# Attachment 3

# Entergy's Original Comments

**COMMENTS OF ENTERGY NUCLEAR GENERATION CO. AND ENTERGY NUCLEAR OPERATIONS, INC., ON DRAFT NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM AND MASSACHUSETTS CLEAN WATERS ACT PERMIT, PERMIT NO. MA0003557, WITH RESPECT TO PILGRIM NUCLEAR POWER STATION**

## INTRODUCTION

Entergy Nuclear Generation Co. and Entergy Nuclear Operations, Inc. (collectively, "Entergy"), respectively the owner and operator of Pilgrim Nuclear Power Station ("Pilgrim" or "PNPS"), are the applicants for a renewed, jointly issued National Pollutant Discharge Elimination System ("NPDES") and Massachusetts Clean Waters Act ("MCWA") permit, NPDES Permit No. MA0003557. On May 18, 2016, United States Environmental Protection Agency, Region 1 ("EPA") and the Massachusetts Department of Environmental Protection ("DEP") issued: (1) the Draft Authorization to Discharge Under the National Pollutant Discharge Elimination System, including Attachments A through C (collectively, the "Draft Permit"), as well as (2) the Fact Sheet, including Attachments A through E thereto (collectively, the "Fact Sheet"; on a consolidated basis, the "Draft Permit package").[1]

Entergy respectfully submits the following comments ("Comments") on the Draft Permit, which reflect terms and conditions that Entergy supports, subject to the corrections and clarifications provided in the Comments below. These Comments also include, as a separate attachment, exemplary revisions to the factual aspects of the proposed Fact Sheet, provided to ensure that EPA and DEP's stated rationale is both correct and supports issuance of the final permit (the "final Permit").[2]

It is worth underscoring that Entergy appreciates the efforts of EPA and DEP with respect to the Draft Permit package. Entergy specifically appreciates EPA and DEP's acknowledgement of the United States Nuclear Regulatory Commission's ("NRC") exclusive jurisdiction over nuclear operations and activities, including with respect to radioisotope discharges. In our experience, the express acknowledgement of NRC's jurisdiction helps to clarify for the public the impropriety of comments to EPA and DEP related to nuclear operations and activities, including with respect to radioisotope discharges and decommissioning, all in a manner that reduces extraneous comments. Entergy further appreciates the incorporation into the Draft Permit of conditions relating to Pilgrim's planned cessation of electricity generation ("shutdown") in 2019.

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[1] *See* Joint Public Notice of a Draft National Pollutant Discharge Elimination System ("NPDES") Permit to Discharge into the Waters of the United States Under Section 301, 316(a), and 402 of the Clean Water Act , as Amended, and Request for State Certification under Section 401 of the Act, NPDES Permit No. MA0003557, Public Notice No. MA-010-16 (May 18, 2016) ("Public Notice"). The Public Notice originally set a comment period from May 18, 2016 to July 18, 2016. EPA and DEP subsequently extended the public comment period to July 25, 2016, scheduling a public hearing for July 21, 2016. *See, e.g.*, Joint Extension of Public Comment Period and Public Notice of a Public Hearing Pertaining to the Issuance of a Draft National Pollutant Discharge Elimination System (NPDES) Permit to Discharge into the Waters of the United States Under Sections 301, 316(a), and 402 of the Clean Water Act ("CWA" or the "Act"), as Amended, and Under Sections 27 and 43 of the Massachusetts Clean Waters Act, as Amended, NPDES Permit No. MA0003557, Public Notice No. MA-012-16 ("Public Notice Extension").

[2] With respect to the Fact Sheet, Entergy suggests a meeting with EPA and DEP to best ensure that the facts required to support the final Permit are accurate and complete.

The inclusion of pre-shutdown and post-shutdown conditions allows the public to better understand Pilgrim's NPDES activities over the next five years, particularly during a period of transition.

These Comments are organized as follows. The first Section below, titled "Environmental Context," summarizes the extensive, robust and consistent scientific record demonstrating that Pilgrim's cooling water intake structure ("CWIS") operations have had no more than a *de minimis* adverse environmental impact on the aquatic community of Cape Cod Bay, and that Pilgrim's operations continue to ensure the protection and propagation of the balanced indigenous population (or community[3]) of fish, shellfish and wildlife. With that context in mind, Entergy's specific comments on the Draft Permit and Fact Sheet, contained in the "Discussion of Draft Permit Language" Section below, proceeds in nine (9) Subsections. Subsection I addresses the impropriety, as a matter of law or fact, of what on the face of the Draft Permit appears to be a condition that requires PNPS to shutdown no later than June 1, 2019 and immediately thereafter enter into decommissioning, both actions within the sole control of Entergy and NRC. Subsection II addresses the volumetric flow limitations proposed by the Draft Permit after shutdown, in particular for service water, which represents the primary continuing (albeit, greatly reduced) discharge during that period. Subsection III addresses the Draft Permit's proposed thermal discharge and backwashing limitations. Subsection IV addresses the Draft Permit's chlorine and boron limitations. Subsection V requests clarification of the Draft Permit's definition of "toxic pollutant" to make clear that it does not include radionuclides. Subsection VI addresses post-shutdown biological monitoring. Subsection VII focuses on Fact Sheet statements concerning listed species and essential fish habitat. Subsection VIII addresses electrical vaults limitations. Finally, Subsection IX addresses the use of PNPS's sea foam suppression system.

Entergy submits these Comments subject to the following understandings and reservations of rights:

- We understand that, as reflected in the Draft Permit,[4] EPA and DEP plan to issue a final Permit that will function as both a NPDES and an MCWA discharge permit, each pursuant to EPA's and DEP's respective laws and procedures. However, the Draft Permit is not clear as to the source of authority for particular sections. Accordingly, Entergy directs these Comments to both EPA and DEP, and specifically requests that each agency clarify which aspects of the final Permit has been issued pursuant to the CWA, as distinct from the MCWA.

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[3] EPA's regulations implementing Section 316(a), 33 USC § 1326(a), use the perm population and community interchangeably, as do these Comments. *See, e.g.,* 40 C.F.R. § 125.71(c) ("The term balanced, indigenous community is synonymous with the term balanced, indigenous population in the Act and means a biotic community typically characterized by diversity, the capacity to sustain itself through cyclic seasonal changes, presence of necessary food chain species and by a lack of domination by pollution tolerant species. Such a community may include historically non-native species introduced in connection with a program of wildlife management and species whose presence or abundance results from substantial, irreversible environmental modifications… .").

[4] *See* Draft Permit, Part I.I, at 41.

- Under EPA's and DEP's respective permitting procedures, each agency is required to respond, in writing, to comments on the Draft Permit, including these Comments.[5] Accordingly, Entergy respectfully requests either separate responses to these Comments from both agencies, or some designation within a combined response that identifies the responding agency, *e.g.*, "Response [by DEP]."

- Under EPA's and DEP's respective permitting procedures, each agency also is required to prepare and issue a fact sheet or statement of basis for draft surface water discharge permits, including the Draft Permit.[6] The Fact Sheet also is not clear as to the source of authority for the various determinations relevant to the Draft Permit, and how those determinations relate to the federal CWA, the MCWA or both.[7] Accordingly, Entergy directs its Comments on the Fact Sheet to both EPA and DEP, and respectfully requests that each agency clarify those aspects of the Fact Sheet that are pursuant to the federal CWA, as distinct from the MCWA.

- Entergy also reserves its right to supplement these Comments as appropriate, including for the purpose of responding to comments submitted by other members of the public or responses to comments by EPA and DEP.[8]

Finally, and consistent with Entergy's longstanding commitment to environmental stewardship and collaboration with regulators, Entergy stands ready to respond to requests for additional information that may be needed by EPA or DEP to issue an informed and factually supported final Permit and fact sheet.

## ENVIRONMENTAL CONTEXT

Before turning to a discussion of the Draft Permit, the focus of which is on Section 316, 33 U.S.C. § 1326, Entergy respectfully submits this summary of the extensive, robust and continuous review, as compiled and analyzed by leading national biologists and statisticians,[9] of Pilgrim's potential impacts on the aquatic ecosystem in Cape Cod Bay over the last nearly half century. As summarized below, this scientific record demonstrates that Pilgrim's historic operations have had no more than a *de minimis* adverse environmental impact to the aquatic ecosystem, including as a result of impingement and entrainment ("I&E") mortality.[10] This scientific record further demonstrates that PNPS's continued operations have in the past and will

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[5] *See* 40 C.F.R. § 124.17; 314 Code Mass. Regs. § 2.09.

[6] *See, e.g.*, 40 C.F.R. § 124.8; 314 Code Mass. Regs. § 2.05(1).

[7] *See* Fact Sheet at 32, 36, 45, 50, 70.

[8] *See* 40 C.F.R. § 124.19; 314 Code Mass. Regs. § 2.08(2)-(3); 310 Code Mass. Regs. § 1.0 *et seq.*

[9] With exception of Dr. Barnthouse who is traveling internationally, affidavits from these respective experts, attaching their respective curriculum vitae ("CVs"), were provided to EPA and DEP in 2008, and are herein provided to reflect updated CVs and current validation of historic documents. Dr. Barnthouse's affidavit will be provided upon his return to the United States.

[10] *See* 40 C.F.R. § 125.94(c)(11).

continue to ensure the protection and propagation of the balanced, indigenous aquatic population (community) of fish, shellfish and wildlife.

For nearly a half century, PNPS's leading national experts have performed a robust suite of integrated environmental monitoring programs that collected and analyzed a wide range of I&E, as well as source of waterbody, aquatic population and aquatic community, data.[11] The plans for these studies, and the studies themselves, were conducted under the direction, oversight and review of EPA, DEP and, for a subset of those years, a specially constituted technical advisory committee (the "PATC").[12] Thus, and to date, for example, Pilgrim's experts have issued 87 semi-annual biological monitoring reports, each charting the health of the aquatic ecosystem and the absence of Pilgrim's impacts.[13]

In addition to this continuous dataset of biological monitoring reports, PNPS's owners and operators over the years have commissioned object-specific studies. Major areas of focus for these studies have included the potential impacts of Pilgrim's operations on: (1) phytoplankton and zooplankton; (2) intertidal and subtidal benthic communities in western Cape Cod Bay; (3) larval, juvenile and adult fish of species of particular concern, including winter flounder, rainbow smelt, cunner, and American lobster; and (4) long-term I&E.[14]

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[11] *See, e.g.*, AKRF, Inc., LWB Environmental Services, Inc. and Normandeau Associates, Inc., *Adverse Environmental Impact Assessment for Pilgrim Nuclear Power Station* (June 2008), at 7-11; Entergy Nuclear Operations, Inc., *Proposal for Information Collection to Address Compliance with Clean Water Act §316(b) Phase II Regulations: Pilgrim Nuclear Power Station* (Oct. 6, 2006) ("PIC").

[12] While it functioned, the PATC consisted of representatives from the federal and Commonwealth water and fisheries resource agencies, as well as technical experts from regional public institutions and the Station. Entergy has continued to provide, on an annual basis, copies of its annual Marine Ecology Reports to those individuals who sat on the PATC when it stopped meeting, and has responded to occasional questions received from former PATC members as they have arisen. *See, e.g.*, Letter from Elise N. Zoli, on behalf of Entergy, to Tom Chapman, U.S. Fish & Wildlife Service (July 13, 2012), Appendix A, at A-2, *available at* http://adams.nrc.gov/wba (Accession No. ML12207A583).

[13] *See* PNPS's annual biological monitoring reports (also called ecological studies), which have previously been provided to EPA. These reports followed pre-operational environmental monitoring that began in 1969, and continued until operation began, thus ensuring robust comparison of pre- and post-operational conditions. *See* PIC at 1. In addition, many ecological studies (1969-1982) were summarized in a peer-reviewed scientific publication titled "*Observations of the Ecology and Biology and Western Cape Cod Bay, Massachusetts*," edited by J.D. Davis and D. Merriman (1984).

[14] *See* PIC at 9-14. These studies include: (1) R.C. Toner, *Phytoplankton of Western Cape Cod Bay* (1984); (2) R.C. Toner, *Zooplankton of Western Cape Cod Bay* (1984); (3) J.D. Davis and R.A. McGrath, *Some Aspects of Nearshore Benthic Macrofauna in Western Cape Cod Bay* (1984); (4) SAIC, *The Ichthyoplankton of Cape Cod Bay* (1992); (5) G. Matthiessen, *The Seasonal Occurrence and Distribution of Larval Lobsters in Cape Cod Bay* (1984); (6) R.P. Lawton, *et al.*, *Fishes of Western Inshore Cape Cod Bay: Studies in the Vicinity of the Rocky Point Shoreline* (1984); (7) R. Lawton, *et al.*, *Final Report on Bottom Trawl Survey (1970-1982) and Impact Assessment of the Thermal Discharge from Pilgrim Station on Groundfish* (1995); (8) B. Kelly, *et al.*, *Final Report on Haul Seine Survey and Impact Assessment of Pilgrim Station on Shore-Zone Fishes, 1981-1991* (1992); (9) M.D. Scherer, *The Ichthyoplankton of Cape Cod Bay* (1984); (10) R.D. Anderson, *Impingement of Organisms at Pilgrim Nuclear Power Station* (1999); and (11) T. Horst, *et al.*, *Seasonal Abundance and Occurrence of Some Planktonic and Ichthyofaunal Communities in Cape Cod Bay: Evidence for Biogeographical Transition* (1984). Many of these studies may be found in volume 11 of Davis and Merriman (1984), *see supra* note 11.

