (Normandeau 2007). Migration of the anadromous species is limited in the Susquehanna River by downstream dams and relatively few individuals migrate into Lake Frederic. Descriptions of migratory species are provided below to fulfill the requirement to discuss data representative of the seasonal activities of biological organisms in the vicinity of the CWIS. These species are not currently abundant in Lake Frederic and therefore not likely to be impinged at the CWIS.

American shad – American shad spawning season runs from mid-April through mid-June (SRAFRC 2010). The majority of American shad tend to pass through the York Haven fish ladder generally between mid-May through early June when the water is between 65-68℉ (Normandeau 2007). The riverine habitat above Lake Frederic is considered suitable spawning habitat for American shad (Normandeau 2007). Juveniles begin their outmigration downstream towards the Atlantic Ocean between October and December (SRAFRC 2010). This movement generally is triggered by a decrease in water temperature and an increase in flow (SRAFRC 2010). Approximately 10-20% of spawning adults are return spawners (SRAFRC 2010).

Alewife and blueback herring (river herrings) (SRAFRC 2010) – Alewife enter the Chesapeake Bay and its tributaries to spawn late March through April. They typically spawn in sluggish tidal and lowland freshwater less than 1 ft. deep during the evenings. Blueback herring spawning season occurs April through Mid-May. Blueback herring prefer to spawn in swift flowing, deep water from the head of the tide and upstream in the evening. Juvenile outmigration for both species occurs in the fall. No alewives or blueback herring have been seen passing at York Haven Dam since 2002 and 2001, respectively (FERC 2014).

Striped bass (SRAFRC 2010) – Chesapeake stock of striped bass tend to spawn from April into early June. Males typically ascend the river before females. Primarily, the species tends to spawn in the lower reaches of tidal and non-tidal rivers, mostly at the mouth of the Susquehanna River. The preferred flow is debated, as some authors state spawning area suitability increases with increased flow, while others argue that sustained minimum flows are necessary for suitable spawning. Those observed passing through the York Haven fish ladder may have been post spawning individuals, possibly chasing forage species, remaining in the Susquehanna

until the early fall, when they return to the Chesapeake Bay or Atlantic Ocean. In data from 2000-2013 (excluding 2011 due to construction), an average of approximately eight striped bass per year have been recorded utilizing the fish passage at York Haven (FERC 2014).

American eel (SRAFRC 2010) – American eel reside within the Susquehanna River for most of its life, and migrate to the Sargasso Sea in the fall. Juvenile eels (elvers) migrate upstream between March and October, possibly continuing their upstream migration until they reach their sexual maturity. They are active at night and have the ability to crawl over low dams, and even travel over moist land.

Gizzard shad – Gizzard shad is considered an open water species, usually residing at or near the surface year round (Miller 1960). During spring spawning events, adults travel upstream through the York Haven fish passage into the York Haven Pool near TMI-1 (FERC 2014). A total of 106,395 individuals utilized the fish passage at York Haven in 2013 (FERC 2014). Juveniles tend to congregate in shallow water near shore mid-summer (Miller 1960). Populations tend to peak from late summer to early fall due to the inclusion of young-of-year (Miller 1960). Young-of-year shad illustrate schooling behavior, but begin to disperse in the fall (Miller 1960). Schooling behavior tends cease after the shad reach 1 year old (Miller 1960). King et al. (2010) describes gizzard shad as an open water, pelagic species demonstrating a negative rheotaxic response to flow and sensitivity to low temperatures and drastic changes in water temperatures. Gizzard shad have also been found to congregate near warm water discharges from industrial facilities during cooler water periods (Miller 1960). In regards to diel activity, electrofishing results in the Platte River, Iowa, indicated higher numbers of gizzard shad at night during the summer and fall (Yu and Peters 2003). This likely indicates that gizzard shad tend to reside higher in the water column at night. Gizzard shad spawning activity also only occurs during nighttime (Miller 1960).

Other Species

Mimic shiner (Ross et al. 2001) – Mimic shiners characteristically form large schools during the day within vegetated shallows, but break off into smaller schools and into deeper water as night approaches, likely as a predation avoidance behavior. During the morning, mimic shiners feed heavily in the middle of the water column, but may feed near bottom or near surface during midday hours, depending on seasonality of available prey.

Spotfin shiner (Ross et al. 2001) – Spotfin shiners tend to reside near bottom and into the middle of the water column year round, where they demonstrate loose aggregations during the day. They tend to be more active in shallow water during the day, and will reside in deeper waters at night. Feeding behavior is pelagic, occasionally occurring at the surface depending on available prey due to seasonality or habitat. Feeding activity peaks at early morning and dusk, but generally occurs throughout the day.

Spottail shiner – Spottail shiners are considered broadcast spawners that can be found in massed groups over gravelly riffles or sandy shoals throughout the summer months (Stauffer et al. 1995). They are known to feed on crustaceans, rotifers, algae, insects, and fishes throughout the water column (Stauffer et al. 1995).

Channel catfish (Wellborn 1988) – During daytime hours, channel catfish typically reside in holes within submerged structure such as logs or boulders. Feeding primarily occurs at night just after sunset and just before sunrise. Adults tend to have high site fidelity and tend to be sedentary, while juvenile's behaviors include much more movement, especially at night when feeding. They tend to be benthic feeders, utilizing external sensory organs on their body to sense prey.

Bluegill (Stuber et al. 1982) – Bluegill of all life stages are opportunistic feeders, feeding on zooplankton and aquatic insects throughout the water column. Bluegill will move into deeper waters during the summer to seek cooler water, as well as during the winter to seek warmer water. Young bluegill and other sunfish display behavior where they tend to reside in shallow waters or shoreline during the day, retreating to deeper water at night to avoid predation (Rypel and Mitchell 2007).

Smallmouth Bass (Edwards et al. 1983) – Smallmouth bass of all life stages exhibit a negative phototaxis and tend to seek some cover away from the light, utilizing submerged debris, vegetation, boulders, etc. Smallmouth bass tend to reside near the edge of the stream's current during the day. Their movement also tends to be restricted to a single pool during a season. Juveniles reside in shallow water, moving into deeper water as adults.

Walleye (Hartman 2009) – Young-of-year walleye occupy shallow water, utilizing macrophytes for shelter, leaving for deeper water in the fall. Walleye, in all life stages, are negatively phototaxic. During the day, they are demersal, however, between dusk and dawn they become active and enter the water column. Walleye have low site fidelity and demonstrate the ability to travel long distances throughout the year. Pre-spawning fish may migrate upstream or downstream within the river or into tributaries. After spawning, fish may disperse upstream or downstream. Movements other than spawning involve movement to deeper waters during periods of warmth or cold, and during periods of high flow. References provided in Attachment E.

References:

Edwards, E. A., G. Gebhart, and O. E. Maughan. 1983. Habitat Suitability Information: Smallmouth Bass. U.S. Department of the Interior, Fish and Wildlife Service. FWS/OBS-82/10.36. 47pp

FERC. 2014. Draft Multi-Project Environmental Impact Statement for Hydropower Licenses. Susquehanna River Hydroelectric Projects. July, 2014.

Hartman, G.F. 2009. A Biological Synopsis of Walleye (Sander vitreus). Can. Manuscr. Rep. Fish. Aquat. Sci. 2888: v + 48 p

King, R.G, Seegert, G, Vondruska, J, Perry, E.S, and Dixon, D.A. 2010. Factors Influencing Impingement at 15 Ohio River Power Plants. North American Journal of Fisheries Management. 30:1149-1175.

Miller, R.R. 1960. Systematic and Biology of the Gizzard Shad (Dorosoma cepedianum) and Related Fishes. Fishery Bulletin 173. Fish and Wildlife Service. Volume 60.

Normandeau Associates Inc. (Normandeau). 2007. Summary of Environmental Studies Near the Three Mile Island Nuclear Station. Prepared for Exelon Corporation. October 2007.

Normandeau. 2013. Peach Bottom Atomic Power Station Entrainment Characterization Study 2012. Prepared for Exelon Generation. February, 2013.

RMC. 1991. An ecological study of the Susquehanna River near the Three Mile Island Nuclear Station. Annual Report for 1990. RMC. Drumore, PA

RMC. 1990. An ecological study of the Susquehanna River near the Three Mile Island Nuclear Station. Annual Report for 1989. RMC. Drumore, PA

Ross, S.T, Brenneman, W.M, Slack, W.T, O'Connell, M.T, and Peterson, T.L. 2001. The Inland Fishes of Mississippi. University Press of Mississippi.

Rypel, A.L and Mitchell, J.B. 2007. Summer Nocturnal Patterns in Freshwater Drum (Aplodinotus grunniens). American Midland Naturalist. Vol. 157, No. 1 (Jan., 2007), pp. 230-234.

Stauffer, J.R Jr, Boltz, J.M, and White, L.R. 1995. The Fishes of West Virginia. Pennsylvania State University. Academy of Natural Sciences of Philadelphia. Accessed February 2015 via Google Books

Stuber, R. J., G. Gebhart, and O. E. Maughan. 1982. Habitat Suitability Index Models: Bluegill. U.S. Department of the Interior, Fish and Wildlife Service. FWS/OBS-82/10.8. 26 pp.

Wellborn, T. 1988. Channel Catfish Life History and Biology. Southern Regional Aquaculture Center. L-2402. SRAC Publication No. 180. December.

Yu, S.L and Peters, E.J. 2003. Diel and seasonal abundance of fishes in the Platte River, Nebraska, USA. Fisheries Science. 2003, 69:154-160.

23. Identify all threatened, endangered and other protected species that might be susceptible to impingement and entrainment and the CWISs.

The 2014 Rule specifically addresses federally-listed threatened and endangered species. State-listed species and other species of concern are included for completeness. The federally- and/or state-listed aquatic species that may be present near the intake were identified based on USFWS (USFWS 2015a, 2015b, 2015c), NMFS (NMFS 2015), and Pennsylvania Natural Heritage Program (PNHP 2015) species lists (Attachment E Table 4-9). In addition, a Pennsylvania Natural Diversity Inventory (PNDI) Project Environmental Review was performed (Attachment D). No known impacts were identified for any aquatic species potentially impinged or entrained at TMI-1, including black bullhead. Potential impacts to two state-protected bird species were identified by the Pennsylvania Game Commission. However, peregrine falcon and osprey are not susceptible to impingement. Peregrine falcon mostly prey on other birds (PA Game Commission 2013) and osprey consume a variety of species of fish (Cornell Lab of Ornithology 2015). Therefore, these species should not be impacted by any impingement or entrainment at TMI-1.

References:

Cornell Lab of Ornithology. Osprey, Life History. All About Birds. Available on-line at: http://www.allaboutbirds.org/guide/osprey/lifehistory. Site last accessed May 19, 2015

National Marine Fisheries Service (NMFS). 2015. NOAA Habitat Conservation. Essential Fish Habitat Mapper v3.0. Accessed February, 2015. http://www.habitat.noaa.gov/protection/efh/habitatmapper.html.

Pennsylvania Game Commission (PA Game Commission). 2013. Banding and Management. http://www.portal.state.pa.us/portal/server.pt?open=514&objID=625958&mode=2. Site last accessed May 19, 2015.

Pennsylvania Natural Heritage Program (PNHP). 2015. Accessed February, 2015. http://www.naturalheritage.state.pa.us/Species.aspx

United States Fish and Wildlife Service (USFWS). 2015a. Critical Habitat Portal. Accessed February, 2015. http://ecos.fws.gov/crithab/

USFWS. 2015b. IPaC – Information, Planning, and Conservation System. February, 2015 http://ecos.fws.gov/ipac/

USFWS. 2015c. Listed Species Believed to or Known to Occur in Pennsylvania. Environmental Conservation Online System. February, 2015. http://ecos.fws.gov/tess_public/reports/specieslisted-by-state-report?state=PA&status=listed

24. Document any public participation or consultation with federal or state agencies in development of the plan.

No public participation or other consultation with Federal or State agencies has been undertaken related to CWA Section 316(b).

25. For owners or operators of existing facilities only, identify protective measures and stabilization activities that have been implemented, and a description of how these measures and activities affected the baseline water condition in the vicinity of the intake.

TMI-1 utilizes closed-cycle natural draft cooling towers for condenser cooling, which reduces cooling water withdrawal rate by approximately 97 percent and the total water withdrawal rate by approximately 94 percent compared to a once-through cooled system. The reduction in water withdrawal rate has a corresponding reduction on impingement and entrainment. Additionally, the through-screen velocity at the TMI-1 intake is at or less than 0.5 fps most of the time, allowing impingeable organisms the opportunity to swim away from the intake. Both these measures, closed-cycle cooling and low through-screen velocity, are protective of fish of all lifestages.

Rip-rap exists along the shoreline in the immediate vicinity of the intake structure. The rip-rap was placed there to protect the earth dikes from the Susquehanna River currents (USNRC 1994).

26. For owners or operators of existing facilities, provide a list of fragile species at the facility as defined in 40 CFR 125.92(m).

Fragile species are defined in 40 CFR §125.92(m) as those species of fish and shellfish that are least likely to survive any form of impingement; for the purposes of CWA 316(b) the rule defines fragile species as those with an impingement survival rate of less than 30 percent.

The fragile species listed in the Rule includes: alewife, American shad, Atlantic herring, Atlantic long-finned squid, Atlantic menhaden, bay anchovy, blueback herring, bluefish, butterfish, gizzard shad, grey snapper, hickory shad, menhaden, rainbow smelt, round herring, and silver anchovy (79 FR 48432, August 15, 2014).

Data from FERC (2014) and Normandeau (2007) demonstrate that the fragile species alewife, American shad, blueback herring, gizzard shad, and rainbow smelt have been found within the York Haven Pool of the Susquehanna River. Available data indicate that gizzard shad is the most common fragile species to be found near the TMI-1 intake. The gizzard shad population found near TMI-1 are likely a landlocked stock that was the result of an accidental stocking that occurred in 1972, and their populations significantly increased in the river ever since that event (Normandeau 2007). It is possible that some of these gizzard shad migrate from the Chesapeake Bay, but both stocks utilize the fish passages to move upstream or downstream in the Susquehanna (FERC 2014). Rainbow smelt is naturally an anadromous species, historically found in the Delaware River in Pennsylvania, at the southern portion of their native range (Fuller et al. 2015). However, those found in the Susquehanna River are introduced specimens. Very few specimens have been found near TMI-1. It is likely that these individuals could be strays from the established population of rainbow smelt in Harvey Lake, Pennsylvania (PA Sea Grant 2013), which is connected to the Susquehanna River via Harvey Creek, or Raystown Lake, which is connected by the Juniata River. Rainbow smelt were stocked by the Pennsylvania Fish Commission into Harvey's Lake in 1952 as forage for lake trout (Petrillo 2008) and in impoundments like Raystown Lake (Steiner 2000).

References

27. Identify all federally listed species and designated critical habitat in the vicinity of the CWIS.

There are no federally listed aquatic species or designated critical habitat near the TMI-1 intake.

Cooling Water System Data

28. Provide a narrative description of the operation of the cooling water system and its relationship to CWISs.

The cooling water system at TMI Unit 1 consists of: one Circulating Water System; one Makeup Water System (MWS); and one Blowdown System. The CWIS is part of the MWS. A description of the CWIS from the point-of-entry of the water up to and including the intake pumps is provided above with the "Cooling Water Intake Structure Data". The following description provides information on the circulating water system, remaining portion of the MWS, and blowdown system.

Circulating Water System:

The Circulating Water System includes two natural draft cooling towers, , both servicing the Unit 1 generator, are used to dissipate heat from the plant condenser steam cycle. The natural draft towers are each 400 feet in diameter at the base and 370 feet in height, and of concrete construction. The towers consist of a basin, a fill area, and a "chimney" portion. The concrete basin extends for the full 400 feet diameter. The towers are designed for a 16°F approach to the wet bulb and produce cooled circulating water in

the 50°F to 95°F range. The cooling towers incorporate two pass herringbone drift eliminators and high efficiency PVC cellular drift eliminators.

The heat rejected from the steam in the steam surface condenser is distributed around the fill of the natural draft cooling towers via the circulating water. Flow through the circulating water system is provided by Circulating Water Pumps, driven by electric motors. The pumps discharge the heated water through pipeline headers back to the cooling towers for heat dissipation. The total design flow of the Unit 1 pumps is 430,000 GPM.

The operation falls into two basic modes: summer and winter. In the summer, the heated water is distributed evenly over the full cross sectional area of the fill to achieve maximum cooling. In winter, to prevent excessive ice formation in the fill area, the towers are operated in a de-icing mode. This is achieved by diverting the full flow to the outboard distribution basin or fill area and causing the heated water to overflow, thus forming a heated curtain wall for the coldest air to pass. In addition, a third mode (start-up mode) is available. By-pass piping provides a means of discharging directly to the tower basin in cold weather for start-up when little heat is contained in the circulating water. Bypassing continues until the water is warm enough to safely be pumped over the tower fill.

Each natural draft cooling tower currently discharges a design maximum of 5,125 GPM of water vapor to the atmosphere (design total of 10,250 GPM). This evaporative loss is replaced by river water from the secondary services cooling system. Refer to Attachment C.

Makeup Water System

The MWS consists of the Unit 1 Pumphouse (described above with the "Cooling Water Intake Structure Data") and associated pipelines that convey makeup water to the natural draft cooling tower basins and the secondary services and nuclear services at TMI-1. Most of the river water that passes through the secondary service coolers is re-used as makeup to the circulating water system with the balance mixed with the natural draft cooling tower blowdown.

Blowdown System

The Blowdown System is provided to control the dissolved solids concentration in the circulating water. Approximately 0.5 to 1.2 percent of the total circulating water is let off continually as blowdown to control the solids build-up and to minimize scale formation in the system. Solids concentrations in the circulating cooling tower water are maintained between two and five times the river concentrations. Blowdown is measured in the flow and radiation monitor box, and discharged to the Susquehanna River. Based on flow records from January 2010 to December 2013, the average and maximum discharge rates to the river are 13,132 GPM (18.9 MGD) and 32,014 GPM (46.1 MGD), respectively.

29. Identify the number of days per year the cooling water system is in operation and seasonal changes in the operation of the system, if applicable.

Once operational, TMI-1 would generate electricity all year, except for scheduled outages (approximately once every two years for several weeks duration) for refueling and planned maintenance activities. In general, the cooling water system operates to support electrical generation with minor seasonal changes.

30. Report the proportion of design intake flow for contact cooling, non-contact cooling and process uses.

Contact Cooling: **0 %**	Non-Contact Cooling: **100%**	Process: **0 %**

31. Describe water reuse, if applicable, including cooling water reused as process water, process water reused for cooling, and the use of gray water for cooling.

N/A

32. Describe reductions in total water withdrawals including cooling water intake flow reductions already achieved through minimized process water withdrawals.

Due to the operation of the cooling towers, cooling water intake flow reductions are achieved through minimized water withdrawals when compared to plant circulating water flow. The circulating water flow rate at TMI-1 is 430,000 gpm and the makeup water flow rate is 14,500 gpm. The reduction in cooling water withdrawal rate is 415,500 gpm or 97 percent. If TMI-1 had been once-through cooled, the total water withdrawal rate would have been approximately 443,550 gpm. But because it has a closed-cycle system its total maximum withdrawal rate is 28,050 gpm. The reduction in total water withdrawal rate from utilizing a closed-cycle system is 415,500 gpm or 94 percent.

Additional flow reduction is recognized during plant outages and planned maintenance activities.

33. Identify and describe any cooling water that is used in a manufacturing process either before or after it is used for cooling, including other recycled process water flows.

N/A

34. Report the proportion of the source water body withdrawn, on a monthly basis.

TMI-1 is not operational at this time. Once operational, the proportion of the source waterbody withdrawn based on the DIF of 81.4 MGD and a mean annual river flow of 38,922 CFS is approximately 0.32%. Streamflow is based on Susquehanna River flow at the USGS Gage Station 01570500, Susquehanna River at Harrisburg, PA.

35. Provide (or attach to Module 5) all design and engineering calculations prepared by a qualified professional and data to support responses to questions 1 through 7 in this section. Attached: Yes No

The through-screen velocity has been calculated at the screens under normal and low water elevations using DIF. The through-screen velocity is approximately 0.58 fps under low water conditions, and approximately 0.27 under normal water conditions.

See Attachment B

36. Describe existing impingement and entrainment technologies or operational measures and a summary of their performance.

TMI-1 operates a closed-cycle cooling system as defined at §125.92 (c)(1) to minimize make-up water withdrawn from the Susquehanna River, a water of the United States. Cooling tower operation provides approximately 97 percent reduction in cooling water withdrawal and approximately 94 percent reduction in total water withdrawal at the facility. As such, TMI-1 meets BTA standards for impingement mortality at §125.94(c)(1) and BTA for entrainment under Best Professional Judgment. In addition to operation of the closed-cycle cooling system, TMI-1 cooling water intake structure has through-screen velocity of 0.5 fps or lower much of the time.

Chosen Method(s) of Compliance with Impingement Mortality Standard

37. Check the appropriate box to indicate which method(s) have been selected to comply with the impingement mortality standard. Also check the appropriate box on the right to indicate whether this method applies to the facility as a whole or to a specific CWIS. If it applies to a specific CWIS, provide the ID No.

X 40 CFR 125.94(c)(1) – Closed-Cycle Recirculating System	X Facility CWIS ID:
☐ 40 CFR 125.94(c)(2) – 0.5 Feet Per Second Through-Screen Design Velocity	☐ Facility CWIS ID:
☐ 40 CFR 125.94(c)(3) – 0.5 Feet Per Second Through-Screen Actual Velocity	☐ Facility CWIS ID:
☐ 40 CFR 125.94(c)(4) – Existing Offshore Velocity Cap	☐ Facility CWIS ID:
☐ 40 CFR 125.94(c)(5) – Modified Traveling Screens	☐ Facility CWIS ID:
☐ 40 CFR 125.94(c)(6) – Systems of Technologies as the BTA for Impingement Mortality	☐ Facility CWIS ID:
☐ 40 CFR 125.94(c)(7) – Impingement Mortality Performance Standard	☐ Facility CWIS ID:

If options 125.94(c)(5) or 125.94(c)(6) are selected, attach an Impingement Technology Performance Optimization Study.

Attached: ☐ Yes ☐ No

38. If a BTA determination for impingement mortality under 40 CFR 125.94(c)(11) or (12), check the appropriate box and attach supporting documentation to Module 5.

40 CFR 125.94(c)(11)	40 CFR 125.94(c)(12)	X Not Applicable

Entrainment Performance Studies

Attach to Module 5 any previously conducted studies or studies obtained from other facilities addressing technology efficacy, through-facility entrainment survival, and other entrainment studies. See instructions.

Attached: Yes ☒ No

Operational Status

39. For power production or steam generation, describe each individual unit operating status, including age of each unit, capacity utilization rate for the previous 5 years, and any major upgrades completed within the past 15 years. See instructions.

TMI-1 began commercial operation in 1974 and was a base-load plant that operated year-round, except for scheduled outages, to produce electric power. It shutdown in 2019, but intends to re-start in the next few years. Scheduled outages for refueling and planned maintenance occur approximately once every two years for several weeks' duration.