Of particular importance to the Draft Permit, in 2008, Entergy's leading national biological and statistical experts issued an "*Adverse Environmental Impact Assessment for Pilgrim Nuclear Power Station*" ("AEI Report") demonstrating that "operation of the [PNPS] CWIS has not adversely affected populations of any of the species . . . representative of the impinged and entrained organisms at [PNPS] and therefore of [PNPS's] potential I&E effects."[15] The AEI Report findings – which were updated with new I&E data covering the 2008-2013 period in what is hereinafter called the "2014 Update,"[16] and through 2014 in the most recent annual biological monitoring report (the "2015 Biological Report")[17] – represent the best available scientific evidence.[18] As detailed below, these twin reports underscore the absence of discernible adverse environmental impact, as contemplated by Section 316(b); impairment of the balanced indigenous community, as contemplated by Section 316(a); or impairment of Commonwealth water quality standards ("MWQS"). Indeed, in the 2014 Update, these leading national experts concluded, *inter alia*, that the "long-term trend in annual dominance diversity values over the 1980 through 2013 time-series … indicat[es] a stable [aquatic] community…."[19]

Likewise of importance to the Draft Permit are the various thermal studies. The first reports were published contemporaneous with Pilgrim's commencing operations in 1974 and 1976,[20] and supplemented in 1995.[21] Additional focused assessments of the potential effect of PNPS's thermal discharges on Cape Cod's aquatic ecosystem were published in two separate Section 316(a) demonstrations, the first performed in 1975 by Stone and Webster Engineering

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[15] AEI Report at 34.

[16] The AEI Report was updated in August 2014, as Attachment 4 to the report entitled "*Engineering Response Supplement to United States Environmental Protection Agency CWA §308 Letter: Pilgrim Nuclear Power Station, Plymouth, Massachusetts*"(hereinafter "2014 Engineering Response Supplement"), prepared on a lead consultant basis by Enercon Services, Inc. ("Enercon") and submitted on behalf of Entergy in response to a May 14, 2014 informational request by EPA to Entergy pursuant to Section 308 of the Clean Water Act. *See* 2014 Engineering Response Supplement, Attach. 4, Normandeau Associates, Inc. Biological Input.

[17] The 2015 Biological Report, *Marine Ecology Studies Pilgrim Nuclear Power Station, Report No. 85, January 2014 – December 2014*, April 30 2015, includes three reports prepared by Normandeau Associates, Inc.: *Winter Flounder Area Swept Estimate Western Cape Cod Bay 2014* ("Normandeau 2015a"); *Ichthyoplankton Entrainment Monitoring At Pilgrim Nuclear Power Station, January – December 2014* ("Normandeau 2015b"); and *Impingement of Organisms on the Intake Screens at Pilgrim Nuclear Power Station, January – December 2014* ("Normandeau 2015c").

[18] 2014 Engineering Response Supplement, Attach. 4, Normandeau Biological Input, at 2-6 (providing updated information); AEI Report at 15; *see, e.g.*, *San Luis & Delta-Mendota Water Auth. v. Jewell*, 747 F.3d 581, 602 (9th Cir. 2014) (noting that under "best available scientific information" standard, agencies "cannot ignore available biological information" or "disregard available scientific evidence that is in some way better than the evidence it relies on" (quoting *Kern County Farm Bur. v. Allen*, 450 F.3d 1072, 1080-81 (9th Cir. 2006)).

[19] 2014 Engineering Response Supplement, Attach. 4, Normandeau Biological Input, at 4; *see also* AEI Report at 16-34.

[20] *See, e.g.,* Pagenkopf, *et al.*, *Circulation and Dispersion Studies at the Pilgrim Nuclear Power Station, Rocky Point, MA* (1976), *in Marine Ecology Studies Related to the Operation of Pilgrim Station*, Semi-annual Report No. 7; Pagenkopf, *et al.*, *Oceanographic Studies at Pilgrim Nuclear Power Station to Determine Characteristics of Condenser Water Discharge* (1974).

[21] *See* EG&G, *Pilgrim Nuclear Power Station Cooling Water Discharge Bottom Temperature Study, August, 1994* (1995).

Corporation ("Stone and Webster"), and the second in 2000 by ENSR Corporation ("ENSR"). ENSR concluded, based on the then-thirty-year record of study, that PNPS's thermal discharges to Cape Cod Bay had caused no prior appreciable harm to representative important species ("RIS"), and by extension to the aquatic community, and would not do so in the future.[22]

In view of this uniquely robust, continuous and verified record, it is unsurprising that, in the Fact Sheet for the Draft Permit, EPA and DEP conclude not only that this record is sufficient, but also that PNPS's continued operations "will assure the protection and propagation of the balanced, indigenous population."[23]

### A. The AEI Report, The 2014 Update, And The 2015 Biological Report Demonstrate That PNPS's CWIS Has Had And Is Expected To Have Only A *De Minimis* Adverse Environmental Impact

The Fact Sheet states that "on average, PNPS entrains about 2.8 billion eggs and 354 million larvae annually, and impinges about 42,800 fish annually."[24] Entergy agrees that these values are sufficient to trigger searching review under Section 316(b).

However, the best scientific evidence is that, despite their apparent magnitude, these levels represent a *de minimis* adverse environmental impact. The reasons are several. First, levels of I&E must be examined in the proper ecological context, *i.e.*, whether I&E levels are large enough to have a significant impact on the relevant fish populations. Second, levels of I&E must account for the actual quotient of mortality attributable to Pilgrim, *e.g.,* whether the vast majority (typically more than 99.9%) of eggs, if fertilized, die of natural causes (*e.g.*, non-fertilization, starvation and predation) before those fish could contribute to future populations.[25] To account for high early life stage mortality, it is widely accepted practice among scientists and EPA to convert the number of eggs and larvae lost into an equivalent number of adults, because doing so puts early life stage I&E losses into their proper ecological context.[26] Indeed, in its August 15, 2014 *Final Regulations to Establish Requirements for Cooling Water Intake Structures at Existing Facilities* ("Final 316(b) Phase II Rule" or "Rule"), EPA expressly approves the use of adult-equivalent losses (*i.e.*, "the number of individual organisms of different ages impinged and entrained by facility intakes, standardized to equivalent numbers of [adult] fish") to evaluate impacts under Section 316(b), stating "EPA finds it appropriate to use the [adult equivalent] measure because information in the record indicates that an overwhelming majority of eggs,

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[22] *See* ENSR, *§316 Demonstration Report-Pilgrim Nuclear Power Station*, Document Number 0970-021-200, prepared for Entergy Nuclear Generation Company (2000) (hereinafter "ENSR (2000)"); Stone and Webster, *§316 Demonstration: Pilgrim Nuclear Power Station – Units 1 and 2* (1975).

[23] Fact Sheet at 70.

[24] *Id.* at 68; *id.*, Attach. D, at 15.

[25] *See*, *e.g.*, EPRI, *Extrapolating Impingement and Entrainment Losses to Equivalent Adults and Production Foregone*, July 2004.

[26] *Id*. at 1-1; *see also infra* note 26.

larvae and juveniles do not survive into adulthood and the [adult equivalent] calculations adjust for differences in survivorship based on species and age-specific mortality rates."[27]

The 2008 AEI Report focused on four fish RIS, *i.e.*, winter flounder, cunner, Atlantic menhaden, and Atlantic mackerel, and one commercially important crustacean RIS, *i.e.,* American Lobster.[28] As explained in that Report, the RIS satisfy EPA's selection criteria, both for potential I&E mortality and thermal impacts.[29] Further, selection of these RIS, which dominate I&E at PNPS,[30] precipitated no objection or criticism from EPA, DEP or the PATC.[31]

The data evaluated in the AEI Report, the 2014 Update and the 2015 Biological Report come from three sources, collected annually: (1) I&E data collected at PNPS; (2) near-field fisheries monitoring studies; and (3) regional and coastal fisheries data available from state and federal resource management agencies.[32] These data are valid and verified by the consultants, have been directed and reviewed, and in some instances were performed, by governmental agencies, or are the product of independent governmental authorities with specialized fisheries-management knowledge, *e.g.*, the Atlantic States Marine Fisheries Commission ("ASMFC") and the National Marine Fisheries Service ("NMFS").[33] Therefore, the data represent the "most authoritative available information concerning abundance, recruitment, and other characteristics useful in interpreting the potential impacts of I&E at PNPS on harvested fish populations," *i.e.*, the best available information to determine whether PNPS's operation has had any adverse environmental impact on Cape Cod Bay species.[34]

The AEI Report and the 2014 Update establish that populations and communities, not individuals, are the proper focus for evaluating the potential adverse impacts of Pilgrim's operations on Cape Cod Bay.[35] In brief, the AEI Report, the 2014 Update, and the data in the

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[27] 79 Fed. Reg. 48300, 48,403 (Aug. 15, 2014). EPA specifically approves the use of age-1 equivalents, *i.e.*, equivalent numbers of 1-year-old fish, to represent adult fish. However, certain species mature at older ages (*e.g.*, after two or three years), and for those species age-2 or other equivalents should be used to represent adult equivalents. In other words, adult equivalent ages below vary with species.

[28] *See* AEI Report at 1. American lobster was included as a result of perceived commercial and recreational overharvesting of lobsters in Massachusetts waters, not because of perceived Pilgrim impacts. *Id.*

[29] *See id.* at 1, 7-8; *see also* EPA, *Draft Interagency 316(a) Technical Guidance Manual and Guide for Thermal Effects Sections of Nuclear Facilities: Environmental Impact Statements*, § 3.5.2.1, at 36-39 (May 1, 1977) (discussing selection criteria and noting that five is a "high" number of RIS for study).

[30] ENSR (2000) at 5-5 to 5-9.

[31] AEI Report at 1, 7-9. Because it arises later in these Comments, it is worth emphasizing that *alosines* alewife, Atlantic silverside and rainbow smelt are represented by RIS Atlantic menhaden. *Id.* at 9.

[32] AEI Report at 12-15.

[33] *Id.*

[34] *Id.* at 15; *San Luis & Delta-Mendota Water Auth.*, 747 F.3d at 602; *Kern County Farm Bur.*, 450 F.3d at 1080-81.

[35] *See* AEI Report at 2; *see also, e.g.*, John A. Veil, *et al.*, *A Holistic Look at Minimizing Adverse Environmental Impact Under Section 316(b) of the Clean Water Act*, Scientific World Journal (Apr. 2002), at 48 ("Impingement and entrainment, when they result in death or harm to an organism, create an adverse impact to that organism. However, they do not necessarily create an adverse impact on the population or ecosystem at large."); David A. Mayhew, *et al.*, *Adverse Environmental Impact: 30-Year Search for a Definition*, Scientific World Journal (Mar.

2015 Biological Report together demonstrate that PNPS has had no discernible adverse impact to the aquatic community. In general, equivalent adult losses of RIS are trivial, particularly compared to conservative (*i.e.*, understated), independent estimates of the abundance of local and regional populations and approved fisheries management practices (and yields). Additional lines of evidence, including standard fisheries management models, also indicate that I&E losses from operation of PNPS's CWIS are not sufficient to affect the ability of representative populations to persist and fulfil their normal functions, including propagation.[36] Therefore, the best available scientific information would not reasonably support a finding of adverse environmental impact for PNPS.[37] The data and analyses presented in the AEI Report, the 2014 Update, and the 2015 Biological Report for individual RIS are summarized in the following sections.

Before addressing the RIS individually, Entergy respectfully submits that the equivalent adult entrainment loss estimates provided in the Fact Sheet for winter flounder, cunner, Atlantic menhaden, Atlantic Herring, Atlantic cod and Atlantic Mackerel, although attributed to the 2015 Biological Report, do not reflect that document correctly. The table below presents a comparison of the equivalent adult entrainment loss estimates (without accounting for entrainment survival) for these species as given in the Fact Sheet and the same metric calculated from the data in the 2015 Biological Assessment.[38]

| | Equivalent Adult Entrainment Losses | |
|---|---|---|
| Species | Fact Sheet | 2015 Biological Report |
| Winter flounder | 17,047 | 12,474 |
| Cunner | 785,219 | 680,116 |
| Atlantic menhaden | 2,508 | 2,653 |
| Atlantic herring | 12,837 | 13,249 |
| Atlantic cod | 1,816 | 950 |
| Atlantic mackerel | 1,437 | 1,524 |

Entergy respectfully requests that the correct 2015 Biological Report numbers be employed in the final Fact Sheet.

Additionally, EPA's presentation of adult equivalent entrainment losses fails to account for the fact that survival of entrainment has been demonstrated for some of the species.[39] When

2002), at 28 ("Over the last 30 years, the scientific community has attempted to define AEI on a scientific basis, *i.e.*, based on impacts at the population level. This is consistent with the clear intent of Section 316(b) to minimize *environmental* impact.").

[36] *See, e.g.*, AEI Report at 11, 18, 22, 31.

[37] AEI Report at 15, 34; *see also* 2014 Engineering Response Supplement, Attach. 4, Normandeau Biological Input, at 4 (concluding that more recent data confirm conclusion that Cape Cod Bay aquatic community has been stable since 1980, notwithstanding PNPS's operations); *San Luis & Delta-Mendota Water Auth*, 747 F.3d at 602; *Kern County Farm Bur.*, 450 F.3d at 1080-81.

[38] *See* Fact Sheet at 68 and Attach. D at 17; *see also* Normandeau 2015b, Tables 5, 9, 13, 15, 18, 20. In Normandeau 2015b, averages over the period 1980-2014 omit the years 1984 and 1987 due to unusually low numbers resulting from plant outages in those years. *Id*.

[39] *See*, Normandeau 2015b.

demonstrated survival is accounted for, as noted below, estimated adult losses are substantially lower than the losses summarized in the table above or reported in the Fact Sheet for most species.

### 1. Atlantic Menhaden

The Atlantic menhaden is a migratory, pelagic fish that is abundant from Florida to Nova Scotia and believed to consist of a single spawning population with no evidence of local or regional subpopulations.[40] The AEI Report relied on two lines of evidence to determine whether historic or continued operation of Pilgrim's CWIS has caused an adverse impact on Atlantic menhaden: (1) comparison of I&E at the PNPS CWIS, expressed as age-1 equivalents, to estimates of age-1 abundance of Atlantic menhaden available from ASMFC; and (2) the use of fisheries assessment models to calculate the impact of PNPS on Atlantic menhaden recruitment and spawning stock biomass.

#### a. Comparison Of Age-1 Equivalent I&E To Age-1 Population

An average of 24,364 Atlantic menhaden per year were impinged at the PNPS from 1980 through 2007, based on normal operational flows of 461.28 MGD, making this species the most abundant fish impinged at PNPS's CWIS during the period assessed in the AEI Report.[41] This number of fish converts to 15,369 adult (age-1) equivalents, most impinged during seasonal transitions (and cold shock events) or predation.[42] An estimated 66,969,349 eggs and larvae were entrained over the 28-year period, which converts to 1,956 age-1 equivalents.[43] ASMFC estimated that age-1 abundance of Atlantic menhaden varied between 1.57 billion and 10.4 billion over the period from 1980-2005, with an average abundance of 4.78 billion fish.[44] Thus, the AEI Report demonstrated that I&E at PNPS is a miniscule fraction—0.0004% to 0.0005%, depending on the method of calculation—of the average age-1 population of Atlantic menhaden.[45]

The data in the 2014 Update confirm that from 2008-2013, I&E remained a small fraction of the Atlantic menhaden population. From 2008-2013, an average of 25.6 million eggs and larvae were entrained and 3,198 fish were impinged, which together convert to just 406 adult equivalent fish per year.[46] According to the ASMFC's 2014 stock assessment, the average age-1 abundance of Atlantic menhaden from 2008 to 2013 ranged from 2.8 billion to 8.8 billion, with an average

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[40] AEI Report at 16.

[41] *Id*.

[42] *Id*. at 16-17, 48. *See also, e.g.*, EPRI, *The Role of Temperature and Nutritional Status in Impingement of Clupeid Fish Species* (Mar. 2008), at 2-10.

[43] AEI Report at 16-17, 48.

[44] *Id*. at 17, 50.

[45] *Id*.

[46] *See* 2014 Update, Appendix B, Tables 9-12. Data through 2013 are presented because the data for numbers of eggs and larvae entrained in 2014 in the 2015 Biological Report are converted to age-2 equivalents and therefore are not directly comparable to age-1 equivalents provided in the 2014 ASMFC stock assessment.

of 4.88 billion fish.[47] Thus, from 2008-2013, I&E at PNPS was an even smaller fraction—0.00001%—of the average age-1 Atlantic menhaden population than that reported in the AEI report.

As provided in the 2015 Biological Report, over the entire 1980-2014 period an average of 63.54 million Atlantic menhaden eggs and larvae per year were entrained and impinged, which converts to an average of 8,950 adult (age-2) equivalents per year.[48] However, these long-term average I&E figures do not account for the fact that a portion of Atlantic menhaden eggs and larvae have been shown to survive entrainment,[49] despite being identified by EPA as fragile under the Final 316(b) Phase II Rule.[50] When entrainment survival is taken into account, annual adult equivalent I&E losses over the entire 1980-2014 period average just 7,587 per year.[51]

### b. Fisheries Assessment Models

The AEI Report presents the results of a model used to calculate year-specific conditional mortality rates ("CMRs") from year-specific estimates of population structure and total egg production available from stock assessment reports.[52] The CMR is a measure of the mortality imposed on a year class of a population by a stressor such as a cooling water intake structure.[53] Information required to implement the model includes: (1) age-specific natural mortality rates for all 1-year-old and older fish; (2) age-specific fecundities and sex ratios for mature fish; (3) the number of eggs spawned during each year included in the calculation (calculated from estimates of the total abundance and age structure of the spawning stock); (4) the number of these eggs that survive to become one-year-old fish; and (5) the number of fish lost due to entrainment during each year.[54] The model's output consists of the total rate of mortality for age 0 fish and the rate of mortality due to I&E, expressed as a CMR. In essence, the CMR identifies the contribution of I&E to total age 0 mortality, as determined from empirical stock assessment data.[55] Over the years 1985-2004 modeled, the combined impingement and entrainment CMRs for the PNPS CWIS averaged only 0.00078%, equivalent to a 0.00078% reduction in recruitment of age-1 Atlantic menhaden.[56] As noted in the AEI Report, from a cumulative impact perspective, more than 12,000 power plants, each imposing a CMR of 0.00078%, would be required to raise the cumulative entrainment and impingement CMR for Atlantic menhaden to 1%.

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[47] *See* Southeast Data, Assessment and Review, *SEDAR 40 Stock Assessment Report: Atlantic Menhaden, Section II: Addendum to the 2014 Atlantic Menhaden Benchmark Stock Assessment*, January 2015, Table 3.

[48] *See* Normandeau 2015b, at Tables 15, 17.

[49] *See id.* at 75.

[50] *See* 40 C.F.R. § 125.92(m).

[51] Normandeau 2015b, at Tables 16, 17.

[52] AEI Report at 18.

[53] *Id*.

[54] *Id*.

[55] *Id*.

[56] *Id*.

### 2. Winter Flounder

The winter flounder is a benthic right-eyed flatfish important to both the commercial and recreational fisheries in Cape Cod Bay and in the Gulf of Maine.[57] Winter flounder larvae and eggs are distributed throughout Cape Cod Bay with higher densities of eggs and larvae associated with Barnstable, Wellfleet, and Plymouth Harbor estuaries, although tidal fluxes and currents disperse the ichthyoplankton throughout the bay.[58]

As discussed in the AEI Report, based on normal operational flows, the estimated total number of winter flounder eggs and larvae entrained at PNPS annually from 1980 through 2007 averaged 25.4 million, while the number winter flounder impinged averaged 985 fish.[59] These numbers of fish convert to a total of 15,766 age-3 (adult) equivalents.[60] When this number is adjusted for demonstrated, site-specific survival, the annual total number of age-3 equivalents is reduced to just 8,029 age-3 winter flounder.[61]

Three lines of evidence were used in the AEI Report to determine whether the operation of the PNPS CWIS has caused an adverse impact on winter flounder: (1) the percent of the larval flux past PNPS that is entrained, as determined by larval transport studies; (2) comparison of equivalent adult losses to spawning population estimates for Gulf of Maine stock, and to the adult population present in Cape Cod Bay; and (3) the use of fisheries assessment models to calculate the impact of the PNPS CWIS on winter flounder recruitment, spawning stock biomass, and fishery yield.

#### a. Larval Transport

PNPS conducted a study of the flux of winter flounder larvae passing the PNPS CWIS, for the purpose of estimating the percent of larvae in the vicinity of PNPS that may be entrained.[62] These data provide a direct estimate of the potential impact of entrainment on susceptible winter flounder populations.[63] Sampling was conducted during three years—2000, 2002, and 2004—and during each, field sampling of four stages of winter flounder larvae was conducted at

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[57] *Id*. at 19.

[58] *Id*. at 19.

[59] *Id*. at 19, 52.

[60] *Id*.

[61] *Id*. *See also* K.A. Rose, *et al.*, *Simulating winter flounder population dynamics using coupled individual-based young-of-the-year and age-structured adult models.* Can. J. Fish. Aquat. Sci. 53:1071-1091 (1996). In addition, as shown in the 2015 Biological Report, for the years 2008-2014, an average of 19,484,840 eggs and larvae were entrained, and another 752 fish were impinged, converting to a total of 12,556 age-3 equivalents. Normandeau, 2015b, Tables 5, 7. Accounting for survival, combined egg and larval losses averaged 18,004,020 per year, which converts to average age-3 equivalent losses of just 9,473. *Id*. at Tables 6, 8. This is particularly low for a species for which Pilgrim has run an effective hatchery. *See* Normandeau Associates, Inc., *Hatchery Production Study Report: Young-of-the-Year Winter Flounder Post-Release Collections 2010* (Apr. 2011).

[62] AEI Report at 20.

[63] *Id*.

five or more transects along the Plymouth (western) coast of Cape Cod Bay.[64] Concurrently, water velocity measurements were performed at each transect and winter flounder entrainment samples were collected at the PNPS CWIS.[65] The percent entrainment over all three years ranged from 0.45% to 2.03%, and averaged 1.23%. Thus, only a very small fraction of the winter flounder transported past PNPS's CWIS are entrained.

#### b. Equivalent Adult Losses

The estimated number of age-3 winter flounder entrained from 1980 through 2007 (summarized above) was compared to NMFS's estimate of the number of age-3 winter flounder in the Gulf of Maine stock for the years 1982-2005. Over the years 1980-2002 (a period that accounts for the three-years needed to reach age-3) an average of 8,452 equivalent age-3 winter flounder were entrained or impinged per year.[66] This represents an average of only 0.25% of the Gulf of Maine stock of age-3 winter flounder over that same period, which was estimated to be more than 3.4 million.[67] I&E of winter flounder also was compared to the abundance of adult winter flounder present in Cape Cod Bay, as estimated from PNPS's Area Swept Trawl Survey that at the time had been conducted annually from mid-April to mid-May from 2000 through 2006.[68] Over the period 1997-2003 an average of approximately 16,800 age-3 equivalents per year were entrained or impinged at PNPS. Over the period 2000-2006, when these fish would have been 3 years old, an average of 286,000 adult winter flounder were present in the PNPS study area and, assuming that the study area represents 1/6 the area of Cape Cod Bay, 1.714 million age-3 winter flounder would have been present in all of Cape Cod Bay. Based on these estimates, I&E of winter flounder at the PNPS CWIS over the 1995 through 2006 period was equivalent to 1% of the adult population present in Cape Cod Bay.[69] Even this small percentage may be an overestimate, as some of the larval winter flounder entrained likely originated from outside Cape Cod Bay.[70]

#### c. Fisheries Assessment Models

The AEI Report employed a Spawning Stock Biomass Per Recruit ("SSBPR") model, which calculates the expected lifetime reproduction of a typical female recruit, measured in terms of the expected future egg production or biomass, to evaluate the potential impact of entrainment on the ability of susceptible winter flounder populations to sustain themselves and support future commercial and recreational fisheries.[71] The SSBPR model, requires estimates of age-specific mortality rates (available from NMFS) and weights of one-year-old and older fish, and an

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[64] *Id*.

[65] *Id*.

[66] *Id*. at 21.

[67] *Id*.

[68] *Id*.

[69] *Id*.

[70] *Id*.