Year	Operating Status	Capacity Utilization Factor
2020	Shutdown, awaiting re-start	0%
2021	Shutdown, awaiting re-start	0%
2022	Shutdown, awaiting re-start	0%
2023	Shutdown, awaiting re-start	0%
2024	Shutdown, awaiting re-start	0%

TMI-1modified upgraded Cooling Tower "A" in 2009. In addition, enhanced steam generators were installed at TMI-1 during the fall 2009 refueling outage. They are in-kind replacements and nearly identical to the previous steam generators; however, they have materials of construction that have been analyzed and rated for performance at a higher reactor core thermal output than the existing steam generators.

40. Describe completed, approved or scheduled uprates and Nuclear Regulatory Commission relicensing status of each unit at nuclear facilities.

A measurement uncertainty recovery power uprate was implemented at TMI-1 in 1988 for a 1.3 percent gain in power output. In 2009, the TMI-1 license was extended from 2014 to 2034.

41. For process units using cooling water other than for power production or steam generation, if the applicant intends to use reductions in flow or changes in operations to meet the requirements of 40 CFR 125.95(c), describe individual production processes and product lines, operating status including age of each line, seasonal operation, any major upgrades completed within the last 15 years, and plans or schedules for decommissioning or replacement of process units or production processes and product lines.

N/A

42. For all manufacturing facilities, describe current and future production schedules.

N/A

43. Explain plans or schedules for any new units planned within the next 5 years.

N/A - There are no plans or schedules for new units at TMI-1 within the next five years.

Additional Studies

44. Check the appropriate boxes to indicate whether required studies for existing facilities withdrawing greater than 125 MGD (actual intake flow) are attached to Module 5. N/A – TMI-1 AIF is less than 125 MGD.

☐ 40 CFR 122.21(r)(9) – Entrainment Characterization Study

☐ 40 CFR 122.21(r)(10) – Comprehensive Technical Feasibility and Cost Evaluation Study

40 CFR 122.21(r)(11) – Benefits Valuation Study

40 CFR 122.21(r)(12) – Non-Water Quality Environmental and Other Impacts Study

45. Is an entrainment reduction technology evaluation for existing facilities withdrawing less than or equal to 125 MGD attached?
X Yes ☐ No

New Units – N/A – TMI does not intend to install new units

Identify the chosen compliance method for all new units at existing facilities. See instructions.

N/A - There are no plans or schedules for new units at TMI-1 within the next five years.

ATTACHMENT A
LOCATIONAL MAPS

0 1500 3000 FEET

GRAPHIC SCALE

CONTOUR INTERVAL = 20 FEET

REFERENCE:
A PORTION OF USGS 7.5 MINUTE TOPOGRAPHIC MAP; MIDDLETOWN & YORK HAVEN QUADS, PA. 1955, PHOTOREVISED 1983.

TITLE

TOPOGRAPHIC MAP

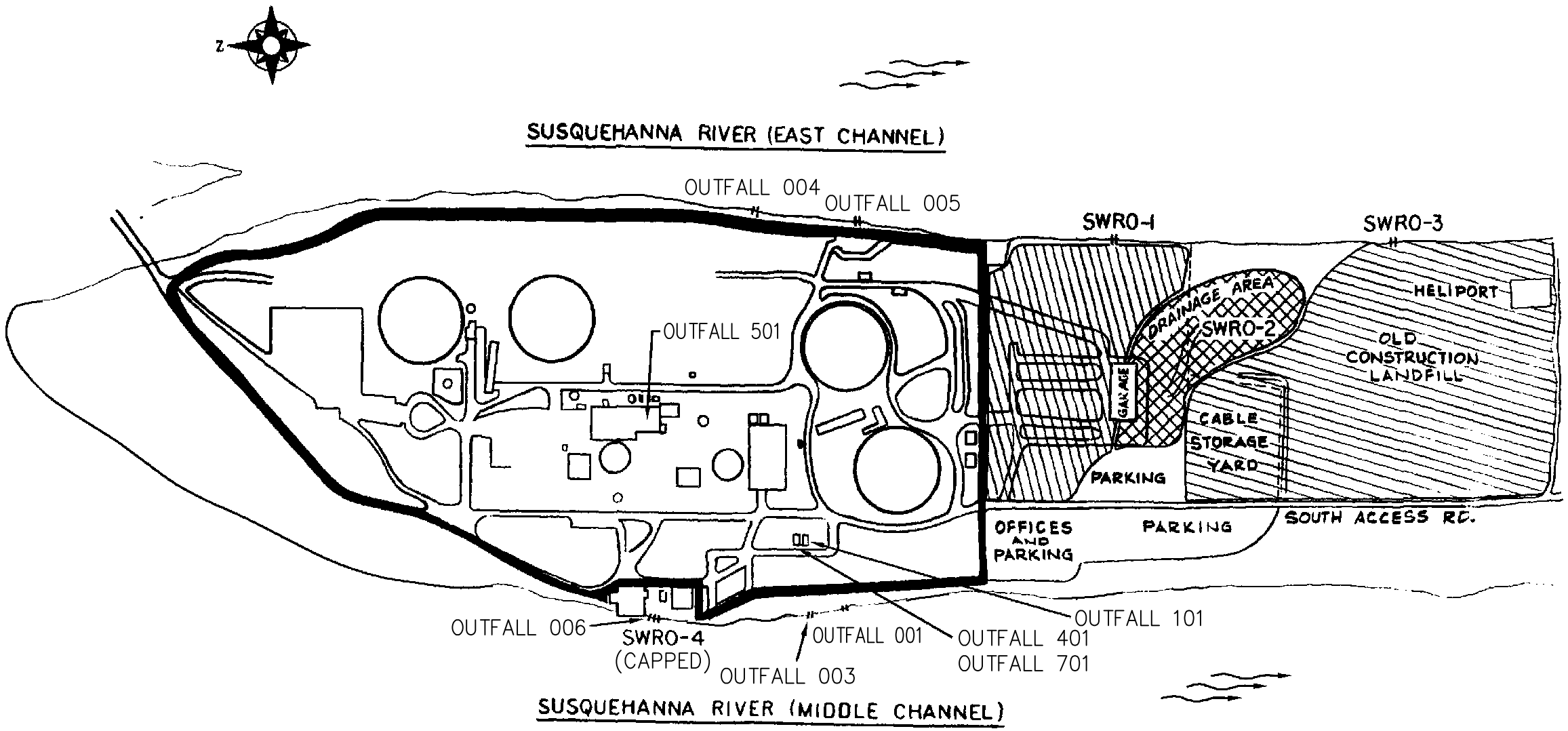
PROJECT

EXELON GENERATION COMPANY, LLC
THREE MILE ISLAND GENERATING STATION
LONDONDERRY TOWNSHIP, DAUPHIN COUNTY, PA

Exelon SM

SCALE	DWN. BY	JOB NO.
AS SHOWN	TFP	20000847.00001
DATE	APPR. BY	FIG. NO.
04/22/15	ECC	1

Drawing Location & Name: S:\Resources\CADD\20242532.00001 - Exelon CWIS Locations\Drawings\CWIS Locations_THREE_MILEBb.dwg
Drawn By & Date/Time: Thomas_Powers Apr 22, 2015 - 1:12pm



STORM WATER OUTFALL (SWRO)	
DESIGNATED OUTFALL	ACREAGE
005A	115.5
SWRO-1	16.5
SWRO-2	11.9
SWRO-3	21.5
*SWRO-4	0.7
TOTAL	166.1

INDUSTRIAL OUTFALLS	
001	MAIN STATION OUTFALL
003	TMI-1 MDCT EMERGENCY OUTFALL
004	BYPASS TMI-1 MDCT
005B	INDUSTRIAL WASTEWATER TO YARD DRAINAGE
006	TMI-1 SCREEN INTAKE STRUCTURE OUTFALL
101	SEWAGE TREATMENT PLANT (INTERNAL)
401	INDUSTRIAL WASTE FILTER SYSTEM (INTERNAL)
501	SECONDARY NEUTRALIZER TANK (INTERNAL)
701	INDUSTRIAL WASTE TREATMENT SYSTEM (INTERNAL)

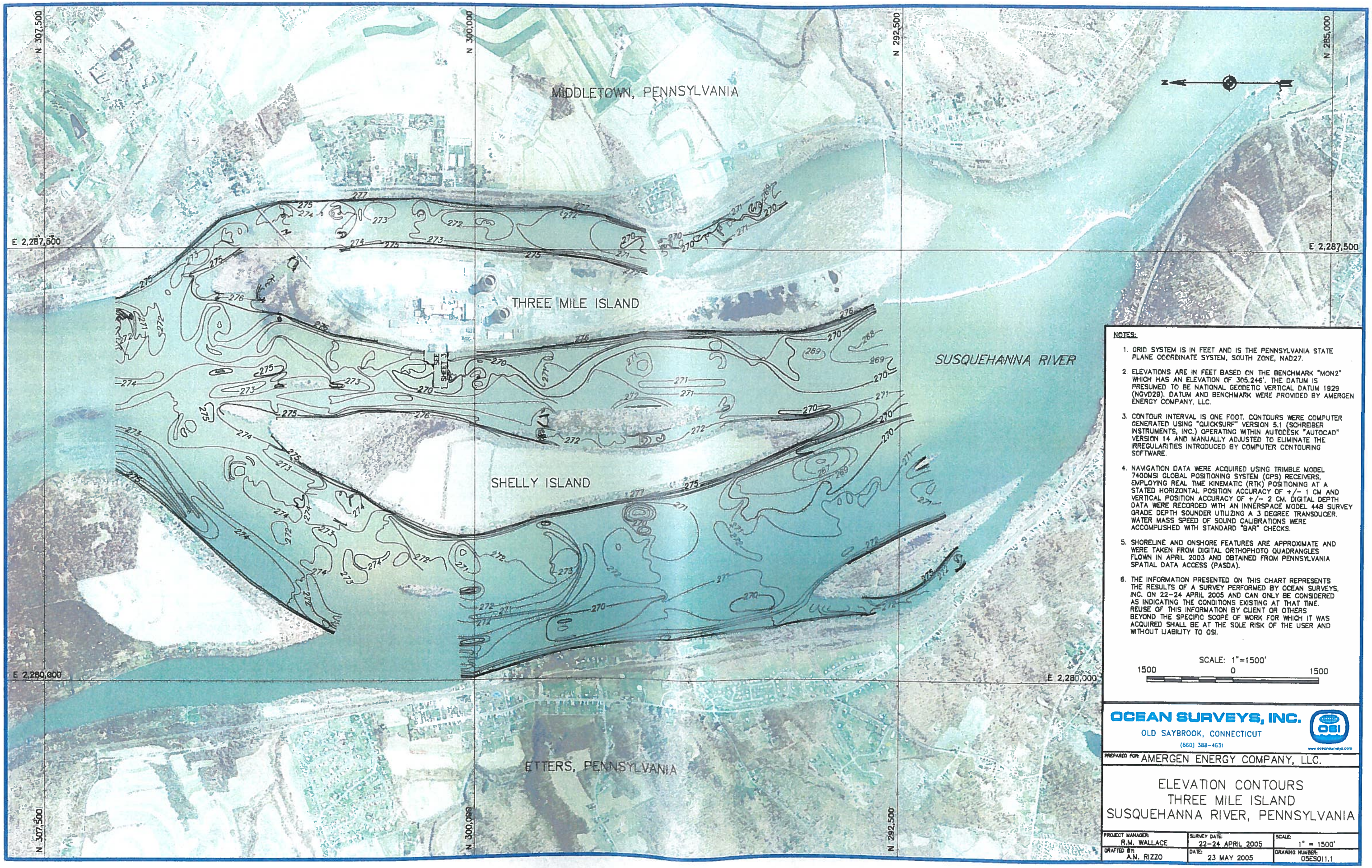
*NOTE: SWR04 IS CAPPED AND IS NO LONGER AN ACTIVE DISCHARGE.

THREE MILE ISLAND NUCLEAR STATION

NPDES PERMIT PA 0009920

STORM WATER AND INDUSTRIAL OUTFALL LOCATIONS

CAD FILE: S1A-SKC-1010_R4



NOTES:

1. GRID SYSTEM IS IN FEET AND IS THE PENNSYLVANIA STATE PLANE COORDINATE SYSTEM, SOUTH ZONE, NAD27.
2. ELEVATIONS ARE IN FEET BASED ON THE BENCHMARK "MON2" WHICH HAS AN ELEVATION OF 305.246'. THE DATUM IS PRESUMED TO BE NATIONAL GEODETIC VERTICAL DATUM 1929 (NGVD29). DATUM AND BENCHMARK WERE PROVIDED BY AMERGEN ENERGY COMPANY, LLC.
3. CONTOUR INTERVAL IS ONE FOOT. CONTOURS WERE COMPUTER GENERATED USING "QUICKSURF" VERSION 5.1 (SCHREIBER INSTRUMENTS, INC.) OPERATING WITHIN AUTODESK "AUTOCAD" VERSION 14 AND MANUALLY ADJUSTED TO ELIMINATE THE IRREGULARITIES INTRODUCED BY COMPUTER CONTOURING SOFTWARE.
4. NAVIGATION DATA WERE ACQUIRED USING TRIMBLE MODEL 7400NSI GLOBAL POSITIONING SYSTEM (GPS) RECEIVERS, EMPLOYING REAL TIME KINEMATIC (RTK) POSITIONING AT A STATED HORIZONTAL POSITION ACCURACY OF +/- 1 CM AND VERTICAL POSITION ACCURACY OF +/- 2 CM. DIGITAL DEPTH DATA WERE RECORDED WITH AN INNERSPACE MODEL 448 SURVEY GRADE DEPTH SOUNDER UTILIZING A 3 DEGREE TRANSDUCER. WATER MASS SPEED OF SOUND CALIBRATIONS WERE ACCOMPLISHED WITH STANDARD "BAR" CHECKS.
5. SHORELINE AND ONSHORE FEATURES ARE APPROXIMATE AND WERE TAKEN FROM DIGITAL ORTHOPHOTO QUADRANGLES FLOWN IN APRIL 2003 AND OBTAINED FROM PENNSYLVANIA SPATIAL DATA ACCESS (PASDA).
6. THE INFORMATION PRESENTED ON THIS CHART REPRESENTS THE RESULTS OF A SURVEY PERFORMED BY OCEAN SURVEYS, INC. ON 22-24 APRIL 2005 AND CAN ONLY BE CONSIDERED AS INDICATING THE CONDITIONS EXISTING AT THAT TIME. REUSE OF THIS INFORMATION BY CLIENT OR OTHERS BEYOND THE SPECIFIC SCOPE OF WORK FOR WHICH IT WAS ACQUIRED SHALL BE AT THE SOLE RISK OF THE USER AND WITHOUT LIABILITY TO OSI.

SCALE: 1"=1500'

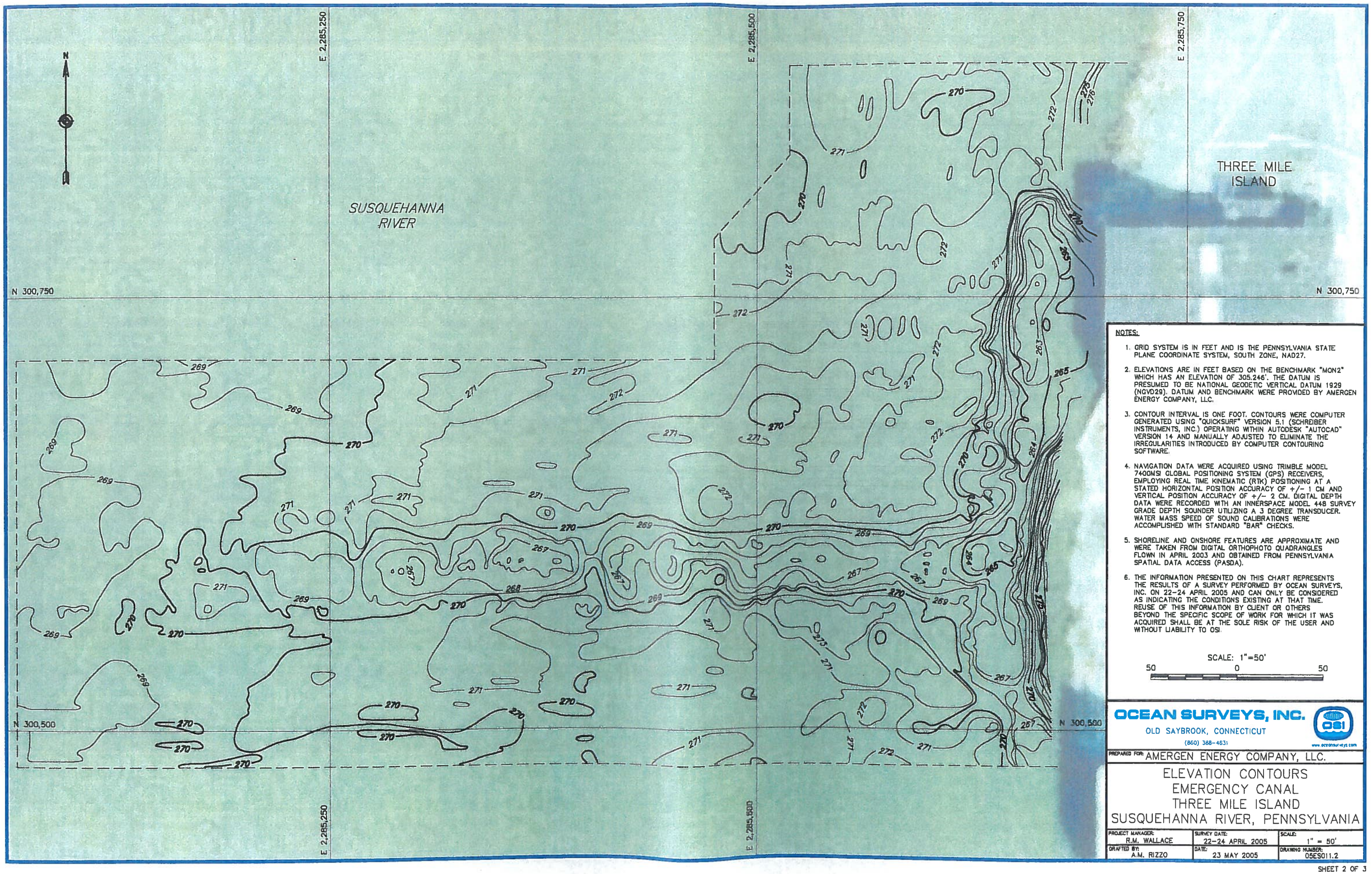
1500 0 1500

OCEAN SURVEYS, INC.
OLD SAYBROOK, CONNECTICUT
(860) 388-4631
www.oceansurveys.com

PREPARED FOR: AMERGEN ENERGY COMPANY, LLC.

ELEVATION CONTOURS
THREE MILE ISLAND
SUSQUEHANNA RIVER, PENNSYLVANIA

PROJECT MANAGER: R.M. WALLACE	SURVEY DATE: 22-24 APRIL 2005	SCALE: 1" = 1500'
DRAFTED BY: A.M. RIZZO	DATE: 23 MAY 2005	DRAWING NUMBER: 05ES011.1



NOTES:

1. GRID SYSTEM IS IN FEET AND IS THE PENNSYLVANIA STATE PLANE COORDINATE SYSTEM, SOUTH ZONE, NAD27.
2. ELEVATIONS ARE IN FEET BASED ON THE BENCHMARK "MON2" WHICH HAS AN ELEVATION OF 305.246'. THE DATUM IS PRESUMED TO BE NATIONAL GEODETIC VERTICAL DATUM 1929 (NGVD29). DATUM AND BENCHMARK WERE PROVIDED BY AMERGEN ENERGY COMPANY, LLC.
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4. NAVIGATION DATA WERE ACQUIRED USING TRIMBLE MODEL 7400MSI GLOBAL POSITIONING SYSTEM (GPS) RECEIVERS, EMPLOYING REAL TIME KINEMATIC (RTK) POSITIONING AT A STATED HORIZONTAL POSITION ACCURACY OF +/- 1 CM AND VERTICAL POSITION ACCURACY OF +/- 2 CM. DIGITAL DEPTH DATA WERE RECORDED WITH AN INNERSPACE MODEL 448 SURVEY GRADE DEPTH SOUNDER UTILIZING A 3 DEGREE TRANSDUCER. WATER MASS SPEED OF SOUND CALIBRATIONS WERE ACCOMPLISHED WITH STANDARD "BAR" CHECKS.
5. SHORELINE AND ONSHORE FEATURES ARE APPROXIMATE AND WERE TAKEN FROM DIGITAL ORTHOPHOTO QUADRANGLES FLOWN IN APRIL 2003 AND OBTAINED FROM PENNSYLVANIA SPATIAL DATA ACCESS (PASDA).
6. THE INFORMATION PRESENTED ON THIS CHART REPRESENTS THE RESULTS OF A SURVEY PERFORMED BY OCEAN SURVEYS, INC. ON 22-24 APRIL 2005 AND CAN ONLY BE CONSIDERED AS INDICATING THE CONDITIONS EXISTING AT THAT TIME. REUSE OF THIS INFORMATION BY CLIENT OR OTHERS BEYOND THE SPECIFIC SCOPE OF WORK FOR WHICH IT WAS ACQUIRED SHALL BE AT THE SOLE RISK OF THE USER AND WITHOUT LIABILITY TO OSI.

SCALE: 1"=50'

50 0 50

OCEAN SURVEYS, INC.
OLD SAYBROOK, CONNECTICUT
(860) 388-4631
www.oceansurveys.com

PREPARED FOR: AMERGEN ENERGY COMPANY, LLC.

ELEVATION CONTOURS EMERGENCY CANAL THREE MILE ISLAND SUSQUEHANNA RIVER, PENNSYLVANIA

PROJECT MANAGER: R.M. WALLACE	SURVEY DATE: 22-24 APRIL 2005	SCALE: 1" = 50'
DRAFTED BY: A.M. RIZZO	DATE: 23 MAY 2005	DRAWING NUMBER: 05ES011.2

ATTACHMENT B
CALCULATIONS

Crane Clean Energy Center

Through-Screen Velocity

Revision: 0
Issue Date: 1/15/2025

Revision No.	Revised by:	Approved by:	Description
0	-	-	-

Calculation Summary:

Through Screen Velocities			
Water Depths	**Units**	**Unit 1**	
Low Water Level	fps	0.58	
Normal Water Level	fps	0.27	

Crane Clean Energy Center

Through-Screen Velocity

Revision: 0
Issue Date: 1/15/2025

System Description:
Crane Clean Energy Center (CCEC) Pumphouse has three through-flow traveling screens that protect service, screenwash, decay heat and emergency cooling pumps.

Calculation Purpose:
1. Calculate the through-screen velocity under low-water, normal water, and high-water conditions for the Crane cooling water intake structure.

Calculation Objectives:

1. Identify the screen physical parameters and design intake flow rate.
2. Calculate the proportion of open screen area to screen surface area.
3. Calculate through-screen velocity.