[71] *Id.* at 22.

estimate of mortality by PNPS entrainment, expressed as a CMR.[72] The SSBPR model was used to model the increase in spawning potential ratio ("SPR," a measure of the impact fishing has on the ability of each recruit to contribute to spawning) that could have occurred: (1) if PNPS had not been operating; and (2) if ten power plants with the same impact as the PNPS (assuming that such plants existed and had been operating at full capacity) had not been operating.[73] According to the model, had PNPS not been operating, winter flounder SPR would have increased by less than 1%.[74] Hypothetically, had there been ten plants with the same impact as the PNPS withdrawing water from the Gulf of Maine, and if impacts of all ten of these plants were removed from the SPR calculations, winter flounder SPR would have been raised only to 30%.[75] Each of these values is far below the 50% overfishing threshold level specified in the ASMFC Fisheries Management Plant for winter flounder, indicating that PNPS is only a minor contributor to overall human influences on this stock and does not threaten the sustainability of the susceptible winter flounder populations.[76]

### 3. Cunner

The cunner is a temperate reef fish that is abundant in rocky areas of the Atlantic coast from the Middle Atlantic States to Newfoundland and is typically associated with rocky subtidal habitats such as those found in the vicinity of PNPS in Western Cape Cod Bay.[77] Since cunner larvae are planktonic, they can be transported for large distances before they settle and occupy a home range.[78] The PNPS breakwaters promote the settlement of cunner, resulting in an artificially localized high density.[79] On average, 2.27 billion cunner eggs and larvae were entrained annually between 1980 and 2007, and just 286 impinged.[80] These numbers convert to an annual average of 829,482 age-1 (adult) equivalents.[81] The 2015 Biological Report shows that, from 2008 through 2014, cunner I&E was somewhat lower, with an average of 2.12 billion cunner eggs and larvae entrained, and fish 381 impinged, which converts to an average of 657,132 age-1 equivalents.[82] However, cunner eggs and larvae have been shown to exhibit substantial

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[72] *Id.*

[73] *Id*. at 22-23.

[74] *Id*. at 23.

[75] *Id*. at 23-24.

[76] *Id*. at 24. Attachment D of the Fact Sheet raises a potential concern about I&E of winter flounder, based on that species' high level of site fidelity to natal spawning grounds. *See* Fact Sheet, Attach. D, at 25-26. The 2014 Update, however, reports an annual average I&E mortality of just 744 age-1 equivalent winter flounder from 2008-2013, as compared to an average annual adult (age-3) population in western Cape Cod bay of 200,160 over the same period. *See* 2014 Update, Appendix B, Tables 9-12; Normandeau (2015), Winter Flounder Area Swept Estimate, Western Cape Cod Bay 2014 (April 30, 2015) at 5-6. Thus, Pilgrim's I&E represents just 0.4% of the annual estimated adult population in western Cape Cod Bay.

[77] AEI Report at 25.

[78] *Id*.

[79] *Id.*

[80] *Id*. at 25, 57.

[81] *Id.*

[82] Normandeau 2015b, Tables 9, 11.

entrainment survival, and older cunner life stages often survive impingement.[83] When this survival is taken into account, the average number of eggs and larvae lost to I&E from 1980 to 2014 is reduced to approximately 221.2 million per year, which converts to an average of just 149,820 age-1 equivalents per year.[84]

Because cunner are considered to have no commercial or recreational value, stock estimates are not readily available.[85] As explained in the 2015 Biological Report, a rough estimate of the population in the PNPS area can be determined by using representative fecundity values to calculate the number of adult cunner that would be necessary to produce the number of eggs found there.[86] For 2014, an estimated 6.9 trillion eggs were produced by an estimated 364 million adult fish.[87] The number of adult equivalent cunner lost due to PNPS I&E in 2014—817,967— represents just 0.2% of the estimated spawning stock.[88] If cunner survival is accounted for, the estimated number of adults lost in 2014,—179,278—is just 0.05% of the estimated spawning stock.[89]

Four additional lines of evidence were used in the AEI Report to determine whether the operation of PNPS's CWIS has caused an adverse impact on cunner: (1) estimation of the size and location of the region from which entrained cunner eggs are withdrawn; (2) analysis of recruitment of cunner larvae to rocky habitats in the vicinity of PNPS; (3) comparison of entrainment losses at the PNPS CWIS to potential cunner production within a 9 km radius surrounding the PNPS site; and (4) comparison of impingement losses to mark and recapture population estimates of the local cunner population inhabiting the artificial habitat created by the breakwater protecting the PNPS CWIS.

### a. Withdrawal Region Size and Location

According to a hydrodynamic study performed by MIT, 90% of eggs entrained at PNPS (which account for 97% of all life stages entrained) would have been spawned within a local subregion extending from approximately 5.5 miles north of PNPS to about 1 mile south.[90] This nearfield area, which is the dominant contributor of eggs entrained at the PNPS CWIS, is only a small fraction of the total habitat available to cunner in Cape Cod Bay. Further, while 90% of

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[83] *Id*. at 69. *See also* EPRI, *Review of entrainment survival studies: 1970 – 2000, Final Report*, EPRI Report 1000757 (2000) ("EPRI (2000)"); MRI, *Assessment of finfish survival at Pilgrim Nuclear Power Station final report, 1980-1983* (2004) ("MRI (2004)").

[84] Normandeau 2015b, Tables 10, 12.

[85] *Id*. at 70.

[86] *Id*.

[87] *Id*.

[88] *Id*.

[89] *Id*.

[90] *Id.* at 26.

entrained eggs are derived from a relatively small subregion of Cape Cod Bay, this does not imply that entrainment is depleting the cunner population in this subregion, as detailed below.[91]

### b. Recruitment of Cunner to Rocky Habitats Near PNPS

As reported in the AEI Report, Nitschke (1998) studied recruitment of cunner juveniles to rocky habitats in the vicinity of PNPS to determine whether entrainment could be reducing the abundance of cunner in the nearfield area.[92] He measured the abundance of settling juveniles as a function of distance from PNPS, and also the relationship between the abundance of settling juveniles and the number of juveniles surviving to the end of the recruitment period. Nitschke reasoned that if entrainment at PNPS were significantly reducing cunner abundance in the vicinity of the plant, then the density of settling cunner larvae should be lower near PNPS than at two sites farther away.[93] However, contrary to this prediction, the density of settling cunner was higher near PNPS than at the other two sites.[94] Nitschke also found that the post-settlement survival of juvenile cunner was inversely related to initial density. Although the initial density of settling cunner in July was highest at the discharge site, by the time sampling ended in November, there was no difference in cunner density between sites.[95] This result is consistent with the hypothesis that settlement success of juvenile cunner is density dependent, which would act to reduce the potential impact of PNPS' CWIS on the abundance of cunner larvae available for settlement.

### c. Comparison of Entrainment Losses at PNPS to Potential Cunner Production within a 9 km Radius

The AEI Report discusses the 1975 sampling of cunner eggs within a 9 km radius surrounding the PNPS site.[96] Correcting for sampling efficiency and for the development time of cunner eggs, approximately 7 trillion cunner eggs were present in this region during 1975.[97] The average annual entrainment of cunner eggs at PNPS is 0.04% of this value.[98] The annual average number of equivalent adult cunner entrained at the PNPS, including both eggs and larvae, over the 1980 through 2006 period was 0.16% of the estimated total population value within this radius.

### d. Comparison of Impingement Losses to Mark and Recapture Population Estimates

[91] *Id*.

[92] *Id*.

[93] *Id*.

[94] *Id*.

[95] *Id*.

[96] *Id*. at 27.

[97] *Id.*

[98] *Id.*

As reported in the AEI Report, Lawton et al. (2000) performed mark and recapture sampling in 1992, 1994 and 1995 to estimate the population of cunner in the vicinity of PNPS.[99] This sampling estimated that, in those three years, 4,976, 7,408 and 9,300 adult cunner were present off the outer breakwater at PNPS.[100] In the same three years, 28, 77, and 346 equivalent adult cunner were impinged at PNPS, respectively.[101] Hence, impingement of cunner at PNPS is equivalent to 4% or less of the adult cunner then present in the vicinity of the PNPS breakwater.[102] Since the breakwater is an artificial habitat that did not exist prior to the construction of the PNPS, even accounting for impingement mortality, the cunner inhabiting the breakwater represents a net increase in the abundance of cunner in western Cape Cod Bay, compared to the population that would have been present without PNPS.

#### 4. American Lobster

The American lobster, a crustacean representative of the mobile megabenthic macroinvertebrate community of the sublittoral zone, comprises the most important fishery within Massachusetts territorial waters.[103] Three lines of evidence were used to determine whether the operation of the PNPS CWIS has caused an adverse impact on American lobster: (1) comparison of equivalent adult losses to adult population estimates for Massachusetts portion of the Gulf of Maine stock, and to the entire Gulf of Maine stock; (2) comparison of the reduction in adult abundance due to I&E to the reduction caused by harvesting; and (3) the use of fisheries assessment models to calculate the impact of the PNPS CWIS on American lobster fishery yield.

##### a. Comparison of Equivalent Adult Losses to Adult Population Estimates

The AEI Report compares American lobster I&E at PNPS for the years 1998-2007 to stock abundance estimates for the years 1982-2007 obtained from ASMFC for the Massachusetts portion of the Gulf of Maine stock and the larger Gulf of Maine. It demonstrates that I&E combined represent 0.01% of the stock abundance in Massachusetts waters every year analyzed (with the exception of 2005 when they represent 0.02% of the stock abundance) and 0.001% or less of the entire Gulf of Maine stock.[104]

##### b. Comparison of Exploitation Rates Due to Commercial Harvest vs. I&E Losses

Estimates of the annual exploitation rate, *i.e.*, the proportion, ranging from 0 to 1, of the exploitable (legal size) American lobster population that is actually harvested by the commercial fishery in a given year, in both the entire Gulf of Maine stock and Massachusetts waters, were

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[99] *Id.*

[100] *Id.*

[101] *Id.*

[102] *Id.*

[103] *Id*. at 28.

[104] *Id*. at 27, 59.

obtained from the ASMFC.[105] Exploitation rates due to the commercial harvest range from 0.33 to 0.61 (33% to 61%) for the entire GOM stock, and from 0.54 to 0.90 (54% to 90%) in Massachusetts waters, over the period of 1982-2003.[106] Adult equivalent lobster losses due to I&E were expressed in terms of annual exploitation rates by dividing the annual adult equivalent I&E totals by ASMFC's annual stock abundance estimates.[107] Adult equivalent exploitation rates due to entrainment at PNPS are less than 0.00004% for the entire Gulf of Maine stock and less than 0.001% in Massachusetts waters.[108] Adult equivalent exploitation rates due to impingement at PNPS are less than 0.001% for the entire Gulf of Maine stock and less than 0.02% in Massachusetts waters every year from 1998-2003.

#### c. Fisheries Assessment Models

The AEI Report presents the results of a simple yield per recruit model of the type that has played a central role in the development of lobster management policy in both Canada and the United States.[109] A comparison of natural and fishing mortality rates for age 1-4 and age 5 (adult) lobster demonstrates that for every lobster recruit entering the fishery in a given year, about 0.18 kg (0.4 lbs.) was obtained from the fishery.[110] Multiplying the adult equivalent numbers lost to I&E, combined with 0.18 kg, results in a range of 17-200 kg (37- 441 lbs.) potentially lost to the fishery per year between 1998 and 2007, or approximately 0.0001 % to 0.0007% of the average annual GOM landings from 2000-2003.[111] By comparison, the average pounds per trap fished in Massachusetts waters of the Gulf of Maine is roughly 24 lbs.[112] Yield lost to I&E therefore conservatively represents less than 2 to 18 traps fished for a year.[113] Thus, fisheries management models demonstrate that I&E at PNPS have a negligible impact on the American lobster population.

### 5. Atlantic Mackerel

The Atlantic mackerel is a migratory, pelagic fish that is abundant from North Carolina to the Gulf of St. Lawrence.[114] One component of the stock spawns along the southern New England corridor and a second spawns in the Gulf of St. Lawrence; only eggs and larvae spawned in the southern New England region are susceptible to entrainment at PNPS.[115] An estimated 799.8

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105 *Id*. at 30.

106 *Id*.

107 *Id*. at 30, 59.

108 *Id*.

109 *Id*. at 31, 60.

110 *Id*.

111 *Id*.

112 *Id*.

113 *Id*.

114 *Id*. at 31.

115 *Id*.

million Atlantic mackerel eggs and larvae were entrained at PNPS annually from 1980 through 2007 while an average of only 6 fish per year were impinged during that same interval.[116] These convert to a total of 5,097 age-1 (adult) equivalent mackerel. Two lines of evidence were used in the AEI Report to determine whether the operation of the PNPS CWIS has caused an adverse impact on Atlantic mackerel: (1) estimation of the size and location of the region from which entrained Atlantic mackerel eggs are withdrawn; and (2) comparison of entrainment losses from the PNPS CWIS, expressed as age 1 equivalents, to estimates of age 1 abundance of Atlantic mackerel available from NMFS.

**a. Size And Location Of The Region From Which Eggs Are Withdrawn**

Eggs account for more than 95% of Atlantic mackerel entrainment at the PNPS, and Atlantic mackerel eggs usually hatch within 4 days at water temperatures typical of the late spring/summer period in western Cape Cod Bay.[117] Based on the results of the MIT hydrodynamic modeling study, entrained Atlantic mackerel eggs would have been spawned no more than about 10 miles north or 2 miles south of the CWIS under typical conditions.[118] Because Atlantic mackerel spawn throughout southern New England, only a negligible fraction of Atlantic mackerel eggs spawned in this region are susceptible to entrainment by PNPS. *Id.*

**b. Comparison Of Age-1 Equivalent Entrainment Losses To NMFS Estimates Of Age-1 Abundance**

Over the period 1980-2004, estimates of Atlantic mackerel entrainment, expressed as age-1 equivalent fish, ranged from 82 to 19,125 per year, with an annual average of 4,606.[119] The most recent stock assessment available from NMFS, by comparison, reported that the estimated coastwide abundance of age-1 equivalent Atlantic mackerel during the period 1961-2004 ranged from 100 million to 5.1 billion, with an average abundance of 1.1 billion age-1 equivalent fish.[120] Based on these estimates, average annual entrainment at PNPS during the 1980-2004 period is equivalent to only 0.004 percent of the average abundance of age-1 equivalents for this species.[121] If one were to conservatively assume that only 10% of the coastwide Atlantic mackerel stock spawns in southern New England, then entrainment at PNPS still would be equivalent to only 0.04 percent of the annual average recruitment for this species.[122] From a cumulative impact perspective, it would take 25 comparably sized power plants along the southern New England corridor, each imposing a CMR of 0.04 percent on the New England component of the Atlantic mackerel population, for the cumulative CMR to equal 1%,

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[116] *Id*. at 31, 61.

[117] *See id.* at 32; *accord* 2014 Update, Appendix B, Table 9 (eggs account for more than 97% of Atlantic mackerel entrainment for the 2008-2013 period).

[118] *See* AEI Report at 32.

[119] *Id.* at 32-33.

[120] *Id.* at 33.

[121] *Id.*

[122] *Id.*

confirming that even viewed cumulatively, the I&E of this species represented by PNPS has at most a negligible impact.[123]

The 2008-2014 I&E data provided in the 2015 Biological Report confirm that I&E of Atlantic mackerel at PNPS is trivial considering the overall abundance of the population, in that the average annual I&E of this species at IPEC over these later years has declined to just 469 age-1 equivalent fish per year.[124]

### 6. Additional Species Of Interest

While these Comments appropriately focus on the RIS, Attachment D to the Fact Sheet also discusses coastwide population declines in rainbow smelt, river herring (which includes alewife) and Atlantic cod, none of which is attributed to or reasonably could be attributable to PNPS.[125] With respect to river herring, the Jones River population—nearest to Pilgrim and therefore most likely to be impacted—is not even in decline. Rather, as the Fact Sheet indicates, the Jones River population has fluctuated from year to year, with an overall increasing trend (positive slope from 2005-2014 with a p value of 0.03).[126]

With respect to rainbow smelt, the 2014 Update indicates that from 2008-2013, an average of just 63,952 larvae were entrained at Pilgrim annually, with another 496 smelt impinged.[127] Together, these figures equate to a mortality of just 859 adult (age-1) equivalent fish, which cannot reasonably be interpreted as having an adverse impact on the smelt population.[128]

For Atlantic cod, the 2014 Update reported an average of 5,444,856 eggs and larvae entrained from 2008-2013, and 74 fish impinged, which together correspond to mortality of just 1,439 adult (age-1) equivalent fish.[129] Although the coastwide population of Atlantic cod has been in recent decline due to overfishing, NMFS has estimated that the average age-1 recruitment for the Gulf of Maine stock ranged from 6.73 million to 8.35 million (depending on the model used) over the years 2008 to 2013, and even in the lowest years, 2013 and 2014, age-1 recruitment ranged from 2.55 to 3 million.[130] Thus, since the AEI Report, I&E mortality of Atlantic cod has remained a small fraction of adult recruitment in the Gulf of Maine, totaling just 0.02% of the 2008-2013 average age-1 stock and 0.05 to 0.06% in the two most recent years of data, 2012 and

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[123] *Id.*

[124] *See* 2014 Update, Appendix B, Table 11.

[125] *See* Fact Sheet, Attach. D, at 27; AEI Report at 9-10; *see also* Affidavit of Michael D. Scherer, Ph.D., in Support of Entergy's Answer Opposing Jones River Watershed Association's and Pilgrim Watch's Motion to Reopen and Hearing Request, *In re Entergy Nuclear Generation Co. & Entergy Nuclear Operations, Inc. (Pilgrim Nuclear Power Station)*, Docket No. 50-293-LR, ASLBP No. 06-848-02-LR (NRC Mar. 19, 2012) ("Scherer ASLB Aff."), ¶¶ 5, 71-73 (concluding PNPS's operations likely have no effect on river herring populations, which are subject only to "infrequent[] entrain[ment]" and "minimal" impingement at PNPS).

[126] *See* Fact Sheet, Attach. D, at 26-27 (Table 3).

[127] *See* 2014 Update, Appendix B, Tables 9-12.

[128] *Id.*

[129] *Id.*

[130] *See* NMFS, Gulf of Maine Atlantic Cod 2014 Assessment Update Report (August 22, 2014), Table 1 at 5.

2013. Indeed, Attachment D to the Fact Sheet acknowledges the average annual losses attributed to PNPS over the last two decades—about 3,700 pounds of cod per year— are trivial, compared to the annual commercial and recreational losses (as landings) along the Massachusetts coast, *i.e.*, respectively 2.2 million and 471,000 pounds.[131]

Thus, there is no reasonable, scientifically grounded concern that Pilgrim has a measurable impact on Rainbow smelt, river herring or Atlantic cod.

### B. As The Fact Sheet Recognizes, PNPS's Thermal Discharges And Thermal Backwashes Have Not Compromised The Aquatic Community Of Cape Cod Bay

The Fact Sheet concluded, on the basis of species-specific analysis presented in Attachment C to the Fact Sheet, that PNPS's thermal discharges to Cape Cod Bay and occasional thermal backwashing have resulted in no prior appreciable harm to Cape Cod Bay RIS, and therefore that the thermal limits contained in PNPS's current permit are "more stringent than necessary to assure the protection and propagation of the balanced indigenous population [or community] of shellfish, fish, and wildlife in and on the body of water into which the discharge is to be made," *viz.* Cape Cod Bay.[132] Specifically, Attachment C concludes that: PNPS's thermal discharges "are not a cause for appreciable harm to fish populations in the environs of the PNPS";[133] there has been no evidence of thermally related fish kills occurring at PNPS since the 1970s;[134] any thermal impact to river herring, rainbow smelt, tautog, cunner, Atlantic silverside, blue fish, striped bass, winter flounder, and American lobster is only "*de minimis*";[135] and historical impingement of Atlantic menhaden in connection with thermal cycling has not occurred since the 1970s.[136]

Some commenters, however, have asserted the 2000 Demonstration is outdated. As a matter of law, this objection is without merit. As EPA precedent and technical guidance concerning 316(a) demonstrations recognize, determinations under Section 316(a) are to be made "on the basis of the best information reasonably attainable," which is satisfied by the periodic thermal assessments discussed at the beginning of the "Environmental Context" Section, *supra*, particularly assessments that were contemporaneous with (*i.e.*, 1995), and postdate (*i.e.*, 2000) Pilgrim's NPDES application.[137] Indeed, EPA's Section 316(a) regulations likewise recognize

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[131] *Id.* at 27-29.

[132] *See* 33 U.S.C. § 1326(a); 40 C.F.R. § 125.71(c) (again, equating statutory term "balanced, indigenous population" with "balanced, indigenous community" and defining both to mean "a biotic community typically characterized by diversity, the capacity to sustain itself through cyclic seasonal changes, presence of necessary food chain species and by a lack of domination by pollution tolerant species").

[133] Fact Sheet, Attach. C, at 33.

[134] *Id.*

[135] *Id.* at 19-22, 24-30.

[136] *See id.* at 22-24.

[137] *See In re Pub. Serv. Co. of N.H. (Seabrook Station, Units 1 and 2)*, NPDES Appeal No. 76-7, Decision of Administrator, 1977 WL 22370, at *12 (E.A.B. June 10, 1977) ("*Seabrook I*") (stating that EPA must make decisions "on the basis of the best information reasonably attainable." (quoting 1974 EPA Draft §316(a) Guidance)).

the principle that prior studies of thermal impacts do not lose their relevance by mere passage of time, and expressly allow applicants for renewal of a thermal variance to rely on prior submissions, absent requests from EPA for additional information: "[a]ny application for the renewal of a section 316(a) variance shall include only such information … as the Director requests within 60 days after receipt of the permit application."[138]

* * *

In sum, PNPS's historic operations have had a *de minimis* impact on the aquatic ecosystem of Cape Cod Bay, which has remained stable since 1980, as demonstrated by the AEI Report and 2014 Update.[139] The absence of such impacts underpins the Draft Permit, because a demonstrable "adverse environmental impact" is the prerequisite to technology forcing under Section 316(b)[140] or to a finding of any alteration of the "excellent habitat for fish, other aquatic life and wildlife, including for their reproduction, migration, growth and other critical functions" for which MWQS provide.[141]

There also is no reasonable question that U.S. nuclear power stations, including PNPS, have played an essential role in the reduction of greenhouse gas ("GHG") emissions and thus in mitigating devastating effects of climate change.[142] Setting aside the profound confusion among some commenters at the July 21, 2016 public hearing on this question, the only evidence is that closure of PNPS will result in more GHGs and exacerbated climate change conditions, the long term impacts of which will affect Cape Cod Bay, with results that may well be catastrophic.[143]

## DISCUSSION OF DRAFT PERMIT LANGUAGE

With this background on the aquatic community, which underscores Pilgrim's lack of adverse environmental impact, impairment of the balanced indigenous aquatic community or impairment

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Courts also recognize that "EPA cannot reject the 'best available' evidence simply because of the possibility of contradiction in the future by evidence unavailable at the time of action – a possibility that will *always* be present." *Chlorine Chem. Council v. EPA*, 206 F.3d 1286, 1291-92 (D.C. Cir. 2001); *accord Bldg. Indus. Ass'n v. Norton*, 247 F.3d 1241, 1246 (D.C. Cir. 2001) (best scientific data "available" does not mean "the best scientific data possible").

[138] 40 C.F.R. § 125.72(c).

[139] AEI Report; 2014 Engineering Response Supplement, Attach. 4: Normandeau Biological Input, at 4; *see also* 40 C.F.R. § 125.94(c)(11).

[140] 33 U.S.C. § 1326(b).

[141] 314 Code Mass. Regs. § 4.05(4)(a), (4)(a)(2)(d).

[142] *See, e.g.*, Pushker A. Kharecha & James E. Hansen, *Prevented Mortality and Greenhouse Gas Emissions from Historical and Projected Nuclear Power*, 47 Environ. Sci. & Tech. 4889 (2013) (concluding, based on analysis of historical production data, that global nuclear power use has prevented an average of 64 gigatonnes of $CO_2$-equivalent GHG emissions that otherwise would have resulted from fossil-fueled generation); NERA, *Economic Assessment of Fish-Protection Alternatives at Pilgrim Nuclear Power Station* (June 26, 2008) ("Economics Report"), at 71-79 (reporting that reductions in generation of electricity at PNPS will "requir[e] that other sources of generation be used more intensively, or that new generating units be built," with the result that there would be significant increases in $CO_2$ emissions, among other criteria air pollutants).

[143] *See* Kharecha & Hansen, *supra* note 142, at 4893 (noting continued potential for "devastating climate impacts").

of MWQS, Entergy respectfully submits the following corrections and clarifications to the Draft Permit:

## I. The Final Permit Should Not Include What May Be Misconstrued As A Mandatory-Shutdown Condition Or Continuous Rotation Of The Traveling Screens

The Draft Permit states that, as of June 1, 2019, "PNPS *will terminate* cooling water withdrawals for the main condenser and will be authorized to continue withdrawing cooling water only as necessary to support decommissioning activities and to cool the spent fuel rods for a limited period of time following the shutdown of PNPS."[144] The Draft Permit further provides that, "[u]pon termination of generation of electricity *or no later than June 1, 2019*, the permittee shall," *inter alia*, "[c]ease cooling water withdrawals for the main condenser and reduce total cooling water withdrawals to an average monthly rate of 7.8 MGD."[145] The Draft Permit also states that "[t]he permittee has informed EPA and MassDEP that it will terminate operations at PNPS *and enter a decommissioning phase no later than June 1, 2019*."[146] Thus, Draft Permit provisions do more than memorialize Entergy's planned shutdown. Rather, the language suggests, and (if intentional)[147] could be interpreted as imposing, a shutdown mandate no later than June 1, 2019, followed by immediate decommissioning.

This mandatory shutdown and decommissioning condition is legally inappropriate, and the immediate shutdown condition is factually inappropriate. Both, therefore, should be removed from the final Permit. As Section I.A below explains, a mandatory closure condition is not within EPA's authority and is otherwise contrary to law. Further, while shutdown is expected to occur no later than June 1, 2019, decommissioning cannot commence immediately. Indeed, as a matter of law, decommissioning cannot commence until at least 90 days after Entergy submits its Post-Shutdown Decommissioning Activities Report ("PSDAR") to NRC, which is not due to NRC until two years following the shutdown.[148] Further, as a matter of industry practice, SAFESTOR is routinely employed by stations and is a viable option at PNPS, in which case decommissioning activities may not commence for many years.[149] Thus, Entergy respectfully submits that a statement that decommissioning activities will proceed "immediate[ly]" is not correct.