Calculation Methodology:

Formula 1 $V = Q / (WD * OA * TW * K)$ [1]

where:

Q = flow rate in gallons per minute (gpm)
V = through-screen velocity in feet per second (fps)
WD = wetted screen depth in feet (ft)
OA = proportion of screen open area to total screen area
TW = nominal screen basket width in ft
K = constant for thru-flow screens

Formula 2 $OA = (W * L) / ((W + D) * (L + d))$ [1]

where:

d = horizontal wire diameter in inches (in)
D = vertical wire diameter (in)
W = width of mesh opening (in)
L = vertical length of mesh opening (in)

Formula 3 $EOA = PC * OA$

Formula 4 $V_{eff} = Q / (WD * EOA * TW * K)$

where:

EOA = proportion of effective open area
PC = screen percent clean (%)
V_{eff} = effective through-screen velocity

Crane Clean Energy Center

Through-Screen Velocity

Revision: 0
Issue Date: 1/15/2025

Design Inputs:

	Total Pumps	Duty Pumps	Pump Rating (gpm)	Total Flowrate (gpm)	Total Flowrate (MGD)	References
Secondary River	3	2	7,250	14,500	20.9	[4],[5]
Nuclear River	3	2	6,000	12,000	17.3	[4],[5]
Decay River	2	0	7,000	-	0.0	[4],[5]
Reactor Bldg Emer. Cooling	2	0	5,400	-	0.0	[4],[5]
Screen Water Pump	2	1	1,400	1,400	2.0	[4],[5]
Fire Protection	2	0	2,500	-	0.0	[4],[5]
Intake ventilation pumps	2	1	150	150	0.2	[4],[5]
Total				**28,050**	**40.4**	

Design Variables	Unit 1	Units	References
Number of screens	3	number	[3]
Design Intake Flow	28,050	gpm	calc above
Low Water Level (LWL)	271.0	feet	[3]
Normal Water Level (NML)	278.0	feet	[3]
High Water Level (HWL)	303.5	feet	[3]
Invert Elevation in TWS Bay	265.0	feet	[3]
Elevation of bottom of curtain wall	275.0	feet	[3]
Water Depth at LWL	6.0	feet	calc
Water Depth at NWL	13.0	feet	calc
Water Depth at HWL	38.5	feet	calc
Screen basket width	10.0	feet	[3]
Mesh size (L)	0.375	inch	[3]
Mesh size (W)	0.375	inch	[3]
Wire gauge type	W&M	W&M	Assm. 2
Vertical wire gauge number	14	gauge	[3]
Vertical wire diameter	0.080	inch	[2]
Horizontal wire gauge number	14	gauge	[3]
Horizontal wire diameter	0.080	inch	[2]
Screen percent clogged	0%	percent	Assm.
Intake Bay Width (CS)	22.0	feet	[3]

Assumptions:

1. Water elevation inside screenhouse is same as pool elevation.
2. The wire is Washburn & Moen gauge
3. No changes to as-built configuration after dates of references used.
4. All three intake screens are normally in service.
5. The constant for Formula 1 includes units conversion (gpm to cfs) and screen efficiency factors.
6. The design flow is conservative.

References

[1] Pankratz, T.M., *Screening Equipment Handbook* , Technomic Publishing Co., Lancaster, Pennsylvania, 1988.
[2] Lide, D.R., CRC Handbook of Chemistry and Physics (Ed. 72), Chemical Rubber Publishing Co., USA, 1991-1992.
[3] Dwg.No. IE-168-02-002, Rev. 7, 2/8/96
[4] Constellation TMI TODA 10/23/24.
[5] Comments from Alyssa Hockaday

Crane Clean Energy Center

Through-Screen Velocity

Revision: 0
Issue Date: 1/15/2025

Calculations:

1. Screen Physical Parameters and Design Intake Flow Rate

Given:

	Variables	Unit 1	Units
	Q_{total} =	28,050	gpm
	Q=	9,350	gpm/screen
	D=	0.08	in
	d=	0.08	in
	L=	0.375	in
	W=	0.375	in
Normal	WD=	13.0	ft
Low	WD=	6.0	ft
	K=	396	-
	TW=	10.0	ft
	PC=	100%	%

2. Proportion of Effective Open Screen Area to Total Screen Area

Formulae Used:
Formulae 3 and 4

Given:
Screen parameters as above

Calculate:

	Unit 1
OA = (W * L) / ((W + D) * (L + d)) =	0.68
EOA = PC * OA =	0.68

Calculations: cont.

3. Design Through-screen Velocity

Formulae Used:
Formula 4

Given:
Screen parameters as above and calculated screen open area proportion

Calculate:

V_{eff} = Q / (WD * EOA * TW * K) =

Water Depth	Unit 1	Units
Low Water Level	0.58	fps
Normal Water Level	0.27	fps

ATTACHMENT C
DRAWINGS AND SCHEMATICS

DWG.NO. 1D-SKM-263 SH. 1 OF 1

REVISIONS		
REV	ZONE	DESCRIPTION
4		GENERAL REVISION

FIRE SERVICE WATER

TMI-1 CIRCULATING WATER PUMP HOUSE & CHEMICAL ADDITION BUILDING FLOOR DRAINS

SCREEN HOUSE VENTILATION

RAINWATER (C)

DISMANTLED UNIT-2 NATURAL DR. COOL.TOWERS

TMI-2 CIRCULATING WATER PUMP HOUSE FLOOR DRAINS (GROUNDWATER)

EAST DAM SETTLING BASIN

OUTFALL 005 (X) TO EAST CHANNEL SUSQUEHANNA RIVER

BASIN DRAIN (X)

NDCT DESILT LINE

UNIT-1 DESILT BASIN

FIRE BRIGADE TRNG. CTR. O/W SEPARATOR

EVAPORATION

UNIT-1 NATURAL DR. COOL.TOWERS

MAIN CONDENSER

BEARING LUBRICANT WATER FROM FILTERED WATER SYSTEM

(C)

BLOWDOWN

OUTFALL 004 (X) EMERGENCY DISCHARGE TO EAST CHANNEL SUSQUEHANNA RIVER

STATION BLACKOUT EMERG.DIESEL GEN. COOLING WATER FROM FIRE SYSTEM

YARD DRAIN SYSTEM

- INTAKE STRUCTURES DESILTATION SETTLING BASIN DISCHARGE
- ALTITUDE TANK (C)
- FIRE SYSTEM WATER (C)
- POTABLE WATER SYSTEM (C)
- STORM WATER
- TMI-1 INDUSTRIAL COOLER MAINTENANCE AND INTERMITTENT LEAKAGE (C)
- DEMINERALIZED WATER STORAGE TANK
- DEMINIMUS CONDENSATION FROM PLANT STEAM SYSTEM LEAKAGE
- MISCELLANEOUS BUILDING SUMP DISCHARGE UNCONTAMINATED RAINWATER (e.g.,AIR INTAKE SUMP, "CARPORT" STORAGE BUILDING,ETC.)
- TMI-1 EMERGENCY DIESEL GENERATOR FLOOR DRAINS
- AIR CONDITIONER CONDENSATE
- MISCELLANEOUS SECONDARY CONTAINMENT (UNCONTAMINATED RAINWATER)
- OIL/WATER SEPARATOR-200,000 GALLON DIESEL FUEL OFFLOADING AREA

DE-ICING MAKE-UP

NDCT DRAINDOWN LINE

INTAKE DE-ICE

(X)

SECONDARY SERVICES

R. B. EMERGENCY COOLING

DECAY HEAT

NUCLEAR SERVICE

SCREEN WASH PUMPS

(C)

UNIT-1 INTAKE

SCREEN INTAKE STRUCTURE FLOOR DRAINS

(C)

OUTFALL 006 TO CENTER CHANNEL SUSQUEHANNA RIVER

RIVER WATER PUMP STRAINER BACKWASH

SECONDARY PLANT LAB DRAINS

(C) ECOLOCHEM, INC. REVERSE OSMOSIS UNIT MAKE-UP WATER PURIFICATION WASTEWATER

CORROSIVE WASTE SUMP

UNIT 1 NEUTRALIZER TANK

OUTFALL 501 (X)

CAUSTIC & ACID TANK SPILL CONTAINMENT

MAKE-UP DEMINERALIZER REGENERATION WASTE

OUTFALL 003 (X) EMERGENCY DISCHARGE TO CENTER CHANNEL SUSQUEHANNA RIVER

(C)

TMI-1 LIQUID RADWASTE (USNRC LICENSED DISCHARGE)

UNIT-1 MDCT

(C)

UNIT-1 INDUSTRIAL COOLER BLOWDOWN

UNIT-1 AUX. BOILER BLOW DOWN (C)

(C)

MISCELLANEOUS TMI-1 SUMPS & DRAINS

TMI-2 EMERG.DIESEL GEN.BLDG.SUMP

MISCELLANEOUS TMI-2 SUMPS & DRAINS

IWTS WASTE COLL. SUMP

UNIT-1 TURBINE SUMP

INTERMEDIATE BLDG. SUMPS A & B

UNIT-1 CONDENSATE POWDEX FILTER BACKWASH (C)

MISCELLANEOUS UNIT 1 SYSTEM/EQUIPMENT DRAINING

(C)

FILTER CAKE DISPOSAL

EMERGENCY BYPASS TO UNIT-1 MDCT (VIA SECONDARY SERVICES)

OUTFALL 001 (X) MAIN STATION DISCHARGE TO CENTER CHANNEL SUSQUEHANNA RIVER

SUMP DECANT

IWTS

OUTFALL 701 (X)

(X)

SLUDGE TO IWFS

(C)

OUTFALL 101

SEWAGE TREATMENT PLANT

SANITARY WASTE

(C)

MISCELLANEOUS SUMPS & DRAINS

UNIT-1 CONDENSATE POWDEX FILTER BACKWASH

UNIT-1 IWT CARBON FILTER BACKWASH

UNIT-1 PRETREATMENT FILTER BACKWASH

UNIT-1 PRETREATMENT SUMP

UNIT-1 PRETREATMENT CLARIFIER SLUDGE

UNIT-1 SURFACE WATER FILTER BACKWASH

IWFS

OUTFALL 401 (X)

FILTER CAKE DISPOSAL

ACCUMULATED RAINWATER

DISMANTLED UNIT-2 MDCT

SCREEN INTAKE STRUCTURE FLOOR DRAINS

DISMANTLED UNIT-2 INTAKE BUILDING

DISMANTLED OUT-OF-SERVICE COOLING WATER SYSTEMS (NO FLOW)

LEGEND

- NORMAL FLOW PATTERN
- INTERMITTENT OR EMERGENCY FLOW PATTERN
- (C) CHEMICAL ADDITION LOCATION
- (X) NPDES PERMIT SAMPLE LOCATION

NO.	DWG. NO.	TITLE
REFERENCES		

Cad File Name : 1D-SKM-263_S1_R3

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Exelon Nuclear

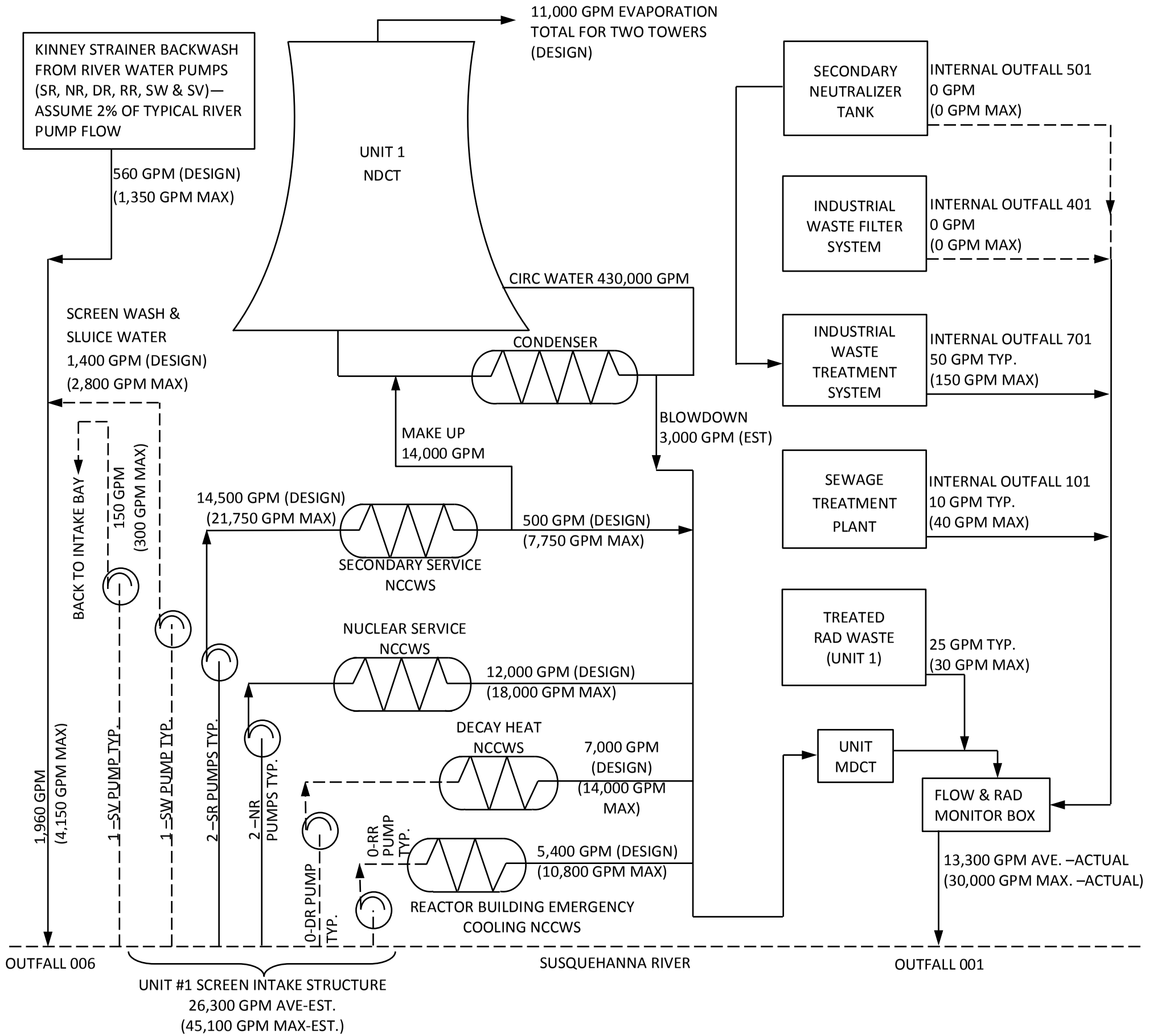
DRAWN	DATE
MARK EVERLY	04/17/12

THREE MILE ISLAND NUCLEAR STATION
NPDES PERMIT PA 0009920
SIMPLIFIED WATER FLOW CHART

TMI-1	DWG. NO.	SH.	REV.
	1D-SKM-263	1 OF 1	4
	SCALE: N/A		

INTERFACING CONCURRENCE

BA NO. –



KEY

SR- Secondary River Water System (3 pumps @ 7,250 gpm)
NR- Nuclear River Water System (3 pumps @ 6,000 gpm)
DR- Decay Heat River Water System (2 pumps @ 7,000 gpm)
RR- Reactor Building Emergency Cooling Water System (2 pumps @ 5,400 gpm)
SW- Screen Wash and Sluice Water System (2 pumps @ 1,400 gpm)
SV- Screen Intake Structure Ventilation System (2 pumps @ 150 gpm) Discharge directly back to Intake Structure
NCCWS- Non-Contact Cooling Water System
MDCT- Mechanical Draft Cooling Tower
NDCT- Natural Draft Cooling Tower

DRAWING NOTES

1. The FOLLOWING discharges are intermittent batch releases:
   a. Industrial Waste Treatment System (IWTS – Outfall 701)
   b. Secondary Neutralizer Tank (Outfall 501)
   c. Treated Liquid Radioactive Waste Treatment
2. Secondary Neutralizer Tank normally discharges to IWTS (Outfall 701).
3. Industrial Waste Filter System is out-of-service as a treatment system. Sump may be used as holding tank for IWTS treatment.
4. Screen Wash and Sluice Water System Screen Vent Pumps operate intermittently.
5. Decay Heat River and Reactor Building Emergency Cooling river pumps are operated intermittently.
6. Typical flows and maximum flows are actual flow data where available. Design or estimated flows are used when actual flow data are not available.
7. Screen Intake Structure Inlet flow rates are estimated using actual Outfall 001 flow rates, the design Evaporation rates and the estimated flow at Outfall 006.

Water Use Schematic
Three Mile Island Nuclear Station (TMI-1)

Exelon Generation Company, LLC
Middletown, Pennsylvania

Exelon

Revision: 09/29/2015; WJC	Drawn By: ECC	URS Job Number: 19999070
Date: 04/09/2012	Approved By: RDS	Project: NPDES Permit Renewal

REVISIONS		
REV	ZONE	DESCRIPTION
13	G 7	REVISED TO INCORPORATE AN ADMINISTRATIVE REVISION

RB-V3A
RB-V4A
RB-V5A
RB-V6A
RB-V7A
RB-V8A
RB-V3B
RB-V4B
RB-V5B
RB-V6B
RB-V7B
RB-V8B
RB-V3C
RB-V4C
RB-V5C
RB-V6C
RB-V7C
RB-V8C
1" VENT RR-V23A
1" DRAIN RR-V24A
1" VENT RR-V25A
1" DRAIN RR-V26A
1" VENT RR-V23B
1" DRAIN RR-V24B
1" VENT RR-V25B
1" DRAIN RR-V26B
1" VENT RR-V23C
1" DRAIN RR-V24C
1" VENT RR-V25C
1" DRAIN RR-V26C
1" DRAIN RB-V8A
1" DRAIN RB-V8B
1" DRAIN RB-V8C
EMERGENCY COOLING COIL 1A
EMERGENCY COOLING COIL 1B
EMERGENCY COOLING COIL 1C
302-848 (F-2)
RB-V1A SEE NOTE 3
RB-V1B SEE NOTE 3
RB-V1C SEE NOTE 3
RB-V10 SEE NOTE 3
RB-V1E SEE NOTE 3
AH-C-3A
AH-C-3B
REACTOR COMPARTMENT COOLING COILS
RB-V12A
RB-V12B
RB-V11
1" DRAIN
RB
FROM INDUSTRIAL COOLER AH-C-1B 302-845(F-5)
RB-V39
RB-V2A
RB-V2
RB-V1S
RB-V1G
3/8" OD
3/4"
TO WATER CIRC PUMPS AH-P-2A & 2B 302-845(G-5)
RB-V7
1" VENT RB-V9
1" VENT RB-V6
#421
#422
5-I
5-H
ES
FE 20
FE 21
FE 22
PT 225
FT 24
FE 24
PT 226
FT 25
FE 25
PT 224
FT 23
FE 23
TI 612
TI 613
TI 614
#410
#411
#412
#407
#408
#409
RR-V3A
RR-V3B
RR-V3C
RR-V4A
RR-V4B
RR-V4C
RR-V40
RR-V14A
RR-V14B
RR-V14C
RR-V11A SEE NOTE 3
RR-V11B SEE NOTE 3
RR-V11C SEE NOTE 3
RR-V15A
RR-V15B
RR-V15C
RR-V9A
RR-V9B
RR-V9C
VENT RR-V13
VENT RR-V16
PS 417
RR-V8A
RR-V8B
RR-V27A
RR-V27B
RR-V1A
RR-V1B
RR-V10A
RR-V10B
RR-V2A
RR-V2B
RR-V40A
RR-V40B
RR-V32A
RR-V32B
DPIS 135
DPIS 136
RR-S-1A
RR-S-1B
PI 4694
PI 4696
RR-V7A
RR-V7B
RR-V10AB
RR-V10BB
RR-V12A
RR-V12B
XJ-10A
XJ-10B
RR-P-1A
RR-P-1B
R.B. EMERGENCY COOLING PUMPS
SERVICE WATER SCREEN AND PUMP HOUSE
FROM NS-V12 302-810 (C-10)
EF-V5
EF-V4
TO EFP SUCTION 302-082 (D-8) TO EF-V3
PC 7
PI 7
TO RIVER WATER DISCHARGE LINE 302-707(D-2)
RR-V6
RR-V5

NOTES:

1. VALVE POSITION SHOWN FOR REFERENCE ONLY. ACTUAL POSITIONS CONTROLLED BY PROCEDURES.
2. ALL INSTRUMENT TAG NUMBERS ARE PREFIXED BY SYSTEM DESIGNATOR UNLESS OTHERWISE NOTED
3. SET POINT VALUES FOR RELIEF VALVES TO BE FOUND IN THE APPLICABLE ENGINEERING SET POINT DATA BASE

NO	DWG. NO.	TITLE
3	302-003	COMPONENT & SYS ID INDEX
2	302-002	SYMBOLS INSTRUMENTATION
1	302-001	SYMBOLS FLOW DIAGRAM

REFERENCES

Cad File Name: 302611_R13

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MARK TENTONE 01/28/10

DESIGNER n/a DATE

ENGINEER n/a DATE

INTERFACING CONCURRENCE

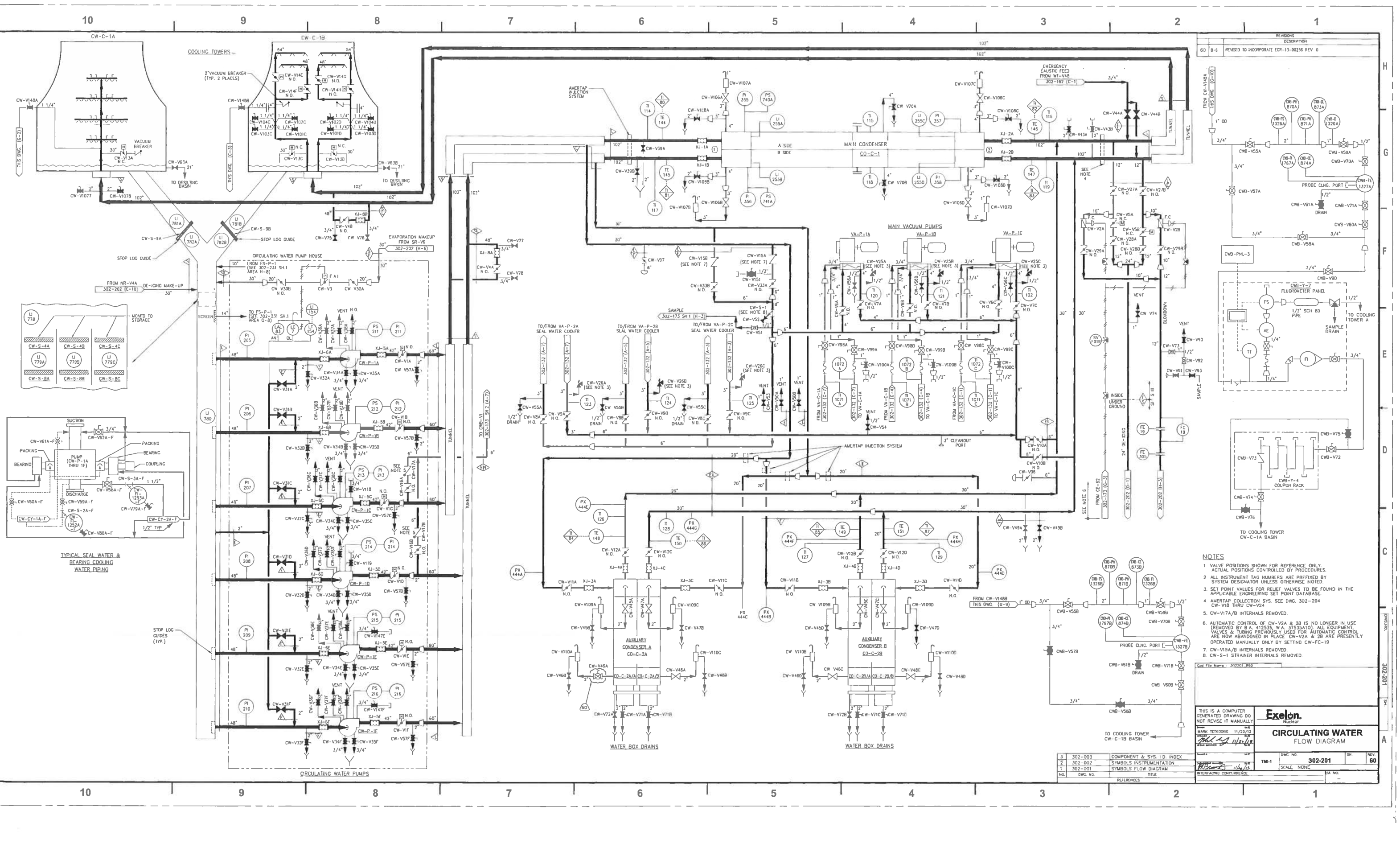
DEA NO. -

REACTOR BLDG NORMAL & EMERGENCY COOLING WATER SYS FLOW DIAGRAM

TMI-1 DWG. NO. 302-611 SH - REV 13

SCALE: NONE

302-611



NOTES

1. VALVE POSITIONS SHOWN FOR REFERENCE ONLY. ACTUAL POSITIONS CONTROLLED BY PROCEDURES.
2. ALL INSTRUMENT TAG NUMBERS ARE PREFIXED BY SYSTEM DESIGNATOR UNLESS OTHERWISE NOTED.
3. SET POINT VALUES FOR RELIEF VALVES TO BE FOUND IN THE APPLICABLE ENGINEERING SET POINT DATABASE.
4. AMERTAP COLLECTION SYS. SEE DWG. 302-204
   CW-V18 THRU CW-V24
5. CW-V17A/B INTERNALS REMOVED.
6. AUTOMATIC CONTROL OF CW-V2A & 2B IS NO LONGER IN USE (REMOVED BY B.A. 412535, W.A. 37535A10). ALL EQUIPMENT, VALVES & TUBING PREVIOUSLY USED FOR AUTOMATIC CONTROL ARE NOW ABANDONED IN PLACE. CW-V2A & 2B ARE PRESENTLY OPERATED MANUALLY ONLY BY SETTING CW-FC-19
7. CW-V15A/B INTERNALS REMOVED.
8. CW-S-1 STRAINER INTERNALS REMOVED.