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[144] Draft Permit, Part I.F, at 32 (emphasis added).

[145] *Id.* at 33 (emphasis added).

[146] *Id.* at 32 (emphasis added).

[147] Based on language appearing in Attachment D of the Fact Sheet, it remains unclear whether EPA or DEP actually intend to impose such a condition. For example, EPA states that, "*[s]hould the plant operate beyond June 2019*, EPA would have to *reconsider*" the "cost-benefit comparison" and "potential availability" of other BTA alternatives that "have been *eliminated from [its BTA] analysis due to the limited remaining useful life of the plant*." Fact Sheet, Attach. D, at 86 (emphasis added). Such statements suggest the Draft Permit's language may be intended merely to reflect what Entergy has announced. To that end, Entergy's requested clarification should be readily satisfied.

[148] *See* 10 C.F.R. § 50.82(a)(4)-(6).

[149] *See, e.g.*, NRC, *Backgrounder: Decommissioning Nuclear Power Plants* (May 2015), at 5-6 (Table) (reflecting that most nuclear facilities for which decommissioning is planned have elected SAFSTOR).

Section I.B below discusses the proposed new condition that PNPS be required to continuously rotate the traveling screens, and to monitor through-screen velocity, during post-shutdown dilution water usage. As detailed there, these proposed conditions are factually unsupported and lack any environmental rationale, and should therefore be deleted from the final Permit.

As a result, Part I.F of the Draft Permit, including the preamble thereto, must be clarified when the final Permit is issued. Proposed revisions are provided below in Section I.C.

### A. The Draft Permit's Mandatory-Shutdown Language Is Both Unlawful And Unnecessary To Protect The Environment

#### 1. Shutdown And Decommissioning Mandates Are Impermissible

A mandatory-shutdown condition infringes on NRC's exclusive jurisdiction over nuclear-reactor operations and radiological decommissioning, and therefore is beyond the legal authority of EPA. In enacting the Atomic Energy Act of 1954 ("AEA"), Congress bestowed on the Atomic Energy Commission (now, NRC) exclusive jurisdiction over, among other things, the "operation" of nuclear power plants.[150] This field necessarily encompasses within its scope nuclear reactor operations, as well as issues related to such operations and shutdown, *e.g.*, *nuclear* fuel management, radiological safety and radiological discharges.[151] EPA and DEP are prohibited from encroaching on this exclusive domain, even when acting according to their respective general grants of authority to regulate water withdrawals or discharges. For decades the Supreme Court has made clear that Congress's grant of CWA authority to EPA was not intended to, and therefore did not, pare back the exclusive authority that Congress previously had bestowed on NRC to regulate nuclear reactor operations, as to which NRC plainly has superior expertise.[152] EPA therefore lacks the legal authority to command ("shall") Pilgrim to cease operating its nuclear reactor as of June 1, 2019, or to regulate facility operations in any way that

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[150] *See, e.g.*, *Pac. Gas & Elec. Co. v. State Energy Res. Conserv. & Dev. Comm'n*, 461 U.S. 190, 212 (1983).

[151] *Id.* ("At the outset, we emphasize that the statute does not seek to regulate the construction or *operation* of a nuclear power plant. It would clearly be impermissible for California to attempt to do so, for such regulation, even if enacted out of non-safety concerns, would nevertheless directly conflict with NRC's exclusive authority over plant construction and *operation*." (emphasis added)); *accord Entergy Nuclear Vt. Yankee LLC v. Shumlin*, 733 F.3d 393, 411 (2d Cir. 2013) (observing that *Pac. Gas* "emphasiz[ed]" that a "state statute that seeks to regulate the construction or *operation* of a nuclear powerplant" would "directly conflict with the NRC's exclusive authority over plant construction or *operation*" (emphases added)); *County of Suffolk v. Long Island Lighting Co.*, 728 F.2d 52, 56 (2d Cir. 1984) ("[T]he NRC retains responsibility to regulate "the construction *and operation* of any production or utilization facility." (emphasis added)); *Missouri v. Westinghouse Elec., LLC*, 487 F. Supp. 2d 1076, 1084 (E.D. Mo. 2007) (reciting that in *PG&E* the Supreme Court "noted two general areas in which state regulation is pre-empted: the construction and *operation* of nuclear power plants…." (emphasis added)).

[152] *Train v. Colo. Pub. Interest Research Group, Inc.*, 426 U.S. 1, 15-17 (1976) (holding that EPA's general authority under CWA to regulate discharges of pollutants does not trump NRC's exclusive authority under AEA to regulate handling of radionuclides); *see also Whitney Nat'l Bank v. Bank of New Orleans & Trust Co.*, 379 U.S. 411, 419-20 (1965) ("[W]here Congress has provided statutory review procedures designed to permit agency expertise to be brought to bear on particular problems, those procedures are to be exclusive.").

"directly and substantially" affects the operator's decisions, including those "concerning nuclear safety levels," fuel management, spent fuel management or radiological discharges.[153]

As a state agency, DEP has no greater authority than EPA to dictate to PNPS that it must shut down its nuclear reactor by some date certain. Indeed, the federal courts have held that state law may not mandate even "temporary" shutdowns of nuclear-reactor operations,[154] nor may it "regulate the operation of [the] nuclear reactor," even if such regulation stops short of a shutdown mandate.[155]

In sum, the Draft Permit's language *mandating* that PNPS shut down on June 1, 2019 is inappropriate as a matter of law, because EPA and DEP lack the legal authority to impose such a condition.

#### 2. There Is No Environmental Rationale For A Mandatory-Shutdown Mandate

Under EPA's Final 316(b) Phase II Rule, different BTA performance standards can be imposed to redress I&E that rises to the level of an adverse environmental impact.[156] We further agree with EPA that the existence of I&E precipitates the application of Section 316(B) and the Rule.[157] Here, as detailed in Section I.A.2.i below, we respectfully submit that Pilgrim satisfies the impingement mortality standard, particularly given that the Rule expressly provides for *de minimis* exceptions to the impingement mandates.[158]

With respect to entrainment (and where the impingement controls for the facility already meet the Rule, as is the case for Pilgrim), the Rule is designed to reflect a flexible, rationale approach that does not stand on technology forcing for its own sake. Thus, for instance, EPA recognizes that flows that are less than 5% of the waterbody in question are unlikely to have a demonstrable adverse environmental impact.[159] Similarly, EPA acknowledges the existence of impingement

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[153] *See, e.g., English v. Gen. Elec. Co.*, 496 U.S. 72, 84-85 (1990); *United States v. Manning*, 434 F. Supp. 2d 988, 1007 (E.D. Wash. 2006); *Me. Yankee Atomic Power Co. v. Bonsey*, 107 F. Supp. 2d 47, 55 (D. Me. 2000).

[154] *See, e.g.*, *County of Suffolk*, 728 F.3d at 59-60 (holding that state-law injunction "that even temporarily shuts down [a nuclear facility] would infringe on the NRC's authority over construction and operation").

[155] *Boeing Co. v. Robinson*, No. CV 10-4839-JFW, 2011 WL 1748312, at *11 & n.11 (C.D. Cal. Apr. 26, 2011).

[156] 40 C.F.R. § 125.94(a)(2), (c), (d).

[157] *See, e.g.*, 79 Fed. Reg. at 48,303 ("In CWA section 316(b) and in this rulemaking, these impacts are referred to as adverse environmental impact (AEI)," an undefined term.).

[158] *See, e.g.*, 40 C.F.R § 124.95 (*de minimis* exception, impingement context).

[159] *See, e.g.*, 79 Fed. Reg. at 48,309 ("EPA acknowledges that there may be circumstances where flexibility in the application of the rule may be called for and the rule so provides. For example, some low flow facilities that withdraw a small proportion of the mean annual flow of a river may warrant special consideration by the Director. As an illustration, if a facility … withdraws less than 5 percent of mean annual flow of the river on which it is located (if on a river or stream), and is not co-located with other facilities with CWISs such that it contributes to a larger share of mean annual flow, the Director may determine that the facility is a candidate for consideration under the de minimis provisions contained at § 125.94(c)(11).").

and entrainment survival, when adequately demonstrated.[160] Finally, EPA acknowledges that natural mortality cannot be improperly ascribed to CWIS.[161]

In this instance, where Pilgrim has in place sufficient impingement controls, EPA should consider the following scientific support for the absence of entrainment impacts. First, Pilgrim's withdrawal is far less than 5% of the source waterbody.[162] Second, Pilgrim's embayment, with its extremely low flows (of less than 0.05 fps), limit access to the intake structure.[163] Third, Pilgrim's leading national experts have demonstrated survival of many entrained species.[164] Finally, Pilgrim's entrainment is dominated by eggs, the fertilization of which is not demonstrated and which exhibit the highest natural mortality, with the result that there is ample evidence that Pilgrim's CWIS actual, causative mortality is at best limited.[165] These considerations are particularly provided for where remaining useful life of a facility is limited.[166]

Even if an additional BTA condition were appropriate here (it is not), the mandatory-shutdown mandate is legally unsupported because it is not a "technology" within the meaning of § 316(b) of the Clean Water Act.

#### i. PNPS's Current Impingement Control Technology Meets The 316(b) BTA Standard

With respect to impingement, an existing facility presumptively satisfies Section 316(b), if its CWIS has the control technologies that EPA has established as the "best technology available"

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[160] *See, e.g.*, *id.* at 48,330 ("Impingeable organisms are generally not very small fish or early life stages (*e.g.*, those that can pass through 3⁄8-inch mesh screens), but typically are fish with fully formed scales and skeletal structures and well- developed survival traits such as behavioral responses to avoid danger. EPA's data demonstrate that, under the proper conditions, many impinged organisms can survive."); *id*. at 48355 ("With regard to entrainment survival, EPA does allow for consideration of entrainment survival."); 40 C.F.R § 125.92(i) ("Entrainment mortality means death as a result of entrainment through the cooling water intake structure, or death as a result of exclusion from the cooling water intake structure by fine mesh screens or other protective devices intended to prevent the passage of entrainable organisms through the cooling water intake structure.").

[161] *See, e.g.*, *id.* at 48,355 ("Finally, EPA is clear in the Rule's preamble that natural mortality is not be unreasonably attributed to CWIS.").

[162] *See* Enercon Services, Inc., *Engineering Response to United States Environmental Protection Agency CWA § 308 Letter, Pilgrim Nuclear Power Station*, 8 (June 2008) ("Engineering Report"), at 2; AEI Report at 16.

[163] *See, e.g.*, Scherer ASLB Aff. ¶¶ 10-11; NRC, NUREG-1437, Supplement 29 to Generic Environment Impact Statement for License Renewal of Nuclear Plants Regarding Pilgrim Nuclear Power Station, Vol. 1, Final Report (July 2007) ("FSEIS"), at 2-7.

[164] *See supra*, "Environmental Context."

[165] *See supra*, "Environmental Context."

[166] *See, e.g.*, 79 Fed. Reg. at 48,332 ("A number of facilities are nearing the end of their useful life. Considering the long lead time to plan, design, and construct closed-cycle cooling systems, EPA determined that the Director should have the latitude to consider the remaining useful plant life in establishing entrainment mortality requirements for a facility. The remaining useful plant life, along with other site-specific information, will affect the entrainment reduction of closed-cycle cooling at a facility. For example, retrofitting to a closed-cycle system at a facility that is scheduled to close in three years will result in little entrainment reduction as compared to retrofitting to closed-cycle at a facility that will continue to operate for a significantly longer period.").

for impingement reduction on a nationwide basis.[167] Those technologies include, among others, "modified traveling screens,"[168] "such as modified Ristroph screens and *equivalent modified traveling screens* with fish-friendly fish returns."[169]

There is no serious question that PNPS's CWIS includes "modified traveling screens," as defined in the Final 316(b) Phase II Rule. Specifically, PNPS's CWIS incorporates "vertical traveling screens to prevent entrainment" of the requisite slot size, as well as dual "fish-return sluiceways," discharging primarily to the embayment that is separated from Cape Cod Bay by two breakwaters.[170]

EPA's seeming conclusion that "the existing traveling screens at PNPS are not consistent with the definition of modified traveling screens" in the Final 316(b) Phase II Rule[171] appears to suffer from various misperceptions. First, EPA suggests that screens may be too abrasive, when the 2014 Engineering Response Supplement explains that stainless steel is a "smooth" material that was selected and is used to prevent abrasion.[172] Second, EPA suggests that the fish returns may be rough or abrasive, when the 2014 Engineering Response Supplement establishes that "water-based epoxy resin emulsions" are used in the sluiceway to provide the requisite smooth surfaces.[173] Third, EPA suggests that Pilgrim's screens are not continuously rotating. The Rule, in fact, requires "continuous *or near continuous* rotation of screens and operation of fish collection equipment *to ensure any impinged organisms are recovered as soon as practicable.*"[174] Pilgrim's screens rotate in response to pressure from loading, and thereby necessarily return impinged organisms to the waterbody "as soon as practicable" consistent with the rule.[175] Further, EPA's Draft Permit, albeit needlessly, requires continuous rotation of the screens moving forward, thus countering EPA's conclusion that Pilgrim's screen and fish return system, as contemplated by the Draft Permit, would not satisfy the Rule, even if EPA were to wrongly assume that continuous rotation is required. Fourth, EPA suggests that Pilgrim's traveling screens may use "narrow shelves" to carry away the fish that do not "minimize turbulence or prevent loss of fish from the collection system," but this is not correct. Indeed,

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167 40 C.F.R. § 125.94(c).