REVISIONS		
	DESCRIPTION	
60	8-6	REVISED TO INCORPORATE ECR-13-00236 REV 0

Cad File Name: 302201_P60

NO.	DWG. NO.	TITLE
3	302-003	COMPONENT & SYS. I.D. INDEX
2	302-002	SYMBOLS INSTRUMENTATION
1	302-001	SYMBOLS FLOW DIAGRAM

REFERENCES

THIS IS A COMPUTER GENERATED DRAWING DO NOT REVISE IT MANUALLY

DRAWN: MARK TETKOSKIE 11/20/13
DESIGN:
ENGR APPROVED:
CHECKED:
APPROVED:
INTERFACING CONCURRENCE:

Exelon. Nuclear

CIRCULATING WATER FLOW DIAGRAM

TMI-1 | DWG NO. 302-201 | SH. | REV. 60 | SCALE: NONE | DATA NO. -

REVISIONS		
REV	ZONE	DESCRIPTION
81	D-7	REVISED TO INCORPORATE ECR-12-00035 REV 2

NUCLEAR SERVICE HEAT EXCHANGERS

IC-C-1A INTERMEDIATE SERVICE COOLER "A"

IC-C-1B INTERMEDIATE SERVICE COOLER "B"

DC-C-2A DECAY HEAT SERVICE COOLER 1A

DC-C-2B DECAY HEAT SERVICE COOLER 1B

SECONDARY SERVICE HEAT EXCHANGERS

SC-C-1A

SC-C-1B

SC-C-1C

SC-C-1D

BACKWASH

HEAT EXCHANGER VAULT

NUCLEAR SERVICE PUMPS

SECONDARY SERVICE PUMPS

D.H. RIVER WATER PUMPS

S.H. VENT EQUIPMENT PUMPS

SERVICE WATER SCREEN AND PUMP HOUSE

RIVER DISCHARGE LINE

48" CONCRETE PIPE

24" CONCRETE

EMERGENCY DUMP THRU E. DIKE

DE-ICING

TO CHLORINE EJECTOR 302-174(C-5)

TO CLARIFIER 302-161 (H-8)

FROM TURB ROOM SUMP 302-165 (H-5)

12" BLOWDOWN

FE-305 302-201 (C-2)

EVAPORATION MAKE-UP 30" CW-V30A 302-201 (F-8)

TO COOLING TOWER

SEE DWG 302-182(B-7)

SEE DWG 302-182 (B-8)

FOR CLOSED CYCLE COOLING WATER SEE DWG. 302-645

FROM R.B. EMERGENCY COOLING 302-611 (B-2)

FROM WASTE EVAPORATOR 302-719(E-2)

UNIT #2 MECH DRAFT COOLING TOWER COLLECTION SUMP

TO RIVER

TO PUMP HOUSE

SUP STREAM SAMPLE POINT SEE NOTE 5.

SUP STREAM SAMPLE POINT. SEE NOTE 5.

BOLOK SAMPLER

OVERFLOW

COLLECTION SUMP

RADIATION MONITOR PIT

FROM MAIN DETOX 302174 (B-2)

TO MAIN DETOX 302174 (D-3)

OUTSIDE SAMPLE

UNDER-ARMING GROUND

NOTES:

1. VALVE POSITION SHOWN FOR REFERENCE ONLY. ACTUAL POSITIONS CONTROLLED BY PROCEDURES.
2. ALL INSTRUMENT TAG NUMBERS ARE PREFIXED BY SYSTEM DESIGNATOR UNLESS OTHERWISE NOTED.
3. SET POINT VALUES FOR RELIEF VALVES ARE FOUND IN THE APPLICABLE ENGINEERING SET POINT DATABASE.
4. TE-894 AND TI-89 ARE ALSO ASSOCIATED WITH RB EMERGENCY COOLING PUMPS RR-P-1A AND RR-P-1B ON DWG. 302-611.
5. THE SIDE STREAM SAMPLING UNIT IS LOCATED HERE BUT IS MOUNTED ON MOBIL CART. SEE CCR-86-0009-532-06 FOR CONFIGURATION.
6. INSTRUMENTS USED INTERMITTENTLY.

FOR SCREEN WASH & SLUICE SYSTEM, SEE DWG 302-203

* – INTERNALS REMOVED FROM VALVES DR-V6A & CR-V6B

NO.	DWG. NO.	TITLE
3	302-003	COMPONENT & SYS ID INDEX
2	302-002	INSTRUMENTATION SYMBOLS
1	302-001	SYMBOLS FLOW DIAGRAM

REFERENCES

THIS IS A COMPUTER GENERATED DRAWING DO NOT REVISE IT MANUALLY

Exelon. NUCLEAR

NUCLEAR SERVICES
RIVER WATER SYSTEM
FLOW DIAGRAM

DWG NO.	SH	REV
302-202		81

SCALE: NONE

TMI-1

Cad File Name: 302202_R81

REVISIONS		
REV	ZONE	DESCRIPTION
69	B-6	REVISED TO INCORPORATE AN ADMINISTRATIVE REVISION BY CORRECTING A TYPOGRAPHICAL ERROR. SEE AR 00914975.

NOTES:

1. VALVE POSITIONS SHOWN FOR REFERENCE ONLY. ACTUAL POSITIONS CONTROLLED BY PROCEDURES.
2. ALL INSTRUMENT TAG NUMBERS ARE PREFIXED BY SYSTEM DESIGNATOR UNLESS OTHERWISE NOTED.
3. SET POINT VALUES FOR RELIEF VALVES TO BE FOUND IN THE APPLICABLE ENGINEERING SET POINT DATA BASE.
4. ALL PIPING ON THIS DRAWING LINE SPECIFICATION E, EXCEPT AS NOTED.
5. ALL PIPING ON THIS DRAWING SEISMIC CLASS I, EXCEPT SECONDARY SERVICE, SCREENWASH, STRAINER BLOWDOWN AND SERVICE WATER POST COOLING TOWER PUMPS WHICH ARE SEISMIC CLASS III.
6. ALL SEISMIC CLASS S-I-NRS.
7. SAFETY AND SEISMIC CLASSES TYPICAL FOR PUMPS RR-P-1A/B NR-P-1A/B/C AND DR-P-1A/B ONLY.

FILTERED WATER 302-169 (A-8)

WATER LUBRICATION SCHEMATIC

NUCLEAR SERVICE PUMPS | SECONDARY SERVICE PUMPS | D.H. RIVER PUMPS | SCREEN WASH PUMPS | SCREEN HOUSE VENTILATION EQUIPMENT PUMPS

RIVER WATER PUMPS-LUBRICATION SYSTEM

REACTOR BLDG EMERGENCY COOLING PUMP RR-P-1A REFER TO DETAIL 'A'

REACTOR BLDG EMERGENCY COOLING PUMP RR-P-1B REFER TO DETAIL 'A'

STATION AIR 302-271(C-2)

FILTERED WATER 302-166 (A-2) FROM WT-V765

HEAT TRACE FROM BLDG WALL TO BELOW GRADE

SCREEN WASH PUMPS

DETAIL 'A' LUBE WATER MANIFOLD SEE NOTE 7

DETAIL 'B' LUBE WATER MANIFOLD

RIVER WATER PUMP LUBRICATION VALVE AND INSTRUMENT TAG NUMBER SCHEDULE								
PUMP TAG	INSTRUMENTS		VALVES					
	FLOW INDICATORS	PRESSURE INDICATORS	A	B	C	D	E	F
RR-P-1A	RR-FI-816	RR-PI-536A	RR-V35A	RR-V37A	RR-V39A	~	RR-V1035	WT-V658
RR-P-1B	RR-FI-818	RR-PI-536B	RR-V35B	RR-V37B	RR-V39B	~	RR-V1037	WT-V659
NR-P-1A		NR-PI-537A	NR-V62A	~	NR-V66A	~	NR-V1030	WT-V660
NR-P-1B		NR-PI-537B	NR-V62B	~	NR-V66B	~	NR-V1032	WT-V661
NR-P-1C	NR-FI-814	NR-PI-537C	NR-V62C	NR-V64C	NR-V66C	~	NR-V1034	WT-V662
SR-P-1A	~	SR-PI-538A	SR-V65A	~	SR-V69A	~	SR-V1000	WT-V663
SR-P-1B	~	SR-PI-538B	SR-V65B	~	SR-V69B	~	SR-V1004	WT-V664
SR-P-1C	~	SR-PI-538C	SR-V65C	~	SR-V69C	~	SR-V1008	WT-V665
DR-P-1A	~	DR-PI-539A	DR-V33A	~	DR-V37A	~	DR-V1014	WT-V666
DR-P-1B	~	DR-PI-539B	DR-V33B	~	DR-V37B	~	DR-V1018	WT-V667
SW-P-1A	SW-FI-828	SW-PI-540A	SW-V50A	SW-V52A	SW-V54A	~	SW-V1013	WT-V668
SW-P-1B	SW-FI-826	SW-PI-540B	SW-V50B	SW-V52B	SW-V54B	~	SW-V1015	WT-V669
SW-P-2A	SW-FI-830	SW-PI-541A	SW-V37A	SW-V36A	SW-V63A	~	SW-V1066	WT-V670
SW-P-2B	SW-FI-832	SW-PI-541B	SW-V56B	SW-V58B	SW-V63B	~	SW-V1067	WT-V671

REFERENCES		
NO.	DWG. NO.	TITLE
1	302-001	SYMBOLS FLOW DIAGRAM
2	302-002	SYMBOLS INSTRUMENTATION
3	302-003	COMPONENT & SYS ID INDEX

Cad File Name : 302203.R69

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SCREEN WASH & SLUICE SYS FLOW DIAGRAM

RIVER WATER PUMPS-LUBRICATION SYS

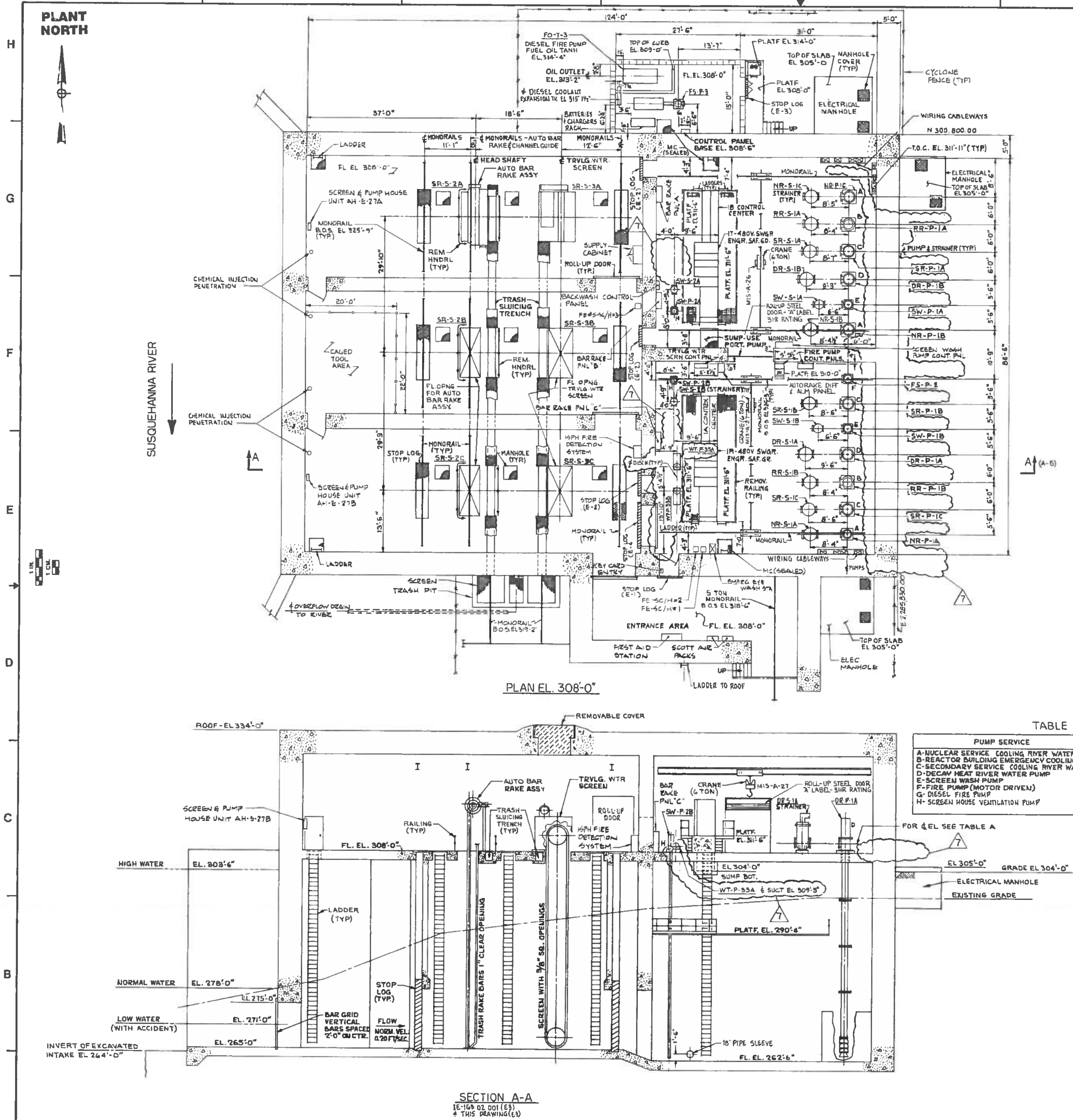
DWG. NO.	SH.	REV.
302-203		69

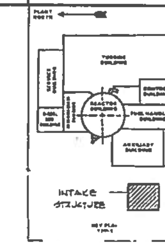
SCALE: NONE

TMI-1

TEMPALCING CONCURRENCE

BA NO. –





REV.	ZONE	DESCRIPTION					
		DRAWN	CHECKED	DSGN. LDR.	ENGINEER	MANAGER	DATE
1	AS NOTED	REVISED: ELEC MANHOLES (D4, G4, H4), FLOOR EL.(A5), REMOVABLE COVER (C6). DELETED: 30" PIPING (G5), MONORAIL EL. (C4,7). ADDED: DIESEL COOLANT EXP. TK. (H6), PANEL D.M. (F5, H5), PLATF (H5), STOP LOG (H5), 6 TON CRANE (C5, F5, G5), REMOVABLE HANDRAIL (C6, E6, F6, G6), B.O.S. EL (F7), MONORAILS (D6, G), EL OF CONC. OPENING (B7), HANDRAIL (B5), ELEC MANHOLE (B4), NOMENCLATURE, TABLE "A" (C3) (PER DCN C001780 DATED 1/11/82)					
		F M	NRT	[signature]	[signature]	[signature]	3/30/84
2	AS NOTED	PER DCN C034606, FCN C022329, REVISED: EQUIPMENT TAG NUMBERS (G4)(E4), NOTES (D2); DELETED: DOOR (G5)(F5); ADDED: CURB (H5), CYCLONE FENCE (H4)(H5)(H6)(D4)(D6), LADDER (G7)(E7), PANEL (G7)(G5)(F5)(E5)(F4)(E7)(C7)(C5), CABINET (F6), PLATF (F4), EMERG EYEWASH STATION (D5), FE (D5), KEY CARD ENTRY (D5), FIRST AID STATION (D5), SCOTT AIR PACKS (D5)					
		N TITOLO	P. OENS	L B	N A	[signature]	2/18/86
3	AS NOTED	PER FCN C041934, FCN C047733, REVISED: EQUIPMENT TAG NUMBER (GH); ADDED: EQUIPMENT TAG NUMBERS (C5, E5, F5)					
		V.P BRIKE	STANKEWICZ	[signature]	N.A	[signature]	7/27/88
4	AS NOTED	REVISED TO INCORPORATE FCN C092156					
		A.T. SMITH	OPGRAMLING	[signature]			10/09/92
5	AS NOTED	REVISED TO INCORPORATE FCN-C008427					
		R J WASSNER	J B FISHER	[signature]	N.A.	[signature]	7/14/93
6	F7	REVISED TO INCORPORATE FCN-C088438					
		A T SMITH	D.P.GRAMLING	[signature]	N A	[signature]	9/15/93
7	VARIES	REVISED TO INCORPORATE FCN-C116674					
		M.TETKOSKIE	M EVERLY	[signature]	N.A.	[signature]	2/8/96

NOTES:
1) FOR NOTES & REFERENCE DRAWINGS SEE DRAWING IE-168-02-001 (A3)

TABLE A

PUMP SERVICE	PUMP DISCHARGE CENTER LINE EL.	TAG NUMBER
A-NUCLEAR SERVICE COOLING RIVER WATER PUMP	310'-6"	NR-P-1A, 1B, & 1C
B-REACTOR BUILDING EMERGENCY COOLING RIVER WTR PUMP	310'-6"	RR-P-1A, & 1B
C-SECONDARY SERVICE COOLING RIVER WATER PUMP	310'-6"	SR-P-1A, 1B, & 1C
D-DECAY HEAT RIVER WATER PUMP	311'-0"	DR-P-1A, & 1B
E-SCREEN WASH PUMP	309'-9"	SW-P-1A, & 1B
F-FIRE PUMP (MOTOR DRIVEN)	309'-4½"	FS-P-2
G-DIESEL FIRE PUMP	309'-4½"	FS-P-3
H-SCREEN HOUSE VENTILATION PUMP	309'-3"	SW-P-2A & 2B

THIS DRAWING SUPERSEDES GAI DRAWING D-015-020

AS BUILT

K.D. ITSCHNER 2-6-81 (DRAWN / DATE)	GPU Nuclear
T. ANDERSON 5-15-81 (CHECKED / DATE)	GENERAL ARRANGEMENT INTAKE SCREEN AND PUMP HOUSE PLAN FLOOR EL. 308'-0"
D. Vallem 10-12-81 (DESIGN LEADER / DATE)	TMI
ENGINEER / DATE	DWG. NO. IE-168-02-002 — REV. 7
[signature] 11-23-81 (MANAGER APPROVAL / DATE)	SCALE: 1/8"=1'-0" & AS NOTED
ENG. MECH. [signatures] 11/16/81	AUTHORIZATION NO. 110002

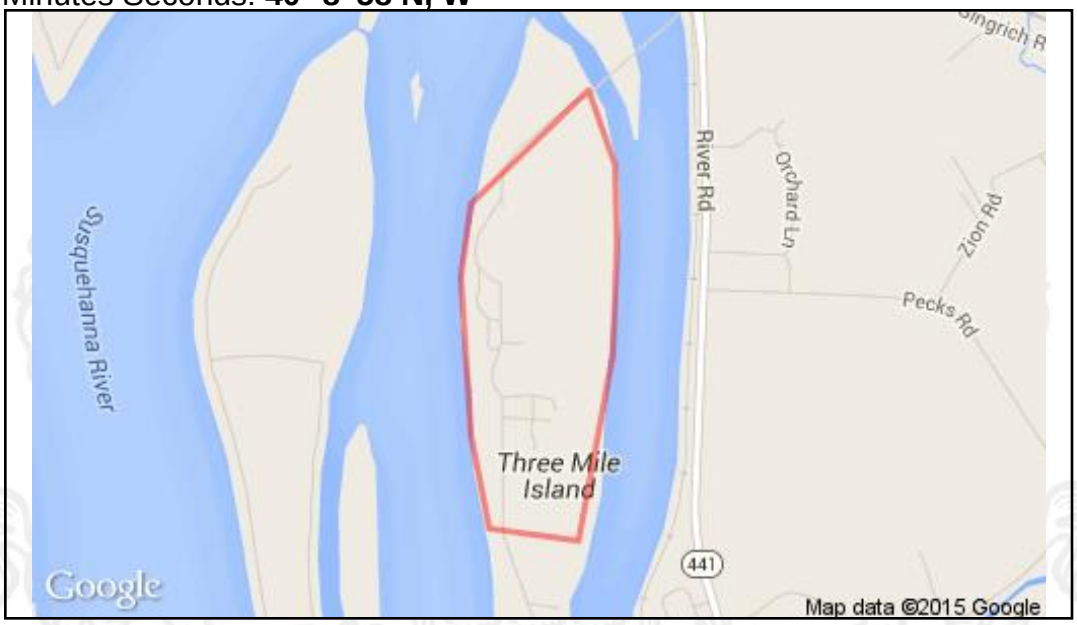
NO.	DWG. NO.	TITLE
	REFERENCES	

DWG. NO. IE-168-02-002

ATTACHMENT D
PNDI ENVIRONMENTAL REVIEW RECEIPT

1. PROJECT INFORMATION

Project Name: **TMI**
Date of review: **5/19/2015 10:08:18 AM**
Project Category: **Energy Storage, Production, and Transfer,Energy Production (generation),Nuclear Power Plant -- maintenance, modification, or expansion**
Project Area: **170.3** acres
County: **Dauphin** Township/Municipality: **Londonderry**
Quadrangle Name: **MIDDLETOWN** ~ ZIP Code: **17057**
Decimal Degrees: **40.149575 N, -76.723455 W**
Degrees Minutes Seconds: **40° 8' 58 N, W**



2. SEARCH RESULTS

Agency	Results	Response
PA Game Commission	**Potential Impact**	**FURTHER REVIEW IS REQUIRED, See Agency Response**
PA Department of Conservation and Natural Resources	No Known Impact	No Further Review Required
PA Fish and Boat Commission	No Known Impact	No Further Review Required
U.S. Fish and Wildlife Service	No Known Impact	No Further Review Required

As summarized above, Pennsylvania Natural Diversity Inventory (PNDI) records indicate there may be potential impacts to threatened and endangered and/or special concern species and resources within the project area. If the response above indicates "No Further Review Required" no additional communication with the respective agency is required. If the response is "Further Review Required" or "See Agency Response," refer to the appropriate agency comments below. Please see the DEP Information Section of this receipt if a PA Department of Environmental Protection Permit is required.

3. AGENCY COMMENTS

Regardless of whether a DEP permit is necessary for this proposed project, any potential impacts to threatened and endangered species and/or special concern species and resources must be resolved with the appropriate jurisdictional agency. In some cases, a permit or authorization from the jurisdictional agency may be needed if adverse impacts to these species and habitats cannot be avoided.

These agency determinations and responses are **valid for two years** (from the date of the review), and are based on the project information that was provided, including the exact project location; the project type, description, and features; and any responses to questions that were generated during this search. If any of the following change: 1) project location, 2) project size or configuration, 3) project type, or 4) responses to the questions that were asked during the online review, the results of this review are not valid, and the review must be searched again via the PNDI Environmental Review Tool and resubmitted to the jurisdictional agencies. The PNDI tool is a primary screening tool, and a desktop review may reveal more or fewer impacts than what is listed on this PNDI receipt. The jursidictional agencies **strongly advise against** conducting surveys for the species listed on the receipt prior to consultation with the agencies.

PA Game Commission

RESPONSE: Further review of this project is necessary to resolve the potential impacts(s). Please send project information to this agency for review (see WHAT TO SEND).

PGC Species: (Note: The PNDI tool is a primary screening tool, and a desktop review may reveal more or fewer species than what is listed below.)
Scientific Name: Falco peregrinus
Common Name: Peregrine Falcon
Current Status: Endangered

Scientific Name: Pandion haliaetus
Common Name: Osprey
Current Status: Threatened

PA Department of Conservation and Natural Resources

RESPONSE: No Impact is anticipated to threatened and endangered species and/or special concern species and resources.

PA Fish and Boat Commission

RESPONSE: No Impact is anticipated to threatened and endangered species and/or special concern species and resources.

U.S. Fish and Wildlife Service

RESPONSE: No impacts to **federally** listed or proposed species are anticipated. Therefore, no further consultation/coordination under the Endangered Species Act (87 Stat. 884, as amended; 16 U.S.C. 1531 *et seq.* is required. Because no take of federally listed species is anticipated, none is authorized. This response does not reflect potential Fish and Wildlife Service concerns under the Fish and Wildlife Coordination Act or other

authorities.

* Special Concern Species or Resource - Plant or animal species classified as rare, tentatively undetermined or candidate as well as other taxa of conservation concern, significant natural communities, special concern populations (plants or animals) and unique geologic features.
** Sensitive Species - Species identified by the jurisdictinal agency as collectible, having economic value, or being susceptible to decline as a result of visitation.

WHAT TO SEND TO JURISDICTIONAL AGENCIES

If project information was requested by one or more of the agencies above, send the following information to the agency(s) seeking this information (see AGENCY CONTACT INFORMATION).

Check-list of *Minimum* Materials to be submitted:

____**SIGNED** copy of this Project Environmental Review Receipt
____Project narrative with a description of the overall project, the work to be performed, current physical characteristics of the site and acreage to be impacted.
____Project location information (name of USGS Quadrangle, Township/Municipality, and County)
____USGS 7.5-minute Quadrangle with project boundary clearly indicated, and quad name on the map

The inclusion of the following information may expedite the review process.
____A basic site plan(particularly showing the relationship of the project to the physical features such as wetlands, streams, ponds, rock outcrops, etc.)
____Color photos keyed to the basic site plan (i.e. showing on the site plan where and in what direction each photo was taken and the date of the photos)
____Information about the presence and location of wetlands in the project area, and how this was determined (e.g., by a qualified wetlands biologist), if wetlands are present in the project area, provide project plans showing the location of all project features, as well as wetlands and streams

4. DEP INFORMATION

The Pa Department of Environmental Protection (DEP) requires that a signed copy of this receipt, along with any required documentation from jurisdictional agencies concerning resolution of potential impacts, be submitted with applications for permits requiring PNDI review. For cases where a "Potential Impact" to threatened and endangered species has been identified before the application has been submitted to DEP, the application should not be submitted until the impact has been resolved. For cases where "Potential Impact" to special concern species and resources has been identified before the application has been submitted, the application should be submitted to DEP along with the PNDI receipt. The PNDI Receipt should also be submitted to the appropriate agency according to directions on the PNDI Receipt. DEP and the jurisdictional agency will work together to resolve the potential impact(s). See the DEP PNDI policy at http://www.naturalheritage.state.pa.us.

5. ADDITIONAL INFORMATION

The PNDI environmental review website is a **preliminary** screening tool. There are often delays in updating species status classifications. Because the proposed status represents the best available information regarding the conservation status of the species, state jurisdictional agency staff give the proposed statuses at least the same consideration as the current legal status. If surveys or further information reveal that a threatened and endangered and/or special concern species and resources exist in your project area, contact the appropriate jurisdictional agency/agencies immediately to identify and resolve any impacts.

For a list of species known to occur in the county where your project is located, please see the species lists by county found on the PA Natural Heritage Program (PNHP) home page (www.naturalheritage.state.pa.us). Also note that the PNDI Environmental Review Tool only contains information about species occurrences that have actually been reported to the PNHP.

6. AGENCY CONTACT INFORMATION

PA Department of Conservation and Natural Resources

Bureau of Forestry, Ecological Services Section
400 Market Street, PO Box 8552, Harrisburg, PA. 17105-8552
Fax:(717) 772-0271

U.S. Fish and Wildlife Service

Pennsylvania Field Office
110 Radnor Rd; Suite 101, State College, PA 16801
NO Faxes Please.

PA Fish and Boat Commission

Division of Environmental Services
450 Robinson Lane, Bellefonte, PA. 16823-7437
NO Faxes Please

PA Game Commission

Bureau of Wildlife Habitat Management
Division of Environmental Planning and Habitat Protection
2001 Elmerton Avenue, Harrisburg, PA. 17110-9797
Fax:(717) 787-6957

7. PROJECT CONTACT INFORMATION

Name:_____
Company/Business Name:_____
Address:_____
City, State, Zip:_____
Phone:(_____)_____Fax:(_____)_____
Email:_____

8. CERTIFICATION

I certify that ALL of the project information contained in this receipt (including project location, project size/configuration, project type, answers to questions) is true, accurate and complete. In addition, if the project type, location, size or configuration changes, or if the answers to any questions that were asked during this online review change, I agree to re-do the online environmental review.

_____ _____
applicant/project proponent signature date

ATTACHMENT E
SUPPORTING TABLES, FIGURES, AND REFERENCES FOR §122.21(r)(4)

ATTACHMENT E
SUPPORTING TABLES, FIGURES, AND REFERENCES FOR §122.21(r)(4)

Table 4-1: Aquatic Species Found Near TMI within the York Haven Pool of the Susquehanna River		
Family	**Common Name**	**Scientific Name**
Fish		
Anguillidae	American eel	*Anguilla rostrata*
Clupeidae	American shad	*Alosa sapidissima*
	Gizzard shad	*Dorosoma cepedianum*
	Alewife	*Alosa pseudoharengus*
	Blueback herring	*Alosa aestivalis*
Osmeridae	Rainbow smelt	*Osmerus mordax*
Salmonidae	Rainbow trout	*Oncorhynchus mykiss*
	Brown trout	*Salmo trutta*
	Brook trout	*Salvelinus fontinalis*
Esocidae	Northern pike	*Esox lucius*
	Muskellunge	*Esox masquinongy*
	Chain pickerel	*Esox niger*
	Tiger muskellunge	*Esox lucius x E. masquinongy*
Cyprinidae	Central stoneroller	*Campostoma anomalum*
	Goldfish	*Carassius auratus*
	Common carp	*Cyprinus carpio*
	Cutlips minnow	*Exoglossum maxillingua*
	River chub	*Nocomis micropogon*
	Golden shiner	*Notemigonus crysoleucas*
	Comely shiner	*Notropis amoenus*
	Common shiner	*Luxilus cornutus*
	Spottail shiner	*Notropis hudsonius*
	Swallowtail shiner	*Notropis procne*
	Rosyface shiner	*Notropis rubellus*
	Spotfin shiner	*Cyprinella spiloptera*
	Mimic shiner	*Notropis volucellus*
	Bluntnose minnow	*Pimephales notatus*
	Blacknose dace	*Rhinichthys atratulus*
	Longnose dace	*Rhinichthys cataractae*
	Creek chub	*Semotilus atromaculatus*
	Fallfish	*Semotilus corporalis*
Catostomidae	Quillback	*Carpiodes cyprinus*
	White sucker	*Catostomus commersoni*
	Northern hogsucker	*Hypentelium nigricans*
	Shorthead redhorse	*Moxostoma macrolepidotum*
Ictaluridae	White catfish	*Ameiurus catus*
	Yellow bullhead	*Ameiurus natalis*
	Brown bullhead	*Ameiurus nebulosus*
	Channel catfish	*Ictalurus punctatus*
	Margined madtom	*Noturus insignis*
	Flathead catfish	*Pylodictis olivaris*
Fundulidae	Banded killifish	*Fundulus diaphanus*
Moronidae	Striped bass	*Morone saxatilis*
	Hybrid striped bass	*Morone saxatilis x M. chrysops*
Centrarchidae	Rock bass	*Ambloplites rupestris*
	Redbreast sunfish	*Lepomis auritus*
	Green sunfish	*Lepomis cyanellus*
	Pumpkinseed	*Lepomis gibbosus*
	Bluegill	*Lepomis macrochirus*
	Smallmouth bass	*Micropterus dolomieu*
	Largemouth bass	*Micropterus salmoides*
	White crappie	*Pomoxis annularis*
	Black crappie	*Pomoxis nigromaculatus*
Percidae	Tessellated darter	*Etheostoma olmstedi*
	Banded darter	*Etheostoma zonale*

ATTACHMENT E
SUPPORTING TABLES, FIGURES, AND REFERENCES FOR §122.21(r)(4)

Table 4-1: Aquatic Species Found Near TMI within the York Haven Pool of the Susquehanna River		
Family	**Common Name**	**Scientific Name**
	Yellow perch	*Perca flavescens*
	Shield darter	*Percina peltata*
	Walleye	*Sander vitreus*
Shellfish		
Unionidae	Eastern floater	*Pyganodon cataracta*
	Yellow lampmussel	*Lampsilis cariosa*
	Eastern elliptio	*Elliptio complanata*
	Alewife floater	*Anodonta implicata*
	Creeper	*Strophitus undulatus*
	Rainbow mussel	*Villosa iris*
	Green floater	*Lasmigona subviridus*
	Susquehanna elktoe	*Alasmidonta marginata*
	Triangle floater	*Alasmidonta undulata*
Corbiculidae	Asiatic clam	*Corbicula fluminea*
Pisidiidae	Long fingernailclam	*Musculium transversum*
	Fingernailclam	*Musculium*
	Peaclams	*Pisidium*
Cambaridae	Freshwater crayfish	*Orconectes*

*Sources: RMC (1988, 1989, 1990, 1991), Smucker et al. (2009), and FERC (2012, 2014)

Table 4-2: Most Abundant Fish Species in the York Haven Pool Near TMI – Seine			
1989		**1990**	
Species	**Percent Composition**	**Species**	**Percent Composition**
Mimic shiner	59.9	Mimic shiner	32.7
Spotfin shiner	28.1	Spotfin shiner	24.8
Bluegill	2.5	Channel catfish	10.4
Pumpkinseed	2.1	Tessellated darter	9.2
Bluntnose minnow	1.6	Spottail shiner	6.6
Gizzard shad	1.2	Bluntnose minnow	4.9
Spottail shiner	1.1	White sucker	4.7
Tessellated darter	1	Pumpkinseed	2.0
Swallowtail shiner	0.5	Swallowtail shiner	0.9
White sucker	0.4	Smallmouth bass	0.7

*Source: RMC (1990, 1991)

Table 4-3: Most Abundant Fish Species in the York Haven Pool Near TMI – Electrofisher			
1989		**1990**	
Species	**Percent Composition**	**Species**	**Percent Composition**
Pumpkinseed	32.4	Pumpkinseed	20.7
Smallmouth bass	14.8	Redbreast sunfish	18.5
Bluegill	12	Smallmouth bass	11.8
Redbreast sunfish	8.5	Bluegill	7.0
Green sunfish	7.1	Green sunfish	6.2
Quillback	6	Rock bass	6.0
Spottail shiner	5.6	Walleye	5.1
Rock bass	2.8	Quillback	4.4
Spotfin shiner	1.7	Spottail shiner	3.7
Largemouth bass	1.7	Spotfin shiner	3.2
Common carp	1.2	White sucker	2.8
Gizzard shad	1.1	Gizzard shad	2.0

*Source: RMC (1990, 1991)

ATTACHMENT E
SUPPORTING TABLES, FIGURES, AND REFERENCES FOR §122.21(r)(4)

Table 4-4: Most Abundant Ichthyoplankton Species in the York Haven Pool Near TMI

1989		1990	
Species	**Percent Composition**	**Species**	**Percent Composition**
Common carp	45.2	Pumpkinseed/Bluegill	23.9
Quillback	13.5	Common carp	23.2
Pumpkinseed/Bluegill	7.8	Quillback	14.2
Channel catfish	6.3	Channel catfish	9.2
Mimic shiner	5.9	Spotfin shiner	8.9
Spotfin shiner	4.4	Banded darter	4.8
Tessellated darter	3.6	Tessellated darter	4.1
Spottail shiner	3.2	Mimic shiner	2.0
Banded darter	3.2	Gizzard shad	1.7
Gizzard shad	2.4	Spottail shiner	1.3

*Source: RMC (1990, 1991)

Table 4-5: Factors Effecting Susceptibility to Impingement or Entrainment

Category	Factor Type	Factors	Source
Impingement	Abiotic Factors	Water temperature, dissolved oxygen, turbidity, CWIS design, and intake velocities	Baker (2007)
	Biotic Factors	Swimming ability, body shape, size, diel and seasonal movements, and health of the organism	Baker (2007)
Entrainment	Abiotic Factors	Intake location, water volume used for cooling, velocity at intake, and screen mesh size	Graham et al. (2008)
	Biotic Factors	Organism size, swimming ability, swimming behavior (pelagic or benthic) diurnal behavior, and spawning habitat	Graham et al. (2008)

Table 4-6: Composition of Species Impinged at PBAPS

Species	Percent Composition
Gizzard shad	92.05
Bluegill	4.72
Channel catfish	1.89
Walleye	0.25
American shad*	0.15
White crappie	0.14
Flathead catfish	0.14
Yellow perch	0.13

Source: Normandeau and URS (2008)

*Note that American shad are more abundant near PBAPS than TMI because very few pass York Haven Dam and little natural reproduction occurs above the York Haven fish ladder.

Table 4-7: Composition of Species and Lifestage Entrained at PBAPS

Species	Lifestage	Percent Composition
American eel	Yearling and Older	0.1
Gizzard shad	Egg	4.6
	Yolk Sac Larvae	18.6
	Post Yolk-Sac Larvae	13.5
	Unknown Stage Larvae	39.2
Common carp	Egg	0.1
	Yolk-Sac Larvae	0.1
Spottail shiner	Young-of-Year	0.1

ATTACHMENT E
SUPPORTING TABLES, FIGURES, AND REFERENCES FOR §122.21(r)(4)

Table 4-7: Composition of Species and Lifestage Entrained at PBAPS		
Species	**Lifestage**	**Percent Composition**
	Yearling and Older	0.1
Unknown cyprinid	Post Yolk Sac Larvae	0.3
Channel catfish	Post Yolk Sac Larvae	0.2
	Young-of-Year	0.5
White sucker	Post Yolk Sac Larvae	0.1
	Unknown Stage Larvae	0.1
Unknown catostomid	Yolk Sac Larvae	0.1
Lepomis spp.	Post Yolk Sac Larvae	0.4
Unknown centrarchid	Post Yolk Sac Larvae	0.1
Banded darter	Yolk-Sac Larvae	0.5
	Post Yolk Sac Larvae	0.7
	Unknown Stage Larvae	0.1
Greenside darter	Post Yolk Sac Larvae	0.1
Tessellated darter	Yolk-Sac Larvae	2.9
	Post Yolk Sac Larvae	3.2
	Unknown Stage Larvae	1.4
	Young-of-Year	0.3
Etheostoma spp.	Post Yolk Sac Larvae	0.1
	Unknown Stage Larvae	0.5
Unidentified Species	Egg	0.1
	Post Yolk Sac Larvae	3.3
	Unknown Stage Larvae	8.8

*Source: Normandeau (2013)

Table 4-8: Life History Data of Ichthyoplankton Found Near TMI				
Species	**Spawning Period**	**Larval Recruitment**	**Life History Notes**	**Sources**
Clupeidae				
Gizzard shad	April – June	April – June	Eggs - Demersal, adhesive, hatch in 36-95 hours	Wang and Kernehan (1979)
American shad*	Mid-April – Early June	May – July	Eggs – Slightly demersal, slightly adhesive. Hatch in 6-15 days. Wedge into substrate downstream. Larvae - tend to remain near hatching area until the fall, then migrate downstream	Wang and Kernehan (1979)
Blueback herring*	Late April – Early June	May – June	Eggs – Demersal, adhesive. Hatch after 2-3 days. Larvae – characterized as pelagic and photopositive	Wang and Kernehan (1979)
Alewife*	April - May	April – June	Eggs – Demersal, slightly adhesive. Hatch after 7 days. Larvae – characterized as pelagic and photopositive	Wang and Kernehan (1979)
Cyprinidae				
Common carp	May – Early July	May – August	Eggs – Demersal and adhesive. Hatch in 4 days. Larvae – inhabit shallow waters	Wang and Kernehan (1979)
Golden shiner	April - July	April – August	Eggs –Adhesive. Often found in centrarchid nests. Hatch in 2-4 days. Larvae – Prolarvae often seen in surface of shallow waters, and post larvae in shallow waters	Wang and Kernehan (1979)
Comely shiner	No life history data found			

Table 4-8: Life History Data of Ichthyoplankton Found Near TMI

Species	Spawning Period	Larval Recruitment	Life History Notes	Sources
Spottail shiner	April - July	April – August	Eggs – demersal and adhesive. Hatch in 4 days. Larvae – inhabit shallow waters	Wang and Kernehan (1979)
Swallowtail shiner	No life history data found			
Spotfin shiner	May - August	May – September	Eggs – demersal, adhesive. Hatch after 5-7 days	Auer (1982)
Mimic shiner	May – Early July	May – August	Eggs – demersal, adhesive. Hatch after 3 days.	Auer (1982)
Blacknose dace	May - June	May – July	Eggs – demersal, defended by male. Larvae – frequent pools and backwaters of streams.	Wang and Kernehan (1979)
Bluntnose minnow	May - August	May – September	Eggs – demersal, adhesive, hatch after 6-10 days.	Auer (1982)
Fallfish	Late April – Mid-May	May – June	Eggs – demersal and adhesive, deposited in a nest. Hatch in approx. 7-9 days.	Auer (1982)
Catostomidae				
Quillback	Late April – Mid June	May – July	Eggs – demersal and adhesive. Larvae – demonstrate downstream drift, found in surface waters at night	Auer (1982) Ross et al. (2001)
White sucker	Late March - May	April – June	Eggs – demersal and slightly adhesive. Hatch in 5-11 days. Larvae – after hatching, larvae remain near substrate for 1-2 weeks, and then migrate downstream.	Wang and Kernehan (1979)
Northern hog sucker	Mid-April – Mid-May	May – June	Eggs – demersal, non-adhesive. Hatch in 10 days	Auer (1982)
Shorthead redhorse	Early-May – Mid-May	May – June	Eggs – Demersal, non-adhesive. Hatch after 8 days. Larvae – Spend first 4 days on bottom, then move into water column.	Auer (1982) Ross et al. (2001)
Ictaluridae				
Yellow bullhead	Two week period from late May – early June	June	Eggs – adhesive, demersal, laid in nest, protected by male, hatch 5-10 days Larvae typically stay guarded at nest, leave at about 50 mm (approximately 2 months)	Wallus and Simon (2006a)
Channel catfish	May - July	Mid May – August (peak in June and July)	Eggs – demersal and adhesive. Guarded by male in nest. Hatch in approximately a week. Yolk Sac Larvae – Leave nest after 2-5 days and enter water column to feed	Wang and Kernehan (1979) Wallus and Simon (2006a)
Fundulidae				
Banded killifish	Late April-August	May – August	Eggs – adhesive, hatch approximately 12 days Larvae – tend to remain in benthos until juvenile stage	Wang and Kernehan (1979) Wallus and Simon (2006c)
Moronidae				
Striped bass*	Early-April – Mid-June	April – July	Eggs – non-adhesive, semi-buoyant. Hatch after 36-48 hours. Larvae – initially planktonic and found in subsurface waters. Migrate to shallow waters with rocky substrate and low currents.	Wang and Kernehan (1979)
Centrarchidae				
Rock bass	May - June	May – July	Eggs – Centrarchids primarily lay demersal, adhesive eggs in a nest, which is guarded by the male. Eggs hatch in approximately 2-4	Wang and Kernehan (1979)
Redbreast sunfish	Late spring – Early Summer	May – July		

Table 4-8: Life History Data of Ichthyoplankton Found Near TMI

Species	Spawning Period	Larval Recruitment	Life History Notes	Sources
Green sunfish	May - August	May – September	days. Larvae – Remain at the nest guarded by the male until after a period of 4 days (bluegill) up to 10 days (largemouth bass), entering water column to feed	Auer (1982)
Pumpkinseed	May – August (Peak in June)	May – September		
Bluegill	May – August (Peak in June)	May – September		
Smallmouth bass	April - June	April – July		
Largemouth bass	Late April - June	May – July		
White crappie	Late April – Early June	May – July		
Black crappie	May - June	May – July		
Percidae				
Tessellated darter	Late March – Early May	March – May	Eggs- Demersal and adhesive. Male guards nest. Hatch after 14 days Larvae – immediately display swimming ability. Exhibit positive thigmotaxis and negative phototaxis	Wang and Kernehan (1979)
Banded darter	May - June	May – July	Eggs- Adhesive, Demersal. Hatch in approximately 7 days Larvae – pelagic immediately after hatching, become demersal at 14+ mm	Wallus and Simon (2006b)
Shield darter	No life history data found			
Yellow perch	Mid-March – Early April	March – May	Eggs – adhesive, laid in semi buoyant strands, attaching to submerged objects. Hatch after 25-27 days Larvae – Have strong swimming ability after hatching. Considered limnetic, photo positive, and pelagic in open water	Wang and Kernehan (1979) Wallus and Simon (2006b)
Walleye	June	June – July	Eggs – Demersal, but only adhesive for 1 hour after deposition, will settle into interstitial spaces, or wash downstream. Hatch likely in 4-10 days. Larvae – Immediately swim to surface post hatching, free swimming by day 2, remain pelagic until 25-30 mm in total length.	Wallus and Simon (2006b)

*Species not found in ichthyoplankton samples (RMC 1990, 1991), however, these species are subject to restoration programs and have been observed in the York Haven Pool of the Susquehanna River during spawning season.
Source: RMC (1990, 1991)

Table 4-9: Threatened and Endangered Species Near TMI

Category	Species	Source	Susceptible to Impingement or Entrainment
Federally-listed Species	None	USFWS (2015b)	N/A
Federal Critical Habitats	None	USFWS (2015c)	N/A
Essential Fish Habitat	None	NMFS (2015)	N/A
State-listed Species	Black bullhead (*Ameiurus melas*)	PNHP (2015)	Not likely • There are conflicting sources regarding presence in Susquehanna basin (PNHP 2015, PFBC 2015). • Not identified by PNDI Project Environmental Review.