168 *Id.* § 125.94(c)(5); 79 Fed. Reg. at 48,321 n.38 ("EPA has defined modified traveling screen at 40 CFR 125.92 to mean *any traveling water screen* that incorporates the specified measures that are protective of fish and shellfish. In this preamble, modified traveling water screen with a fish handling and return system is often referred to more simply a modified traveling screen.") (emphasis added).

169 79 Fed. Reg. at 48,337 (emphasis added).

170 40 C.F.R. § 125.92(s) (defining "modified traveling screen"); 79 Fed. Reg. at 48,321 n.39 ("Though less common, the EPA recognizes that 1⁄2 by 1⁄4 inch mesh are used in some instances and perform comparably to the 3⁄8 inch square mesh. Therefore, today's rule allows for facilities to apply a 1⁄2 by 1⁄4 inch sieve (diagonal opening of 0.56 inches) or a 3⁄8 inch sieve (diagonal opening of 0.53 inches) when discerning between impinged and entrained organisms.").*see also* FSEIS at 2-7.

171 Fact Sheet at 88.

172 2014 Engineering Response Supplement at 48.

173 *See* Engineering Report.

174 40 C.F.R. 125.92(s) (emphasis added).

175 Engineering Report at 6.

Entergy is not aware of any turbulence in the screen baskets. Finally, EPA suggests that returning fish within the breakwater embayment may not be ideal because it could result in re-impingement.[176] Within the embayment, "average intake velocity is 0.05 ft. per second (fps)," velocities slower than the ambient surrounding tidal dynamic in Cape Cod Bay.[177] Indeed, the embayment velocity is an order on magnitude lower than the EPA Rule concludes is *automatic evidence* of compliance with the Rule's impingement standards, because such velocities are so readily avoided by impingeable fish.[178] For all of these reasons, Entergy respectfully submits that Pilgrim's modified travelling screens and fish returns satisfy the Final 316(b) Phase II Rule.

This is the case, even without regard to the fact that the Rule's impingement standard excludes fragile species: "The impingement mortality performance standard … requires that a facility must achieve a 12-month impingement mortality performance of all life stages of fish and shellfish of no more than 24 percent mortality, including latent mortality, *for all non- fragile species* that are collected or retained in a sieve with maximum opening dimension of 0.56 inches 39 and kept for a holding period of 18 to 96 hours."[179] Pilgrim's demonstrated impingement survival for fragile species also satisfies the Rule, particularly given that "EPA does not intend for such naturally occurring mortality," particularly cold shock that results in later impingement, "to be counted against a facility's performance in reducing impingement mortality."[180] Indeed, as discussed below in Section VI.C, the overwhelming majority of Pilgrim's historic impingement, and virtually all large-scale impingement events, are associated with natural mortality, *e.g.*, cold shock and predation.[181]

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[176] *See* Fact Sheet at 89.

[177] FSEIS at 2-7; *see* ENSR (2000), at 4-3 to -4 (reporting results of previous hydrodynamic investigations finding that nearshore surface velocities of up to 16.9 feet per minute (or 0.282 fps), offshore surface velocities of up to 30.4 feet per minute (or 0.51 fps), and velocities at a depth of 25 feet of up to 5.3 feet per minute (or 0.09 fps)).

[178] 79 Fed. Reg. at 48,321 (describing 0.5 fps, through screen velocity as "essentially pre-approved technologies requiring no demonstration or only a minimal demonstration that the flow reduction and control measures are functioning as EPA envisioned").

[179] *Id.* (emphasis added); *see also id.* at 48,323 ("EPA included a definition for ''fragile species'' at § 125.92(m), as a species of fish or shellfish that has an impingement survival rate of less than 30 percent."); 40 CFR § 125.94(c)(5) ("(5) Modified traveling screens. A facility must operate a modified traveling screen that the Director determines meets the definition at § 125.92(s) and that, after review of the information required in the impingement technology performance optimization study at 40 CFR 122.21(r)(6)(i), the Director determines is the best technology available for impingement reduction at the site. As the basis for the Director's determination, the owner or operator of the facility must demonstrate the technology is or will be optimized to minimize impingement mortality of all non-fragile species.") and § 125.92(m) ("(m) Fragile species means those species of fish and shellfish that are least likely to survive any form of impingement. For purposes of this subpart, fragile species are defined as those with an impingement survival rate of less than 30 percent, including but not limited to 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."); Final 316(b) Phase II Rule at 48326 ("The Director must determine, based on a demonstration by the facility to the Director, that the system of technologies or operational measures, in combination, have been optimized to minimize impingement mortality of all non-fragile species.").

[180] 79 Fed. Reg. at 48,364. *See, e.g.*, *supra*, "Environmental Context," Section A.

[181] If EPA doubted that the optimization of Pilgrim's screens and fish return had been achieved, its obligation under the Rule was to ask for additional study to achieve optimization sometime over the last 21 years, not to await the

### ii. Based On A Site-Specific Assessment, PNPS Does Not Require Further Entrainment Controls To Meet The BTA Standard

With respect to entrainment reductions, EPA did not set a nationwide BTA standard in the Final 316(b) Phase II Rule, as it did with impingement, but instead established a procedure for determining entrainment controls "for each intake on a site-specific basis."[182] The site-specific determination may consider, *inter alia*, the "[e]ntrainment impacts on the waterbody," "thermal discharge impacts," credits for prior flow reductions, and impacts on energy reliability.[183] Application of the mandated site-specific assessment does not warrant further entrainment controls for Pilgrim.

As detailed above in the "Environmental Context" Section, nearly five decades of environmental monitoring data and object-specific studies have demonstrated that Pilgrim's historic operations, including specifically its water withdrawals and thermal discharges, have produced no more than *de minimis* adverse impacts on the aquatic community of Cape Cod Bay.[184] Indeed, EPA previously concluded, in connection with the 2004 version of its Section 316(b) rule for existing facilities, that PNPS "already meet[s] otherwise applicable performance standards based on existing technologies and measures."[185] The Fact Sheet contains no information that supports a different conclusion, including with respect to any particular species.[186]

### b. Even If Some BTA Measure Were Necessary For PNPS, The Mandatory-Shutdown Mandate Would Still Be Unlawful Because It Is Not A "Technology"

facility's closure to only then pronounce the system inadequate. *See, e.g.*, 79 Fed. Reg. at 48,321 ("In the case of Option (5), the facility must submit a site-specific impingement technology performance optimization study that must include two years of biological sampling demonstrating that the operation of the modified traveling screens has been optimized to minimize impingement mortality."); *id.* at 48321 n.38 ("Therefore EPA has defined modified traveling screen at 40 CFR 125.92 to mean any traveling water screen that incorporates the specified measures that are protective of fish and shellfish. In this preamble, modified traveling water screen with a fish handling and return system is often referred to more simply a modified traveling screen."); *id.* at 48321 n.39 ("Though less common, the EPA recognizes that 1⁄2 by 1⁄4 inch mesh are used in some instances and perform comparably to the 3⁄8 inch square mesh. Therefore, today's rule allows for facilities to apply a 1⁄2 by 1⁄4 inch sieve (diagonal opening of 0.56 inches) or a 3⁄8 inch sieve (diagonal opening of 0.53 inches) when discerning between impinged and entrained organisms.").

[182] 40 C.F.R. § 125.94(d)

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[184] *See supra*, "Environmental Context."

[185] *See* 69 Fed. Reg. 41,576, 41,646, 41677 (July 9, 2004) (listing PNPS as being among facilities that "already meet otherwise applicable performance standards based on existing technologies and measures," and for which EPA "projected zero compliance costs"). *See also* 68 Fed. Reg. 13522, 13567 and n.23 (Mar. 19, 2003); *Case Study Analysis for the Proposed Section 316(b) Phase II Existing Facilities Rule* (EPA-821-R-02-002), Part G: Seabrook and Pilgrim Facilities Case Study (Feb. 2002).

[186] *See supra*, "Environmental Context," Section A.6, and *supra*, note 76.

On its face, Section 316(b) requires a CWIS's "location, design, construction, and capacity" to "reflect the best *technology* available for minimizing adverse environmental impact."[187] EPA's Final 316(b) Phase II Rule further defines a CWIS as a discrete portion of the facility that comprises "the total physical structure and any associated constructed waterway used to withdraw cooling water from the waters of the U.S.," and that "extends from the point at which water is withdrawn from the surface water source up to, and including, the intake pumps."[188]

As a matter of this plain language, a permit condition must reflect a "technology," and also must "have [some]thing to do with the location, the design, the construction, or the capacity of cooling water intake structures," *i.e.*, cannot be "unrelated to the structures themselves."[189] Courts have accordingly held that Section 316(b) does not license EPA's efforts to reduce I&E by any means available, but instead authorizes the agency to use only *particular* means in pursuing that goal, *viz.*, technology related to the "location, design, construction, and capacity of the cooling water intake structure."[190]

A mandatory-shutdown condition does not fall within the category of authorized I&E mitigation measures that Section 316(b) authorizes EPA to mandate. It is plainly not a CWIS "technology." On the contrary, it is a *prohibition against making use of the CWIS technology* for cooling water. It is also inconsistent with what courts have properly recognized as "the most salient characteristic of th[e Clean Water Act's] statutory scheme," namely its "technology-forcing" character, which contemplates that a "series of progressively more demanding technology-based standards" would "stimulate" and "press development of new, more efficient and effective technologies."[191] No such "technology-forcing" incentives attend a mandatory-shutdown requirement. Nor can a mandatory-shutdown requirement be fairly described as being related to the "location, design, construction, and capacity" of the CWIS, all of which will remain unchanged (but merely go unused) as a result.[192]

We recognize that EPA has taken the position that "flow reductions, seasonal operations, [and] unit closures" may be part of a "system of technologies, management practices, and operational

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[187] 33 U.S.C. § 1326(b) (emphasis added).

[188] 40 C.F.R. § 125.92(f).

[189] *Riverkeeper, Inc. v. EPA*, 358 F.3d 174, 189 (2d Cir. 2004).

[190] *ConocoPhillips Co. v. EPA*, 612 F.3d 822, 839 (5th Cir. 2010) (holding that CWA Section 316(b) does not license the regulation of a facility's "location," "design," "construction," or "capacity" generally, but only insofar as they relate to the "cooling water intake structure"); *Robertson Cnty.: Our Land, Our Lives v. Tex. Comm'n on Envtl. Quality*, No. 03-12-00801-CV, 2014 WL 3562756, at *4-6 (Tex. Ct. App. July 17, 2014) (holding that BTA requirement did not apply to a water-transfer pump which did not constitute part of the "cooling water intake structure" as defined under EPA regulations); *Surfrider Found. v. Cal. Reg'l Water Quality Control Bd.*, 211 Cal. App. 4th 557, 579-80 (4th Dist. 2012) ("[B]y referring solely to the 'location, design, construction and capacity of cooling water intake structures,' section 316(b) … specifically focuses *only* on the nature of the intake structures themselves, *to the exclusion of other measures for limiting environmental harm*.") (emphasis added); *see also Dir., Office of Workers' Comp. Programs v. Newport News Shipbuilding & Dry Dock Co.*, 514 U.S. 122, 136 (1995) ("Every statute purposes, not only to achieve certain ends, but also to achieve them by particular means.").

[191] *Nat. Res. Def. Council v. USEPA*, 822 F.2d 104, 123-24 (D.C. Cir. 1987).

[192] *See, e.g.*, Webster's Third New Int'l Dictionary 330 (2002) ("capacity" defined to mean ""the *power or ability* to hold, receive, or accommodate" something, or "the measured *ability* to contain" something (emphasis added)).

measures" that together can serve as the best technology available ("BTA") for a facility.[193] Even setting aside whether EPA's interpretation can survive judicial scrutiny as a matter of Section 316(b)'s plain language and "technology-forcing" structure,[194] nothing in EPA's Final 316(b) Phase II Rule suggests that the *permanent shutdown* of the facility as a whole can be imposed on a facility as a BTA requirement, as opposed to merely a means by which the facility, *at its sole election*, can claim credit for purposes of minimizing I&E as a result of planned unit closures.[195] To the extent EPA implicitly concludes otherwise by incorporating a permanent mandatory-shutdown requirement as BTA, it is in error.