ATTACHMENT E
SUPPORTING TABLES, FIGURES, AND REFERENCES FOR §122.21(r)(4)

Figure 4-1: Abundance of Fish Collected By Seine - 1989

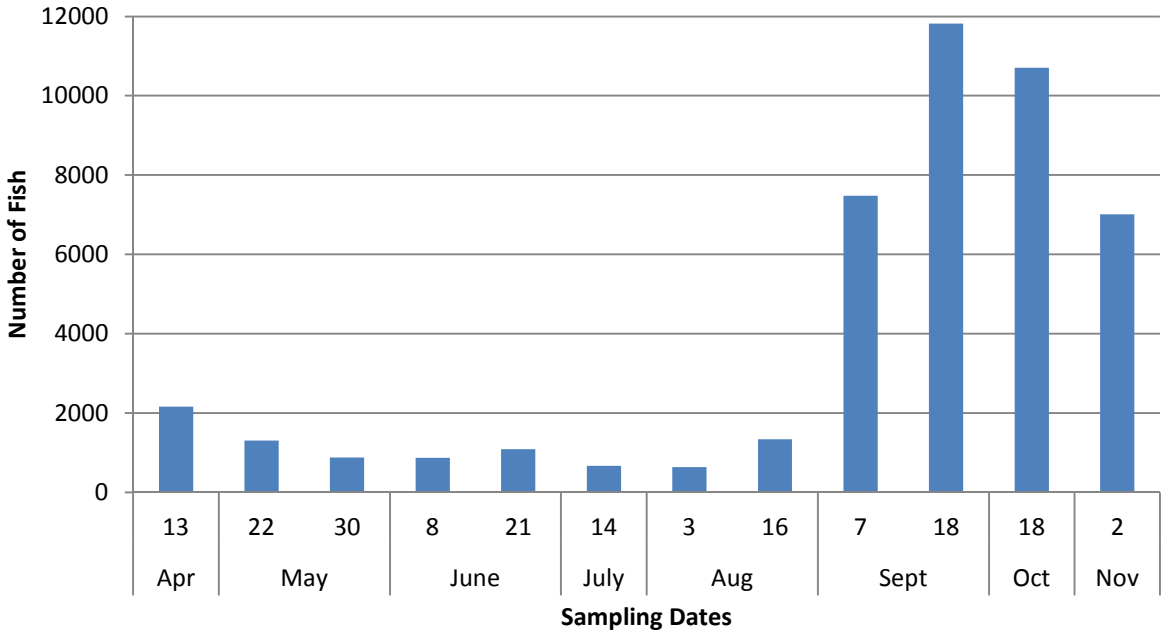


Figure 4-2: Temporal Distribution of the Most Abundant Species Collected By Seine - 1989

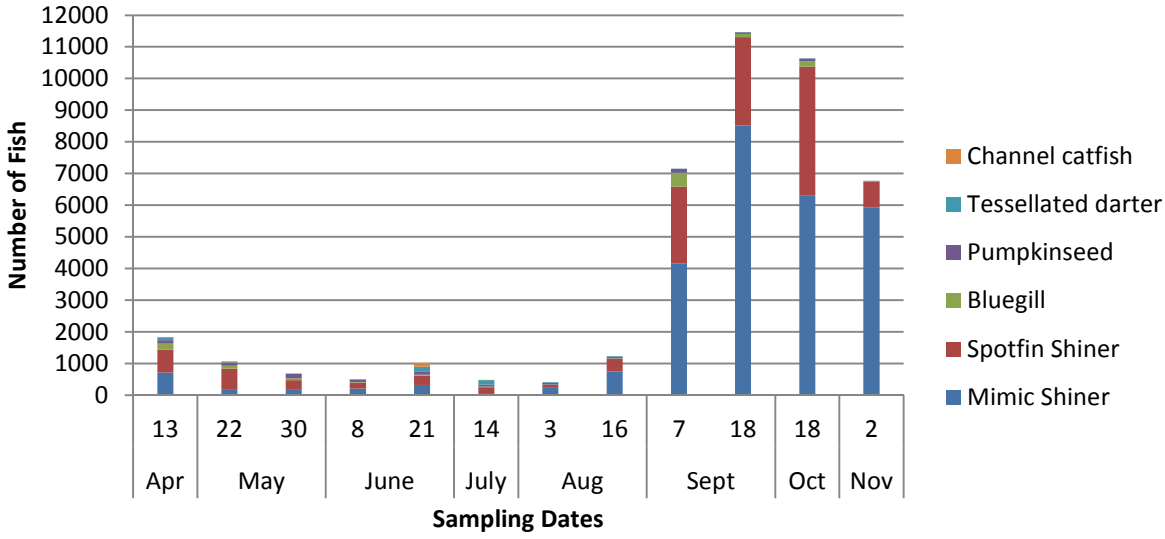


Figure 4-3: Abundance of Fish Collected By Seine - 1990

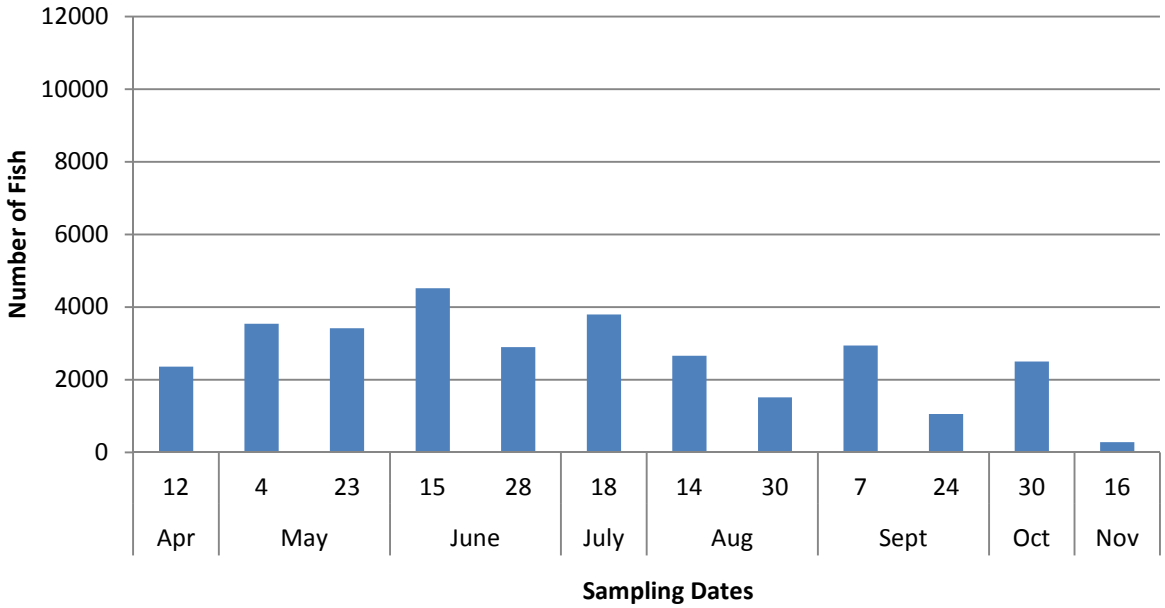


Figure 4-4: Temporal Distribution of the Most Abundant Species Collected By Seine - 1990

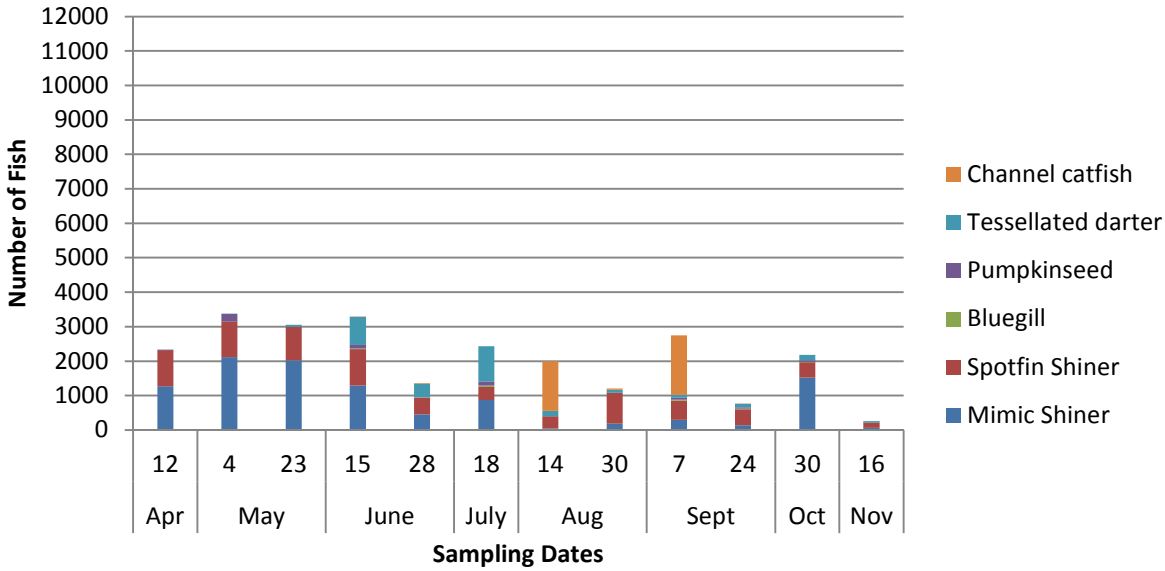


Figure 4-5: Abundance of Fish Collected By Electrofisher - 1989

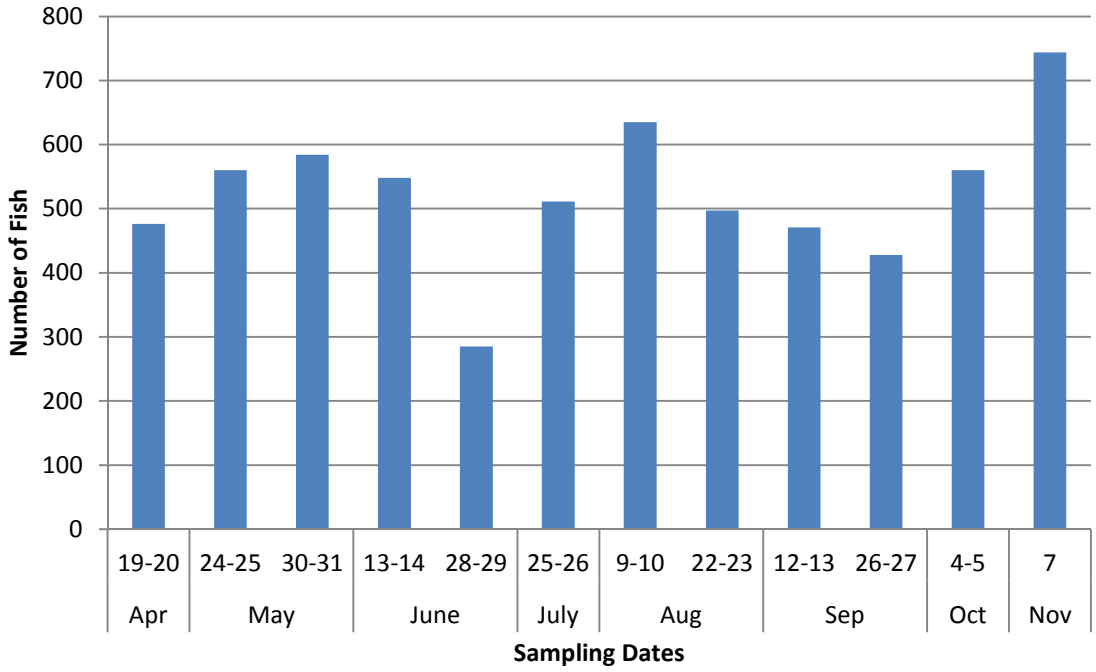


Figure 4-6: Temporal Distribution of the Most Abundant Species Collected By Electrofisher - 1989

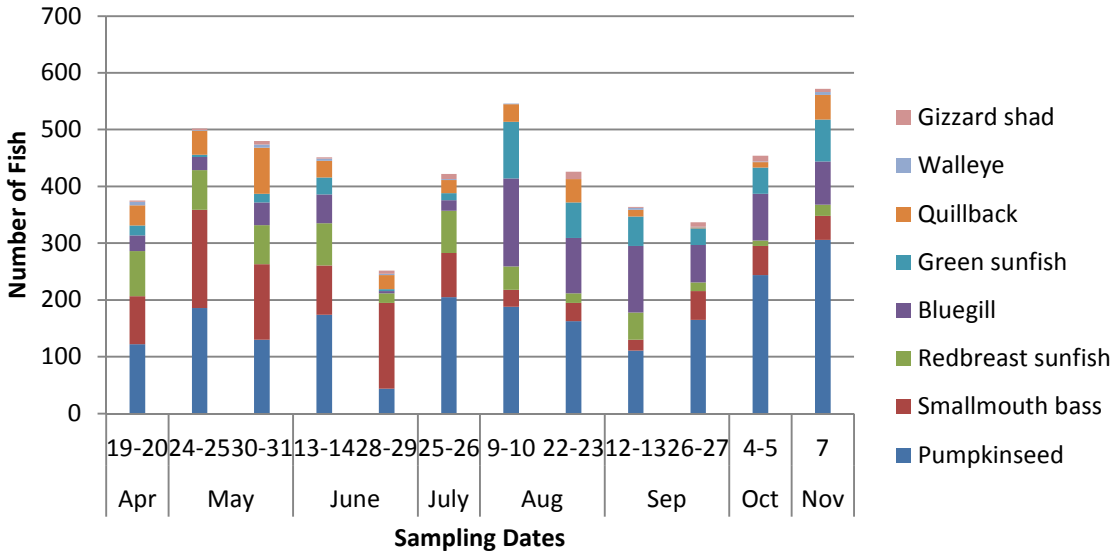


Figure 4-7: Abundance of Fish Collected By Electrofisher - 1990

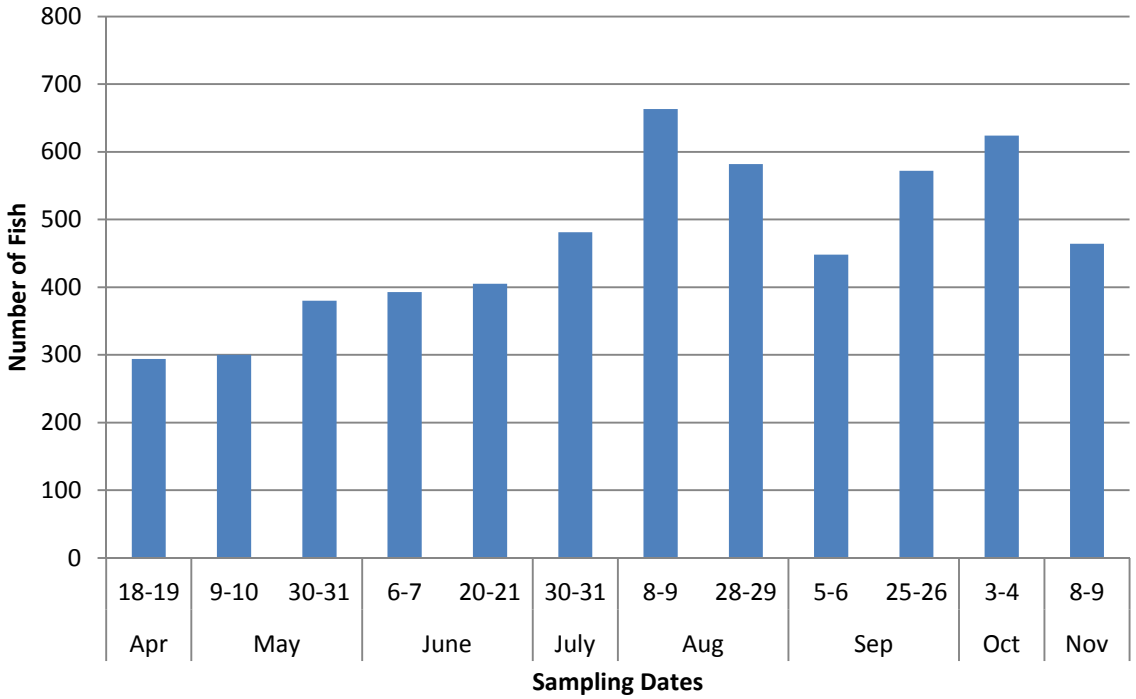
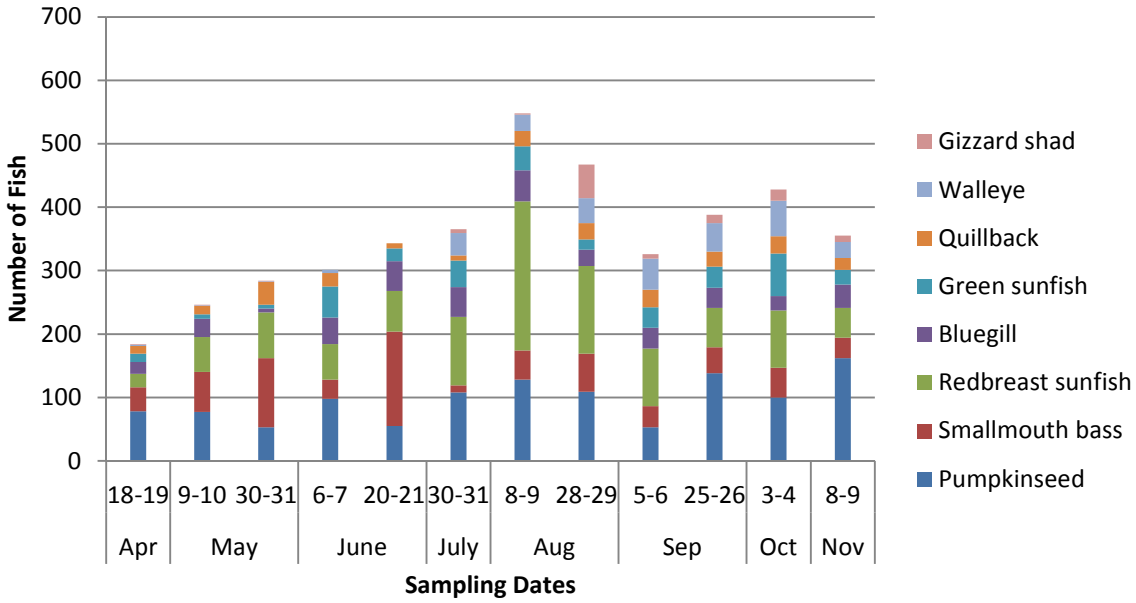


Figure 4-8: Temporal Distribution of the Most Abundant Species Collected By Electrofisher - 1990



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SUPPORTING TABLES, FIGURES, AND REFERENCES FOR §122.21(r)(4)

References:

Auer, N.A. 1982. Identification of Larval Fishes of the Great Lakes Basin with Emphasis on the Lake Michigan Drainage. Special Publication 82-3. Great Lakes Fishery Commission. Ann Arbor, MI. December.

Baker, J.L. 2007. Health of Fish Impinged On Cooling-Water Intake Screens. Auburn University. Auburn, AL. May.

Cornell Lab of Ornithology. Osprey, Life History. All About Birds. Available on-line at: http://www.allaboutbirds.org/guide/osprey/lifehistory. Site last accessed May 19, 2015.

Edwards, E. A., G. Gebhart, and O. E. Maughan. 1983. Habitat Suitability Information: Smallmouth Bass. U.S. Department of the Interior, Fish and Wildlife Service. FWS/OBS-82/10.36. 47pp.

FERC (Federal Energy Regulatory Commission). 2012. York Haven Hydroelectric Project, FERC Project No. 1888, Final License Application, Volume I, August 2012.

FERC. 2014. Draft Multi-Project Environmental Impact Statement for Hydropower Licenses. Susquehanna River Hydroelectric Projects. July, 2014.

Fuller, P., E. Maynard, J. Larson, A. Fusaro, T.H. Makled, and M. Neilson. 2015. *Osmerus mordax*. USGS Nonindigenous Aquatic Species Database, Gainesville, FL. http://nas.er.usgs.gov/queries/factsheet.aspx?SpeciesID=796. Revision Date: 7/8/2014. Site last accessed May 19, 2015.

Hartman, G.F. 2009. A Biological Synopsis of Walleye (*Sander vitreus*). Can. Manuscr. Rep. Fish. Aquat. Sci. 2888: v + 48 p.

King, R.G, Seegert, G, Vondruska, J, Perry, E.S, and Dixon, D.A. 2010. Factors Influencing Impingement at 15 Ohio River Power Plants. North American Journal of Fisheries Management. 30:1149-1175.

Miller, R.R. 1960. Systematic and Biology of the Gizzard Shad (*Dorosoma cepedianum*) and Related Fishes. Fishery Bulletin 173. Fish and Wildlife Service. Volume 60.

National Marine Fisheries Service (NMFS). 2015. NOAA Habitat Conservation. Essential Fish Habitat Mapper v3.0. Accessed February, 2015. http://www.habitat.noaa.gov/protection/efh/habitatmapper.html.

Normandeau Associates Inc. (Normandeau). 2007. Summary of Environmental Studies Near the Three Mile Island Nuclear Station. Prepared for Exelon Corporation. October 2007.

Normandeau. 2013. Peach Bottom Atomic Power Station Entrainment Characterization Study 2012. Prepared for Exelon Generation. February, 2013.

Normandeau Associates Inc. and URS Corporation (Normandeau and URS). 2008. Detailed Characterization of the Aquatic Resources and Impingement Mortality at the Peach Bottom Atomic Power Station for Peach Bottom Atomic Power Station. Prepared for Exelon. October, 2008.

Pennsylvania Fish and Boat Commission (PFBC). 2015. Pennsylvania Species By Watersheds, Accessed February, 2015. http://fishandboat.com/pafish/fishhtms/chap2.htm.

Pennsylvania Game Commission (PA Game Commission). 2013. Banding and Management. http://www.portal.state.pa.us/portal/server.pt?open=514&objID=625958&mode=2. Site last accessed May 19, 2015.

Pennsylvania Natural Heritage Program (PNHP). 2015. Accessed February, 2015. http://www.naturalheritage.state.pa.us/Species.aspx

ATTACHMENT E
SUPPORTING TABLES, FIGURES, AND REFERENCES FOR §122.21(r)(4)

Pennsylvania Sea Grant (PA Sea Grant). 2013. Pennsylvania's Field Guide to Aquatic Invasive Species. Pennsylvania State University, Pennsylvania Sea Grant.

Petrillo, C.F. 2008. Harvey's Lake History: Smelt Fishing. http://harveyslake.org/text/story_smelt.htm

Pisces Conservation LTD (Pisces). 2007. Entrainment, Impingement and Thermal Impacts at Indian Point Nuclear Power Station. Lymington, England. November, 2007.

PSEG. Undated. Power New York Inc's Bethlehem Energy Center SPDES Modification, Alternative Cooling Systems Study for Ristroph screens. *Cited in:* Pisces (2007).

RMC Environmental Services (RMC). 1988. An ecological study of the Susquehanna River near the Three Mile Island Nuclear Station. Annual Report for 1987. RMC. Drumore, PA. *Cited in:* Normandeau (2007).

RMC. 1989. An ecological study of the Susquehanna River near the Three Mile Island Nuclear Station. Annual Report for 1988. RMC. Drumore, PA. *Cited in:* Normandeau (2007).

RMC. 1990. An ecological study of the Susquehanna River near the Three Mile Island Nuclear Station. Annual Report for 1989. RMC. Drumore, PA.

RMC. 1991. An ecological study of the Susquehanna River near the Three Mile Island Nuclear Station. Annual Report for 1990. RMC. Drumore, PA.

Ross, S.T, Brenneman, W.M, Slack, W.T, O'Connell, M.T, and Peterson, T.L. 2001. The Inland Fishes of Mississippi. University Press of Mississippi.

Rypel, A.L and Mitchell, J.B. 2007. Summer Nocturnal Patterns in Freshwater Drum (*Aplodinotus grunniens*). American Midland Naturalist. Vol. 157, No. 1 (Jan., 2007), pp. 230-234.

Smucker, B., J. Rosenberger, and D. Shumway. 2009. Juniata/Susquehanna River Creel Survey 2007. Draft Final Report. The Pennsylvania State University Statistical Consulting Center. 92 Pp + appendices. *Cited in*: FERC (2012).

Stauffer, J.R Jr, Boltz, J.M, and White, L.R. 1995. The Fishes of West Virginia. Pennsylvania State University. Academy of Natural Sciences of Philadelphia. Accessed February 2015 via Google Books.

Steiner, L. 2000. Pennsylvania Fishes. Pennsylvania Fish & Boat Commission. Chapter 14 Smelts, Family Osmeridae. Available on-line at: http://fishandboat.com/pafish/fishhtms/chapindx.htm. Site last accessed May 19, 2015.

Stuber, R. J., G. Gebhart, and O. E. Maughan. 1982. Habitat Suitability Index Models: Bluegill. U.S. Department of the Interior, Fish and Wildlife Service. FWS/OBS-82/10.8. 26 pp.

Susquehanna River Anadromous Fish Restoration Cooperative (SRAFRC) 2010. Migratory Fish Management and Restoration Plan for the Susquehanna River Basin. November.

United States Environmental Protection Agency (USEPA). 2014. Technical Development Document for the Final Section 316(b) Existing Facilities Rule. EPA-821-R-14-002. May 2014.

United States Fish and Wildlife Service (USFWS). 2015a. Critical Habitat Portal. Accessed February, 2015. http://ecos.fws.gov/crithab/

USFWS. 2015b. IPaC – Information, Planning, and Conservation System. February, 2015 http://ecos.fws.gov/ipac/

USFWS. 2015c. Listed Species Believed to or Known to Occur in Pennsylvania. Environmental Conservation Online System. February, 2015. http://ecos.fws.gov/tess_public/reports/species-listed-by-state-report?state=PA&status=listed

ATTACHMENT E
SUPPORTING TABLES, FIGURES, AND REFERENCES FOR §122.21(r)(4)

United States Nuclear Regulatory Commission (USNRC). 1994. Letter dated February 10, 1994 to Mr. T. Gary Broughton, Vice President and Director, TMI-1, GPU Nuclear Corporation re: Issuance of Amendment -TSCR NOs. 226 and 233 (TAC NOs. M86715 and M88380) Correction of Amendments 177 and 180 (TAC NOs. M86236 and M88060).

Wallus, R and Simon, T.P. 2006a. Reproductive Biology and Early Life History of Fishes in the Ohio River Drainage: Ictaluridae – Catfish and Madtoms. Volume 3. Taylor & Francis Group. Boca Raton, FL.

Wallus, R and Simon, T.P. 2006b. Reproductive Biology and Early Life History of Fishes in the Ohio River Drainage: Percidae – Perch, Pikeperch, and Darters. Volume 4. Taylor & Francis Group. Boca Raton, FL. 2006.

Wallus, R and Simon, T.P. 2006c. Reproductive Biology and Early Life History of Fishes in the Ohio River Drainage: Aphredoderidae through Cottidae, Moronidae, and Sciaenidae. Volume 5. Taylor & Francis Group. Boca Raton, FL. 2006.

Wang, J.C.S and Kernehan, R.J. 1979. Fishes of the Delaware Estuaries: A Guide to Early Life Histories. EA Communications, Towson, MD. 1979.

Wellborn, T. 1988. Channel Catfish Life History and Biology. Southern Regional Aquaculture Center. L-2402. SRAC Publication No. 180. December.

York Haven Power Company, LLC (YHPC). 2011. Assessment of Aquatic Resources in the Susquehanna River below the York Haven Project Dams Study Report, York Haven Hydroelectric Project, FERC Project No. 1888. *Cited in*: FERC (2012) as YHPC 2011c.

YHPC. 2012. York Haven Hydroelectric Project FERC Project No. 1888, Final License Application.

Yu, S.L and Peters, E.J. 2003. Diel and seasonal abundance of fishes in the Platte River, Nebraska, USA. Fisheries Science. 2003, 69:154-160.

Chemical Additives

This section includes:

A. Tables with

1. Chemical additives that have been introduced to waste streams over the past two years.
2. Chemical additives that TMI-1 is requesting approval to use upon issuance of the permit; this table clarifies the maximum allowable usage rate and the maximum use request for each chemical.
3. Status of each chemical additive – if on DEP's approved list, if a usage notification form is included, and if TMI-1 is requesting that a chemical be included in the Approved List.

B. Chemical Additives Notification forms showing the calculated maximum allowable usage rate

C. New Chemical Additives Request forms

D. DEP Toxics Management Spreadsheet updated with maximum allowable usage rate calculations for each chemical (provided as a separate Excel file)

Chemical Additives

1. Identify all chemical additives that have been introduced to any waste stream over the past two years.

Chemical Additive Name	Outfall / IMP No.	Purpose	Usage Frequency	WQBEL-based Max Allowable Usage Rate Calculated	Requested Max Usage Rate	Units
Hypersperse MDC714	001	Antiscalant for RO membranes	24 hours for 1-2 days	3,748	16	gal/day
Sodium Hypochlorite (12 -15%)	001	Biocide	As-needed		5	gal/day
Sodium Hydroxide	001	Neutralizing Agent / pH Control	As-needed		< 1	gal/day
Aluminum Sulfate	001	Water Treatment	As-needed		10	gal/day
CP 837 Chloride (Zinc Orthophosphate for drinking water)	001	Corrosion Control / biocide	As-needed		2	gal/day

2. List all chemical additives that the applicant is requesting approval to use upon issuance of the permit by DEP. Identify the point of introduction on a line or process diagram.

Chemical Additive Name	Outfall / IMP No.	Purpose	Proposed Usage Frequency	WQBEL-based Max Allowable Usage Rate Calculated	Proposed Max Usage Rate	Units
NALCO 77352NA	001	Biocide	As-needed	0.5	< 1	gal/day
3D TRASAR 3DT198	001	Corrosion Inhibitor	As-needed	96	20	gal/day

Chemical Additive Name	Outfall / IMP No.	Purpose	Proposed Usage Frequency	WQBEL-based Max Allowable Usage Rate Calculated	Proposed Max Usage Rate	Units
NALCO H150M	001	Biocide	2 treatments / yr	0.5	600	gal/day
NALCO 1315	001	Neutralizing Agent	2 treatments / yr	34,936	15,000	gal/day
3D Trasar 3DT120	001	Circulating Water Treatment	Continuous	1,569	50	gal/day
3D Trasar 3DT120	001	Circulating Water Treatment -Component cooling water systems	As-needed	1,569	5	gal/day
3D Trasar 3DT138	001	Circulating Water Treatment	Continuous	126	50	gal/day
3D Trasar 3DT138	001	Circulating Water Treatment - Component cooling water systems	As-needed	126	5	gal/day
Ammonium Hydroxide	001	pH Control	1 / 2yr application	1.4	<1	gal/day
ControlBrom CB70	001	Biocide	2 hrs application / day	10,820	35	gal/day
Sulfuric Acid (93 - 95%)	001	Neutralization Agent / pH Control (Circulating Water)	Continuous	126	500	gal/day
Sulfuric Acid (1 - 50%)	001/ 701	Neutralization Agent / pH Control [PreTreatment System (RO / UF / DI trailers)]	Continuous	126	5	gal/day
C-9	001	Corrosion Inhibitor	Continuous	22	10	gal/day
NALCO 73550	001	Biocide	As-needed (May - Oct)	40	40	gal/day

Chemical Additive Name	Outfall / IMP No.	Purpose	Proposed Usage Frequency	WQBEL-based Max Allowable Usage Rate Calculated	Proposed Max Usage Rate	Units
NALCO 7468	001	Neutralizing Agent	As-needed (May - Oct)	3493	5	gal/day
3D Trasar 3DT199	001/006	Cooling Water Treatment	2 treatment / month	146	20	gal/day
Nalclean 2568 PULV	001	Scale Control	As-needed	34	< 1	gal/day
Nalco 8158	001	Neutralizing agent	As-needed	1,053	< 1	gal/day
Y302551 - Potassium Sulfite	001	Neutralizing agent	As-needed		75	gal/day
PRE-TECT 2040HP	001	Corrosion inhibitor	As-needed		3	gal/day
PRE-TECT PT7000	001	Corrosion inhibitor	As-needed		3	gal/day
Boric Acid	001	Pressurized Water Reactor Treatment	As-needed		10	lbs/day
Lithium Hydroxide (Lithium)	001	pH control	As-needed		2	lbs/day
Hydrazine 35%	001	Corrosion inhibitor	As-needed		5	gal/day
CT 603SO	001	Scale control	As-needed		2	gal/day
TRASAR TRAC103	001	Corrosion inhibitor	As-needed		< 1	gal/day
NALCLEAR 7744	001	Water treatment - flocculant	As-needed		< 1	gal/day
OPTIMER 9602 PULV	001	Water treatment	As-needed		< 1	gal/day
SAG-2001	001	Scale control	As-needed		< 1	gal/day
Aluminum Sulfate	001	Water treatment	As-needed		10	gal/day
CP 837 Chloride (Zinc Orthophosphate for drinking water)	001	Corrosion control / biocide	As-needed		2	gal/day
OPTIMER 7139 PLUS	001	Water treatment	As-needed		< 1	gal/day
Zinc Acetate Dihydrate	001	Internal boiler water treatment	As-needed		< 1	lbs/day
OPTISPERSE PWR6600	001	Internal boiler water treatment	As-needed		< 1	gal/day

Chemical Additive Name	Outfall / IMP No.	Purpose	Proposed Usage Frequency	WQBEL-based Max Allowable Usage Rate Calculated	Proposed Max Usage Rate	Units
CT 603SO	001		As-needed		< 1	gal/day
Klaraid IC1172	001	Neutralizing Agent	As-needed		< 1	gal/day
Sodium Hypochlorite (12 -15%)	001	Biocide	2hrs application / day		300	gal/day
Sodium Hypochlorite (12 -15%)	001	Biocide	2hrs application / day		75	gal/day
Sodium Hypochlorite (12 -15%)	001	Biocide	As needed		5	gal/day
Sodium Bisulfite	001	Neutralizing Agent	As needed		< 1	gal/day
Sodium Hydroxide	001	Neutralizing Agent / pH Control	As needed		< 1	gal/day
Citric Acid	001	Neutralizing Agent	As needed		< 1	gal/day
Hypersperse MDC714	001	Antiscalant for RO membranes	24 hours for 1-2 days	3,748	16	gal/day

3. List all chemical additives in the same order as question 2, above, and provide the requested information. For chemical additives that are not on DEP's Approved List, submit New Chemical Additive Request Form(s) to DEP's Central Office. For chemical additives that are on DEP's Approved List but a Chemical Additives Notification Form was not previously submitted, attach a Chemical Additives Notification Form to the application.

Chemical Additive Name	On Approved List? (Y/N)	Notification Form Attached? (Y/N)	Notification Form Previously Submitted? (Y/N)	Notification Form Submission Date	Analytical Method
NALCO 77352NA	Y	Y	Y	10/14/2010	
3D TRASAR 3DT198	Y	Y	Y	10/14/2010	colorimetric
NALCO H150M	Y	Y	Y	10/14/2010	
NALCO 1315	Y	Y	Y	10/14/2010	
3D Trasar 3DT120	Y	Y	Y	10/14/2010	photometric
3D Trasar 3DT120	Y	Y	Y	10/14/2010	photometric
3D Trasar 3DT138	Y	Y	Y	10/14/2010	photometric
3D Trasar 3DT138	Y	Y	Y	10/14/2010	photometric
Ammonium Hydroxide	Y	Y	Y	07/14/1988	
ControlBrom CB70	Y	Y	Y	10/14/2010	
Sulfuric Acid (93 - 95%)	Y	Y			
Sulfuric Acid (1 - 50%)	Y	Y			
C-9	Y	Y	Y	10/14/2010	
NALCO 73550	Y	Y	Y	10/14/2010	
NALCO 7468	Y	Y	Y	10/14/2010	
3D Trasar 3DT199	Y	Y	Y	06/24/2015	colorimetric
Nalclean 2568 PULV	Y	Y	Y	10/17/2013	
Nalco 8158	Y	Y	Y	10/14/2010	
Y302551 (potassium sulfite)- Potassium Sulfite	N		Y	10/14/2010	
PRE-TECT 2040HP	N		Y	10/14/2010	Ion chromatograph
PRE-TECT PT7000	N		Y	10/14/2010	Ion chromatograph

Chemical Additive Name	On Approved List? (Y/N)	Notification Form Attached? (Y/N)	Notification Form Previously Submitted? (Y/N)	Notification Form Submission Date	Analytical Method
Boric Acid	N		Y	10/02/1997	
Lithium Hydroxide (Lithium)	N				
Hydrazine 35%	N		Y	02/28/2002	
CT 603SO	N		Y	10/14/2010	
TRASAR TRAC103	N		Y		
NALCLEAR 7744	N		Y		
OPTIMER 9602 PULV	N		Y		
SAG-2001	N				
Aluminum Sulfate	N				
CP 837 Chloride (Zinc Orthophosphate for drinking water)	N				
OPTIMER 7139 PLUS	N				
Zinc Acetate Dihydrate	N				
OPTISPERSE PWR6600	N				
CT 603SO	N		Y	10/14/2010	
Klaraid IC1172	Y	N	Y	03/10/2015	
Sodium Hypochlorite (12 -15%)	Y	N	Y	03/10/2015	photometric
Sodium Bisulfite	Y	N	Y	03/10/2015	
Sodium Hydroxide	Y	N	Y	03/10/2015	
Citric Acid	Y	N	Y	03/10/2015	
Hypersperse MDC714	Y	N	Y	11/12/2024	

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DEPARTMENT OF ENVIRONMENTAL PROTECTION

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF ENVIRONMENTAL PROTECTION
BUREAU OF CLEAN WATER

CHEMICAL ADDITIVES NOTIFICATION FORM

Use this form to notify the DEP regional office that issued the NPDES permit of the new or increased use of chemical additives that were not reported in the NPDES permit application and are on DEP's Approved List (see www.dep.pa.gov/chemicaladditives). Use one form per chemical additive and discharge point.

Permittee Name:	Constellation Energy Generation LLC	**Facility Name:**	TMI Unit 1
Permit No.:	PA0009920	**Municipality:**	Londonderry Twp
Permit Effective Date:	Nov 1, 2007	**County:**	Dauphin County
Permit Expiration Date:	Administratively extended		

Trade Name of Chemical Additive:	NALCO 77352NA
Manufacturer Name:	Nalco Company
Intended Use(s):	Biocide
Location(s) of Use:	Component cooling water systems
Frequency of Use:	as-needed
Method of Introduction:	Manual
Treatment Following Introduction:	N/A
Discharge Point (Outfall No.):	001
Design Flow of Discharge (MGD):	25.3
Receiving Water Body Name:	Susquehanna River
Q_{7-10} Flow of Stream (cfs):	2,640 (USGS StreamStats- https://streamstats.usgs.gov/ss/ , Workpace ID PA20241107193706422000)
Calculated WQBEL (mg/L):	0.001
Maximum Usage Rate:	0.5 **Units:** gallons per day

Will Other Chemical Additives Be Introduced at the Same Time? ☒ YES ☐ NO If YES, Number: Varies; as-needed

I certify under penalty of law that this document was prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations. See 18 Pa. C.S. § 4904 (relating to unsworn falsification).

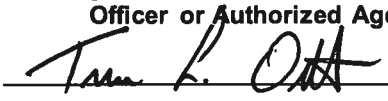
Name/Title Principal Executive Officer

Trevor L Orth / Plant Manager

Phone: 267-533-5559

Date: January 15,2025

Signature of Principal Executive Officer or Authorized Agent



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Permit No.:	PA0009920	**Municipality:**	Londonderry Twp
Permit Effective Date:	Nov 1, 2007	**County:**	Dauphin County
Permit Expiration Date:	Administratively extended		

Trade Name of Chemical Additive:	3D TRASAR 3DT198
Manufacturer Name:	Nalco Company
Intended Use(s):	Corrosion Inhibitor
Location(s) of Use:	Component cooling water systems
Frequency of Use:	As-needed
Method of Introduction:	Manual
Treatment Following Introduction:	N/A
Discharge Point (Outfall No.):	001
Design Flow of Discharge (MGD):	25.3
Receiving Water Body Name:	Susquehanna River
Q_{7-10} Flow of Stream (cfs):	2,640 (USGS StreamStats- https://streamstats.usgs.gov/ss/ , Workpace ID PA20241107193706422000)
Calculated WQBEL (mg/L):	0.19
Maximum Usage Rate:	96.2 **Units:** gallons per day

Will Other Chemical Additives Be Introduced at the Same Time? ☒ YES ☐ NO If YES, Number: Varies; as-needed

I certify under penalty of law that this document was prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations. See 18 Pa. C.S. § 4904 (relating to unsworn falsification).

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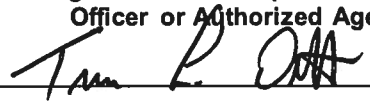

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Permit No.:	PA0009920	**Municipality:**	Londonderry Twp
Permit Effective Date:	Nov 1, 2007	**County:**	Dauphin County
Permit Expiration Date:	Administratively extended		

Trade Name of Chemical Additive:	NALCO H150M
Manufacturer Name:	Nalco Company
Intended Use(s):	Biocide
Location(s) of Use:	Circulating water, Service water, Filtration system
Frequency of Use:	2 treatments / yr
Method of Introduction:	Pumped
Treatment Following Introduction:	Yes - hydraulic residence
Discharge Point (Outfall No.):	001
Design Flow of Discharge (MGD):	25.3
Receiving Water Body Name:	Susquehanna River
Q_{7-10} Flow of Stream (cfs):	2,640 (USGS StreamStats- https://streamstats.usgs.gov/ss/ , Workpace ID PA20241107193706422000)
Calculated WQBEL (mg/L):	0.001
Maximum Usage Rate:	0.5 **Units:** gallons per day

Will Other Chemical Additives Be Introduced at the Same Time? ☒ YES ☐ NO If YES, Number: Varies; as-needed

I certify under penalty of law that this document was prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations. See 18 Pa. C.S. § 4904 (relating to unsworn falsification).

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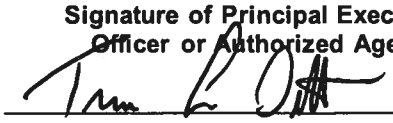

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Use this form to notify the DEP regional office that issued the NPDES permit of the new or increased use of chemical additives that were not reported in the NPDES permit application and are on DEP's Approved List (see www.dep.pa.gov/chemicaladditives). Use one form per chemical additive and discharge point.

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Permit No.:	PA0009920	**Municipality:**	Londonderry Twp
Permit Effective Date:	Nov 1, 2007	**County:**	Dauphin County
Permit Expiration Date:	Administratively extended		

Trade Name of Chemical Additive:	NALCO 1315
Manufacturer Name:	Nalco Company
Intended Use(s):	Neutralizing Agent
Location(s) of Use:	Circulating Water, Filteration system, Service water
Frequency of Use:	2 treatments / yr
Method of Introduction:	pumped
Treatment Following Introduction:	Yes - hydraulic residence
Discharge Point (Outfall No.):	001
Design Flow of Discharge (MGD):	25.3
Receiving Water Body Name:	Susquehanna River
Q_{7-10} Flow of Stream (cfs):	2,640 (USGS StreamStats- https://streamstats.usgs.gov/ss/ , Workpace ID PA20241107193706422000)
Calculated WQBEL (mg/L):	69
Maximum Usage Rate:	34,936 **Units:** gallons per day

Will Other Chemical Additives Be Introduced at the Same Time? ☒ YES ☐ NO If YES, Number: Varies; as-needed

I certify under penalty of law that this document was prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations. See 18 Pa. C.S. § 4904 (relating to unsworn falsification).

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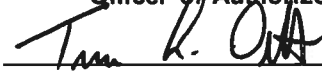
Date: January 15, 2025

Signature of Principal Executive Officer or Authorized Agent



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DEPARTMENT OF ENVIRONMENTAL PROTECTION

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF ENVIRONMENTAL PROTECTION
BUREAU OF CLEAN WATER

CHEMICAL ADDITIVES NOTIFICATION FORM

Use this form to notify the DEP regional office that issued the NPDES permit of the new or increased use of chemical additives that were not reported in the NPDES permit application and are on DEP's Approved List (see www.dep.pa.gov/chemicaladditives). Use one form per chemical additive and discharge point.

Permittee Name:	Constellation Energy Generation LLC	**Facility Name:**	TMI Unit 1
Permit No.:	PA0009920	**Municipality:**	Londonderry Twp
Permit Effective Date:	Nov 1, 2007	**County:**	Dauphin County
Permit Expiration Date:	Administratively extended		

Trade Name of Chemical Additive:	3D Trasar 3DT120
Manufacturer Name:	Nalco Company
Intended Use(s):	Circulating Water Treatment
Location(s) of Use:	Circulating Water, Component cooling water systems
Frequency of Use:	Circulating Water- Continuous Component cooling water systems - As needed
Method of Introduction:	Pumped (Circulating Water) Manual (Component cooling water systems)
Treatment Following Introduction:	N/A
Discharge Point (Outfall No.):	001
Design Flow of Discharge (MGD):	25.3
Receiving Water Body Name:	Susquehanna River
Q_{7-10} Flow of Stream (cfs):	2,640 (USGS StreamStats- https://streamstats.usgs.gov/ss/ , Workpace ID PA20241107193706422000)
Calculated WQBEL (mg/L):	3.1
Maximum Usage Rate:	1,569.6 **Units:** gallons per day

Will Other Chemical Additives Be Introduced at the Same Time? ☒ YES ☐ NO If YES, Number: Varies; as-needed

I certify under penalty of law that this document was prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations. See 18 Pa. C.S. § 4904 (relating to unsworn falsification).

Name/Title Principal Executive Officer

Trevor L Orth / Plant Manager

Phone: 267-533-5559

Date: January 15, 2025

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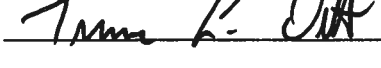

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Permit Effective Date:	Nov 1, 2007	**County:**	Dauphin County
Permit Expiration Date:	Administratively extended		

Trade Name of Chemical Additive:	3D Trasar 3DT138
Manufacturer Name:	Nalco Company
Intended Use(s):	Circulating water treatment
Location(s) of Use:	Circulating water, Component cooling water systems
Frequency of Use:	Circulating Water- Continuous Component cooling water systems - As needed
Method of Introduction:	Circulating Water- Pumped Component cooling water systems - Manual
Treatment Following Introduction:	N/A
Discharge Point (Outfall No.):	001
Design Flow of Discharge (MGD):	25.3
Receiving Water Body Name:	Susquehanna River
Q_{7-10} Flow of Stream (cfs):	2,640 (USGS StreamStats- https://streamstats.usgs.gov/ss/ , Workpace ID PA20241107193706422000)
Calculated WQBEL (mg/L):	0.25
Maximum Usage Rate:	126.6 **Units:** gallons per day

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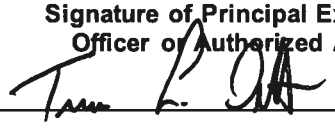

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Permit Expiration Date:	Administratively extended		

Trade Name of Chemical Additive:	Ammonium Hydroxide
Manufacturer Name:	Nalco Company
Intended Use(s):	pH Control
Location(s) of Use:	Reactor System
Frequency of Use:	1 application / 2yr
Method of Introduction:	Manual
Treatment Following Introduction:	N/A
Discharge Point (Outfall No.):	001
Design Flow of Discharge (MGD):	25.3
Receiving Water Body Name:	Susquehanna River
Q_{7-10} Flow of Stream (cfs):	2,640 (USGS StreamStats- https://streamstats.usgs.gov/ss/ , Workpace ID PA20241107193706422000)
Calculated WQBEL (mg/L):	0.0028
Maximum Usage Rate:	1.4 **Units:** gallons per day

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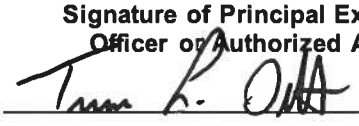

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Permit Effective Date:	Nov 1, 2007	**County**:	Dauphin County
Permit Expiration Date:	Administratively extended		

Trade Name of Chemical Additive:	ControlBrom CB70
Manufacturer Name:	NALCO Company
Intended Use(s):	Biocide
Location(s) of Use:	Circulating Water
Frequency of Use:	2 hrs application / day
Method of Introduction:	Pumped
Treatment Following Introduction:	N/A
Discharge Point (Outfall No.):	001
Design Flow of Discharge (MGD):	25.3
Receiving Water Body Name:	Susquehanna River
Q_{7-10} Flow of Stream (cfs):	2,640 (USGS StreamStats- https://streamstats.usgs.gov/ss/ , Workpace ID PA20241107193706422000)
Calculated WQBEL (mg/L):	21.37
Maximum Usage Rate:	10,820 **Units**: gallons per day

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Permit No.:	PA0009920	**Municipality**:	Londonderry Twp
Permit Effective Date:	Nov 1, 2007	**County**:	Dauphin County
Permit Expiration Date:	Administratively extended		

Trade Name of Chemical Additive:	Sulfuric Acid (93 - 95%) and Sulfuric Acid (1 - 50%)
Manufacturer Name:	Univar USA
Intended Use(s):	Neutralization Agent / pH Control
Location(s) of Use:	Circulating Water PreTreatment System (RO / UF / DI trailers)
Frequency of Use:	Sulfuric Acid (93 - 95%) - Circulating Water - Continuous Sulfuric Acid (1 - 50%)- Pre Treatment System - Continuous
Method of Introduction:	Pumped
Treatment Following Introduction:	N/A
Discharge Point (Outfall No.):	Sulfuric Acid (93 - 95%) - Outfall 001 , Sulfuric Acid (1 - 50%) - Outfall 001 and 701
Design Flow of Discharge (MGD):	25.3
Receiving Water Body Name:	Susquehanna River
Q_{7-10} Flow of Stream (cfs):	2,640 (USGS StreamStats- https://streamstats.usgs.gov/ss/ , Workpace ID PA20241107193706422000)
Calculated WQBEL (mg/L):	0.25
Maximum Usage Rate:	126 **Units**: gallons per day

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Date: 1/15/25

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Permit Expiration Date:	Administratively extended		

Trade Name of Chemical Additive:	C-9
Manufacturer Name:	Nalco Company
Intended Use(s):	Corrosion Inhibitor
Location(s) of Use:	Circulating Water
Frequency of Use:	Continuous
Method of Introduction:	Pumped
Treatment Following Introduction:	N/A
Discharge Point (Outfall No.):	001
Design Flow of Discharge (MGD):	25.3
Receiving Water Body Name:	Susquehanna River
Q_{7-10} Flow of Stream (cfs):	2,640 (USGS StreamStats- https://streamstats.usgs.gov/ss/ , Workpace ID PA20241107193706422000)
Calculated WQBEL (mg/L):	0.044
Maximum Usage Rate:	22 **Units**: gallons per day

Will Other Chemical Additives Be Introduced at the Same Time? ☒ YES ☐ NO If YES, Number: Varies; as-needed

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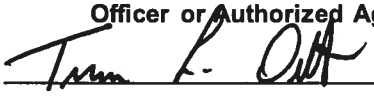

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Permit Effective Date:	Nov 1, 2007	**County**:	Dauphin County
Permit Expiration Date:	Administratively extended		

Trade Name of Chemical Additive:	NALCO 73550
Manufacturer Name:	Nalco Company
Intended Use(s):	Biocide
Location(s) of Use:	Circulating Water
Frequency of Use:	As needed (May - Oct)
Method of Introduction:	Manual
Treatment Following Introduction:	Yes - hydraulic residence
Discharge Point (Outfall No.):	001
Design Flow of Discharge (MGD):	25.3
Receiving Water Body Name:	Susquehanna River
Q_{7-10} Flow of Stream (cfs):	2,640 (USGS StreamStats- https://streamstats.usgs.gov/ss/ , Workpace ID PA20241107193706422000)
Calculated WQBEL (mg/L):	0.08
Maximum Usage Rate:	40 **Units**: gallons per day

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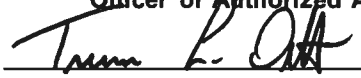

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Permit No.:	PA0009920	**Municipality:**	Londonderry Twp
Permit Effective Date:	Nov 1, 2007	**County:**	Dauphin County
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Trade Name of Chemical Additive:	NALCO 7468
Manufacturer Name:	Nalco Company
Intended Use(s):	Neutralizing Agent
Location(s) of Use:	Circulating Water
Frequency of Use:	As needed (May - Oct)
Method of Introduction:	Manual
Treatment Following Introduction:	Yes
Discharge Point (Outfall No.):	001
Design Flow of Discharge (MGD):	25.3
Receiving Water Body Name:	Susquehanna River
Q_{7-10} Flow of Stream (cfs):	2,640 (USGS StreamStats- https://streamstats.usgs.gov/ss/ , Workpace ID PA20241107193706422000)
Calculated WQBEL (mg/L):	6.9
Maximum Usage Rate:	3,493 **Units:** gallons per day

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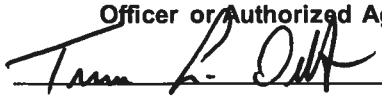

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Trade Name of Chemical Additive:	3D Trasar 3DT199
Manufacturer Name:	Nalco Company
Intended Use(s):	Cooling Water Treatment
Location(s) of Use:	Service Water
Frequency of Use:	2 treatments / month
Method of Introduction:	Pumped
Treatment Following Introduction:	N/A
Discharge Point (Outfall No.):	001 and 006
Design Flow of Discharge (MGD):	25.3
Receiving Water Body Name:	Susquehanna River
Q_{7-10} Flow of Stream (cfs):	2,640 (USGS StreamStats- https://streamstats.usgs.gov/ss/ , Workpace ID PA20241107193706422000)
Calculated WQBEL (mg/L):	0.29
Maximum Usage Rate:	146 **Units**: gallons per day

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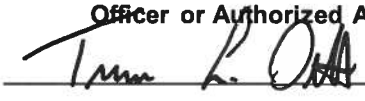

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Trade Name of Chemical Additive:	Nalclean 2568 PULV
Manufacturer Name:	Nalco Company
Intended Use(s):	Scale Control
Location(s) of Use:	Radwaste
Frequency of Use:	As needed
Method of Introduction:	Manual
Treatment Following Introduction:	N/A
Discharge Point (Outfall No.):	001
Design Flow of Discharge (MGD):	25.3
Receiving Water Body Name:	Susquehanna River
Q_{7-10} Flow of Stream (cfs):	2,640 (USGS StreamStats- https://streamstats.usgs.gov/ss/ , Workpace ID PA20241107193706422000)
Calculated WQBEL (mg/L):	0.069
Maximum Usage Rate:	34 **Units:** gallons per day

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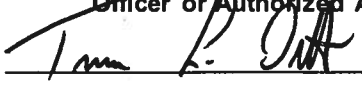

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Permittee Name:	Constellation Energy Generation LLC	**Facility Name:**	TMI Unit 1
Permit No.:	PA0009920	**Municipality:**	Londonderry Twp
Permit Effective Date:	Nov 1, 2007	**County:**	Dauphin County
Permit Expiration Date:	Administratively extended		

Trade Name of Chemical Additive:	Nalco 8158
Manufacturer Name:	Nalco Company
Intended Use(s):	Neutralizing agent
Location(s) of Use:	Sewage treatment plant
Frequency of Use:	As needed
Method of Introduction:	Manual
Treatment Following Introduction:	N/A
Discharge Point (Outfall No.):	001
Design Flow of Discharge (MGD):	25.3
Receiving Water Body Name:	Susquehanna River
Q_{7-10} Flow of Stream (cfs):	2,640 (USGS StreamStats- https://streamstats.usgs.gov/ss/ , Workpace ID PA20241107193706422000)
Calculated WQBEL (mg/L):	2.08
Maximum Usage Rate:	1,053 **Units:** gallons per day

Will Other Chemical Additives Be Introduced at the Same Time? ☒ YES ☐ NO If YES, Number: Varies; as-needed

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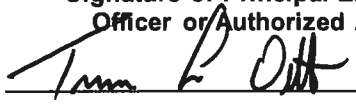
Name/Title Principal Executive Officer

Trevor L Orth / Plant Manager

Phone: 267-533-5559

Date: January 15, 2025

Signature of Principal Executive Officer or Authorized Agent



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COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF ENVIRONMENTAL PROTECTION
BUREAU OF CLEAN WATER

NEW CHEMICAL ADDITIVES REQUEST FORM

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Indicate who is submitting this form: ☒ Permittee ☐ Manufacturer

Permittee Name:	Constellation Energy Generation LLC	**Facility Name:**	TMI Unit 1
Permit No.:	PA0009920	**Municipality:**	Londonderry Twp
Permit Effective Date:	Nov 1, 2007	**County:**	Dauphin County
Permit Expiration Date:	Administratively extended		

Trade Name of Chemical Additive: Potassium Sulfite 45% TECH

Manufacturer Name: Hydrite

Intended Use(s): Neutralizing Agent

48-Hour LC_{50} or EC_{50} (for whole product): NA - non-toxic mg/L

Species Tested: ☐ Ceriodaphnia sp. ☐ Daphnia sp. ☐ Simocephalus sp.

List All Product Ingredients:

Constituent Name:	CAS #	Percent (%)	By Weight or Volume
Potassium Sulfite	10117-38-1	45	By Weight
	Total:	100	

Analytical Method(s) That May be Used to Determine Effluent Concentration: EPA Method 4500-SO32-B

Method Detection Limit (mg/L): 2

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Name/Title Principal Executive Officer	Signature of Principal Executive Officer or Authorized Agent	Date
Trevor L Orth / Plant Manager	Trevor L Orth	January 15, 2025

Phone: 267-533-5559 Email: Trevor.Orth@Constellation.com

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Trade Name of Chemical Additive: PRE-TECT 2040HP

Manufacturer Name: Nalco Company

Intended Use(s): Corrosion Inhibitor

48-Hour LC_{50} or EC_{50} (for whole product): 694 mg/L

Species Tested: ☐ Ceriodaphnia sp. ☒ Daphnia sp. ☐ Simocephalus sp.

List All Product Ingredients:

Constituent Name:	CAS #	Percent (%)	By Weight or Volume
Methoxypropylamine	5332-73-0	45	By Weight
	Total:	100	

Analytical Method(s) That May be Used to Determine Effluent Concentration:

Method Detection Limit (mg/L):

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Trevor L Orth / Plant Manager	Trevor L Orth	January 15, 2025

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Trade Name of Chemical Additive: PRE-TECT PT7000

Manufacturer Name: Nalco Company

Intended Use(s): Corrosion Inhibitor

48-Hour LC_{50} or EC_{50} (for whole product): 250 mg/L Mysid Shrimp (Mysidopsis bahia)

Species Tested: ☐ Ceriodaphnia sp. ☐ Daphnia sp. ☐ Simocephalus sp.

List All Product Ingredients:

Constituent Name:	CAS #	Percent (%)	By Weight or Volume
Monoethanolamine	141-43-5	45	By Weight
	Total:	100	

Analytical Method(s) That May be Used to Determine Effluent Concentration:

Method Detection Limit (mg/L):

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Trevor L Orth / Plant Manager	Trevor L Orth	1/15/25

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Trade Name of Chemical Additive: Boric Acid

Manufacturer Name: U.S. Borax Inc.

Intended Use(s): Pressurized Water Reactor Treatment

48-Hour LC_{50} or EC_{50} (for whole product): 133 mg/L

Species Tested: ☐ Ceriodaphnia sp. ☒ Daphnia sp. ☐ Simocephalus sp.

List All Product Ingredients:

Constituent Name:	CAS #	Percent (%)	By Weight or Volume
Boric Acid	10043-35-3	100	
	Total:	100	

Analytical Method(s) That May be Used to Determine Effluent Concentration: EPA Method 6020B

Method Detection Limit (mg/L):

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Trevor L Orth / Plant Manager	Trevor L Orth	January 15,2025

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Trade Name of Chemical Additive: Lithium Hydroxide (Lithium)

Manufacturer Name: Eagle Picher Technologies LLC

Intended Use(s): pH control

48-Hour LC_{50} or EC_{50} (for whole product): 30.3 mg/L Oncorhynchus mykiss

Species Tested: ☐ Ceriodaphnia sp. ☐ Daphnia sp. ☐ Simocephalus sp.

List All Product Ingredients:

Constituent Name:	CAS #	Percent (%)	By Weight or Volume
Lithium Hydroxide	72255-97-1		
Water	7732-28-5		
	Total:	100	

Analytical Method(s) That May be Used to Determine Effluent Concentration: EPA Method 200.7

Method Detection Limit (mg/L): 1

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Trevor L Orth / Plant Manager	Trevor L Orth	1/15/25

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Permit Expiration Date:	Administratively extended		

Trade Name of Chemical Additive: Hydrazine 35%

Manufacturer Name: Arch Chemicals Inc.

Intended Use(s): Corrosion inhibator

48-Hour LC_{50} or EC_{50} (for whole product): 0.46 mg/L

Species Tested: ☐ Ceriodaphnia sp. ☒ Daphnia sp. ☐ Simocephalus sp.

List All Product Ingredients:

Constituent Name:	CAS #	Percent (%)	By Weight or Volume
Hydrazine	302-01-2	35	
	Total:	100	

Analytical Method(s) That May be Used to Determine Effluent Concentration: EPA 8270

Method Detection Limit (mg/L): 0.01

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Trevor L Orth / Plant Manager	Trevor L Orth	January 15,2025

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Trade Name of Chemical Additive: CT 603SO

Manufacturer Name: Nalco Company

Intended Use(s): Scale Control

48-Hour LC_{50} or EC_{50} (for whole product): >1000 mg/L Bluegill Sunfish/ 96hrs

Species Tested: ☐ Ceriodaphnia sp. ☐ Daphnia sp. ☐ Simocephalus sp.

List All Product Ingredients:

Constituent Name:	CAS #	Percent (%)	By Weight or Volume
Maleic andydride	113221-69-5	10-30	by weight
Maleic Acid	110-16-7	10-30	by weight
	Total:	100	

Analytical Method(s) That May be Used to Determine Effluent Concentration:

Method Detection Limit (mg/L):

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Trevor L Orth / Plant Manager	Trevor L. Orth	1/15/25

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Trade Name of Chemical Additive: TRASAR TRAC103

Manufacturer Name: Nalco Company

Intended Use(s): Corrosion Inhibitor

48-Hour LC_{50} or EC_{50} (for whole product): 3,026 mg/L

Species Tested: ☒ Ceriodaphnia sp. ☐ Daphnia sp. ☐ Simocephalus sp.

List All Product Ingredients:

Constituent Name:	CAS #	Percent (%)	By Weight or Volume
Sodium Molybdate	7631-95-0	30-60	by weight
	Total:	100	

Analytical Method(s) That May be Used to Determine Effluent Concentration:

Method Detection Limit (mg/L):

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Trade Name of Chemical Additive: NALCLEAR 7744

Manufacturer Name: Nalco Company

Intended Use(s): Water Treatment - flocculant

48-Hour LC_{50} or EC_{50} (for whole product): 1.25 mg/L

Species Tested: ☒ Ceriodaphnia sp. ☐ Daphnia sp. ☐ Simocephalus sp.

List All Product Ingredients:

Constituent Name:	CAS #	Percent (%)	By Weight or Volume
Anionic polyacrylamide		100	
	Total:	100	

Analytical Method(s) That May be Used to Determine Effluent Concentration:

Method Detection Limit (mg/L):

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Trade Name of Chemical Additive: OPTIMER 9602 PULV

Manufacturer Name: Nalco Company

Intended Use(s): Water treatment

48-Hour LC_{50} or EC_{50} (for whole product): 43.3 mg/L

Species Tested: ☐ Ceriodaphnia sp. ☒ Daphnia sp. ☐ Simocephalus sp.

List All Product Ingredients:

Constituent Name:	CAS #	Percent (%)	By Weight or Volume
Flocculant			
	Total:	100	

Analytical Method(s) That May be Used to Determine Effluent Concentration:

Method Detection Limit (mg/L):

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Trade Name of Chemical Additive: SAG 2001
Manufacturer Name: GE Silicones
Intended Use(s): Scale Control
48-Hour LC_{50} or EC_{50} (for whole product): N/A mg/L

Species Tested: ☐ Ceriodaphnia sp. ☐ Daphnia sp. ☐ Simocephalus sp.

List All Product Ingredients:

Constituent Name:	CAS #	Percent (%)	By Weight or Volume
Water	7732-18-5	>70	
Silica filled polydimethysiloxane	67762-90-7	>20	
Proprietary additives	Trade secret	<10	
	Total:	100	

Analytical Method(s) That May be Used to Determine Effluent Concentration: NA
Method Detection Limit (mg/L):

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Permittee Name:	Constellation Energy Generation LLC	**Facility Name**:	TMI Unit 1
Permit No.:	PA0009920	**Municipality**:	Londonderry Twp
Permit Effective Date:	Nov 1, 2007	**County**:	Dauphin County
Permit Expiration Date:	Administratively extended		

Trade Name of Chemical Additive: Aluminum Sulfate

Manufacturer Name: Univar

Intended Use(s): Water Treatment

48-Hour LC_{50} or EC_{50} (for whole product): 250 mg/L Largemouth bass/ 96 hrs

Species Tested: ☐ Ceriodaphnia sp. ☐ Daphnia sp. ☐ Simocephalus sp.

List All Product Ingredients:

Constituent Name:	CAS #	Percent (%)	By Weight or Volume
Aluminum Sulfate	10043-01-3	100	by weight
	Total:	100	

Analytical Method(s) That May be Used to Determine Effluent Concentration: EPA-NERL 375.2

Method Detection Limit (mg/L): 3-300

I certify under penalty of law that this document was prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations. See 18 Pa. C.S. § 4904 (relating to unsworn falsification).

Name/Title Principal Executive Officer	Signature of Principal Executive Officer or Authorized Agent	Date
Trevor L Orth / Plant Manager	Trevor L. Orth	1/15/25

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BUREAU OF CLEAN WATER

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NEW CHEMICAL ADDITIVES REQUEST FORM

Use this form to request approval of new chemical additives that are not identified on DEP's Approved List (see www.dep.pa.gov/chemicaladditives). One form should be used for each proposed chemical additive. Upon approval, DEP will add the chemical to the Approved List. **The Material Safety Data Sheet (MSDS) must be attached.**

Indicate who is submitting this form: ☒ Permittee ☐ Manufacturer

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Trade Name of Chemical Additive: CP 837 Chloride

Manufacturer Name: Sterling Water Technologies LLC

Intended Use(s): Corrosion Control / Biocide

48-Hour LC_{50} or EC_{50} (for whole product): 0.798 mg/L

Species Tested: ☐ Ceriodaphnia sp. ☒ Daphnia sp. ☐ Simocephalus sp.

List All Product Ingredients:

Constituent Name:	CAS #	Percent (%)	By Weight or Volume
Zinc Chloride	7646-85-7	10-20	
Orthophosphoric Acid	7664-38-2	30-50	
Water	7732-18-5	30-60	
	Total:	100	

Analytical Method(s) That May be Used to Determine Effluent Concentration: EPA 600/4-79-020 ?

Method Detection Limit (mg/L):

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Trevor L Orth / Plant Manager	Trevor L. Orth	January 15, 2025

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Trade Name of Chemical Additive: OPTIMER 7139 PLUS

Manufacturer Name: Nalco Company

Intended Use(s): Water Treatment

48-Hour LC_{50} or EC_{50} (for whole product): 1.20 mg/L

Species Tested: ☐ Ceriodaphnia sp. ☒ Daphnia sp. ☐ Simocephalus sp.

List All Product Ingredients:

Constituent Name:	CAS #	Percent (%)	By Weight or Volume
Adipic Acid	124-04-9	1-5	by weight
	Total:	100	

Analytical Method(s) That May be Used to Determine Effluent Concentration:

Method Detection Limit (mg/L):

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Indicate who is submitting this form: ☒ Permittee ☐ Manufacturer

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Trade Name of Chemical Additive: Zinc Acetate Dihydrate

Manufacturer Name: Fisher Scientific

Intended Use(s): Internal boiler water treatment

48-Hour LC_{50} or EC_{50} (for whole product): N/A mg/L

Species Tested: ☐ Ceriodaphnia sp. ☐ Daphnia sp. ☐ Simocephalus sp.

List All Product Ingredients:

Constituent Name:	CAS #	Percent (%)	By Weight or Volume
Zinc Acetate Dihydrate $Zn(CH_3CO_2)_2.2H_2O$	5970-45-6	>98	
	Total:	100	

Analytical Method(s) That May be Used to Determine Effluent Concentration:

Method Detection Limit (mg/L):

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Trevor L Orth / Plant Manager	Trevor L Orth	January 15, 2025

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Indicate who is submitting this form: ☒ Permittee ☐ Manufacturer

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Trade Name of Chemical Additive: OPTISPERSE PWR6600

Manufacturer Name: GE Betz Inc.

Intended Use(s): Internal boiler water treatment

48-Hour LC_{50} or EC_{50} (for whole product): 1250 mg/L

Species Tested: ☐ Ceriodaphnia sp. ☒ Daphnia sp. ☐ Simocephalus sp.

List All Product Ingredients:

Constituent Name:	CAS #	Percent (%)	By Weight or Volume
Monoethanolamine	141-43-5	7-13	by weight
	Total:	100	

Analytical Method(s) That May be Used to Determine Effluent Concentration:

Method Detection Limit (mg/L):

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