#### c. A Mandatory-Shutdown Mandate Is Not Necessary To Meet The MWQS

Massachusetts law, in particular Massachusetts's surface water quality standards ("MWQS"), likewise provides no basis for either EPA or DEP to impose technology-forcing conditions on the use of PNPS's CWIS under its NPDES/MCWA permit, beyond any that may be imposed by virtue of the federal CWA.[196] There are several reasons for this.

First, although the MWQS claim that DEP "has the authority" under the MCWA "to assure compliance of the withdrawal activity with" the MWQS, including "compliance with narrative and numerical criteria and protection of existing and designated uses,"[197] that provision, as the Supreme Judicial Court of Massachusetts has held, is not self-executing.[198] On its face, the provision is not action- or technology-forcing. As the Supreme Judicial Court has held, it "not only … ha[s] no self-executing effect, [but it] purport[s] not to regulate at all," its "literal terms … go[ing] no further than declaring that [DEP] has the *authority* to regulate CWISs."[199] In short, DEP lacks any "self-executing, enforceable regulations" establishing limitations on CWISs.[200]

Second, the CWA Section 401 water quality certification ("WQC") process likewise provides an inadequate basis to impose limiting conditions on the use of PNPS's CWIS. Section 401 authorizes DEP to deny or to impose conditions on the grant of a WQC only if doing so is necessary to comply with "applicable" water quality standards.[201] Water quality standards, however, are not "applicable" under the CWA unless and until EPA has approved them under

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[193] 79 Fed. Reg. at 48,326.

[194] *But see, e.g.*, *Utility Air Regulatory Group v. EPA*, 134 S. Ct. 2427, 2443 (2014) ("[A]n agency interprestation that is 'inconsisten[t] with the design and structure of the statute as a whole,' … does not merit deference." (citation omitted))

[195] *See* 79 Fed. Reg. at 48,331-32, 48,342 (allowing EPA to take account of flow reductions resulting from unit closures and remaining life of the facility as part of the BTA analysis).

[196] *See* 314 Code Mass. Regs. Part 4.00.

[197] 314 Code Mass. Regs. § 4.05(4)(a)(2)(d).

[198] *Entergy Nuclear Generation Corp. v. Dep't of Envtl. Prot.*, 944 N.E.2d 1027, 1035 & n.14 (Mass. 2011).

[199] *Id.* at 1035.

[200] *Id.* at 1035 n.14.

[201] *See* 33 U.S.C. § 1341(a)(1), (d).

Section 303.[202] The provision of the MWQS concerning CWISs, however, is still being reviewed by EPA, as the agency's website reflects.[203] It therefore is not an "applicable" water quality standard for purposes of the Section 401 WQC process, and thus provides no basis for imposing conditions on PNPS's use of its CWIS.[204]

Even if the MWQS provision concerning CWISs were somehow "applicable," it still would be insufficient to impose action- or technology-forcing requirements in PNPS's NPDES/MCWA permit. The only "authority" that the provision claims for DEP is that of impos[ing] conditions on CWISs in order to "assure compliance of the withdrawal activity with … narrative and numerical criteria and protection of existing and designated uses" as elsewhere prescribed by the MWQS.[205] With respect to impingement and entrainment ("I&E"), however, there are no limiting "narrative and numerical criteria" under the MWQS.[206] Further, the "designated uses" of a waterbody cannot impose any action- or technology-forcing requirements with respect to I&E or thermal discharges that are more stringent than those set by Section 316, *i.e.*, satisfaction of the federal standards under Section 316 of the CWA necessarily also satisfies the MWQS. That is because the MWQS provision under which DEP asserts its ostensible "authority" to regulate PNPS's CWIS purports on its face to be a "Temperature" standard.[207] Under Section 303(g) the CWA, "[w]ater quality standards relating to heat shall be consistent with the requirements of [Section 316]," which necessarily includes those provided Section 316(b).[208] Because the CWA thus mandates that DEP apply the MWQS consistent with the federal standards that apply under Section 316(b), any attempt to apply the MWQS in a manner that attempts to impose a different standard on PNPS's CWIS would conflict with the federal CWA and necessarily be preempted.[209] Accordingly, the MWQS provide no basis for imposing more stringent requirements on the use of PNPS's CWIS than those that exist under federal law.

Finally, even if the MWQS could provide a basis for imposing more stringent requirements on the use of PNPS's CWIS, there is no evidence that more stringent requirements are necessary to

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[202] *See id.* § 1313(c)(3).

[203] *See* EPA, *Water Quality Standards Regulations: Massachusetts, State Standards in Effect for CWA Purposes*, https://www.epa.gov/wqs-tech/water-quality-standards-regulations-massachusetts (last visited July 22, 2016) (providing copy of MWQS, effective Sept. 19, 2007), which contains annotations noting that as of Dec. 1, 2010, "EPA is still reviewing … [r]evisions concerning the applicability of Mass DEP's water quality standards to cooling water intake structures at 314 CMR … 4.05(4)(a)(2)(d)").

[204] The Supreme Judicial Court's decision in *Entergy*, *supra*, is not to the contrary. The Court addressed only the general permissibility of using the MWQS to regulate CWISs through the federal WQC process; it did not consider or decide the specific issue whether the MWQS provision at issue in that case, and here, is "applicable" for purposes of that process because it has not yet been approved by EPA under Section 303's review process. *See Entergy*, 944 N.E.2d at 1039.

[205] 314 Code Mass. Regs. § 4.05(4)(a)(2)(d).

[206] *See id.* § 4.05(4)(a)(1)-(8), (5)(a)-(e).

[207] *Id.* § 4.05(4)(a)(2).

[208] 33 U.S.C. § 1313(g).

[209] *See* 33 U.S.C. § 1370 (preserving state authority to adopt or enforce more stringent water quality standards and effluent limitations than provided for under the CWA, "*[e]xcept as expressly provided in this chapter*…." (emphasis added)).

achieve the narrative standard. In relevant part, the MWQS provide that conditions may be imposed on CWISs located in Class SA waters such as Cape Cod Bay in order to "assure compliance of the withdrawal activity with 314 CMR 4.00, including but not limited to, compliance with narrative and numerical criteria and protection of existing and designated uses,"[210] *i.e.*, "excellent habitat for fish, other aquatic life and wildlife, including for their reproduction, migration, growth and other critical functions, and for primary and secondary contact recreation."[211] The lack of adverse impact on aquatic species in the vicinity of PNPS obviates the imposition of final Permit conditions ensuring the "reproduction, migration, growth and other critical functions" of aquatic life under the SWQS.[212] That is because the lack of any demonstrated harm to the populations of fish and other aquatic species in the vicinity of PNPS over its 40+-year operating history demonstrate that the protection of those species' biological functions already is assured, as the Fact Sheet concludes.[213]

* * *

In sum, there is no legal or biological rationale for imposing a mandatory-shutdown condition – or any modification to PNPS's CWIS – pursuant to Section 316(b) or MWQS.[214] Further, upon shutdown, the vast majority of PNPS's cooling water withdrawals and discharges will be further reduced, to in excess of 97%. It follows that no BTA or similar limitations on water withdrawals via PNPS's CWIS are necessary or appropriate in order to comply with Section 316(b) or MWQS after PNPS has shut down, either.

### B. The Final Permit Should Not Require Continuous Rotation Of Traveling Screens

PNPS does not currently rotate its traveling screens on a continuous basis. Instead, they are rotated when necessary, *e.g.*, based on pressure representing the presence of impinged organisms or debris) or "for 8 hours prior to conducting the impingement sampling,"[215] where appropriate.[216] Nonetheless, the Draft Permit proposes that PNPS continuously operate and rotate the traveling screens when circulating water is in use and monitor the through-screen velocity,

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[210] 314 Code Mass. Regs. § 4.05(4)(a)(2)(d).

[211] *Id.* § 4.05(4)(a).

[212] *See* 314 Code Mass. Regs. § 4.05(4)(a)(2)(d).

[213] *See supra*, "Environmental Context."

[214] *See generally* 2014 Update; AEI Report; Normandeau Associates, Inc., *Entrainment and Impingement Studies Performed at Pilgrim Nuclear Power Station, Plymouth, Massachusetts from 2002 to 2007* (June 2008) ("I&E Report"); Letter from Elise N. Zoli to Damien Houlihan, EPA (July 1, 2008); *see also, generally*, Economics Report; Engineering Report.

[215] FSEIS at 4-28; *see also* Engineering Report at 5-6.

[216] *Id.*; *see also* Normandeau Associates, Inc. ("NAI"), Impingement of Organisms on the Intake Screens at Pilgrim Nuclear Power Station, Report No. 67, January through December 2005 (Apr. 30, 2005).

which EPA maintains –without rationale – would ensure that it is no greater than 0.5 feet per second in most circumstances in post-shutdown conditions.[217]

These new requirements are not supported by any stated biological or engineering calculations. Further, they are a dubious mandate for equipment transitioning to and through shutdown, *i.e.*, at the end of its useful life, particularly when the technology was not designed for continuous rotation. Again, as detailed above in Section I.A.2.i, Pilgrim's modified traveling screens and fish returns satisfy the letter and spirit of the Final 316(b) Phase II Rule, obviating the need for more. The post-shutdown reduced water usage at PNPS further decreases the credible basis for continuous rotation.[218] Indeed, EPA and DEP have not imposed such mandates on other recent NPDES/MCWA permit applicants. Thus, for example, the final NPDES/MCWA permit issued for Canal Generating Station on August 1, 2008 contains neither a continuous screen-rotation requirement, nor any requirement to monitor through-screen velocities, despite the fact that the permit authorizes water withdrawals via its once-through CWIS of up to 518 MGD.[219]

In lieu of continuous screen rotation and/or monitoring of through-screen velocity, Entergy requests that Part I.F.1 and .2 of the Draft Permit be revised so as to provide for operation of the traveling screens in the manner currently managed (defined as proposed below in Section VI.C below).

### C. Suggested Revisions To The Language Of Part I.F Of The Draft Permit

For all the reasons detailed above, Entergy proposes the following changes to Part I.F of the Draft Permit:

> Section 316(b) of the CWA, 33 U.S.C. § 1326(b), dictates that this permit must require that the cooling water intake structure's (CWIS) design, location, construction, and capacity reflect the best technology available for minimizing adverse environmental impact (BTA), including the CWIS's entrainment and impingement of various life stages of aquatic organisms (*e.g.*, eggs, larvae, juveniles, and adults). Accordingly, EPA has determined the BTA for PNPS' CWIS and has specified requirements reflecting this BTA below in Parts I.F.1 and I.F.2 of this permit.

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[217] *See* Draft Permit at 33. Of course, this through-screen velocity is one third of Pilgrim's current calculated through-screen velocity, which would otherwise exempt Pilgrim from the Rule's impingement mandates. 40 C.F.R. § 125.94(c)(3).

[218] *See Nat. Res. Def. Council v. EPA*, 859 F.2d 156, 170 (D.C. Cir. 1988) (EPA "is powerless to impose permit conditions unrelated to the discharge itself"); 314 Code Mass. Regs. § 3.11(2)(a), (2)(a)(5) (DEP is authorized to impose permit conditions that "provide for and assure compliance with all applicable requirements of the [G. L. c. 21, §§ 26-53] and the [CWA]," including "monitoring requirements *and other means of verifying the compliance of the discharge with a permit*" (emphasis added)).

[219] *See, e.g.,* Mirant Canal, LLC, Permit No. MA0004928, Part I.A.2, .12.a (providing only that permittee "shall rotate and visually inspect the intake screens of the cooling water intake structures for Units 1 and 2 at least every eight hours that the unit circulation pumps are operated," similar to the requirement under PNPS's current permit); *FCC v. Fox Television Stations, Inc.*, 556 U.S. 502, 515 (2009).

The permittee has informed EPA and MassDEP that it ~~will~~**is expected to** terminate **electricity-generating** operations at PNPS **no later than June 1, 2019,** ~~and enter a~~ **and ultimately to decommission the facility under the direction of the U.S. Nuclear Regulatory Commission**~~ing phase no later than June 1, 2019~~. ~~As of this date~~ **Following the termination of electric-generating operations (“shutdown”)**, PNPS will terminate ~~cooling~~ **circulating** water withdrawals for main condenser **cooling, except that** will be authorized to continue withdrawing ~~cooling~~ water ~~only~~ as necessary to support ~~decommissioning activities and to cool the spent fuel rods for a limited period of time following~~ **post-**shutdown ~~of PNPS~~ **operations at PNPS, *e.g.*, dilution or fire-protection water**. The BTA requirements in this permit reflect the current operations of PNPS prior to shut down ~~or June 1, 2019, whichever comes first and~~**, and** the anticipated operations from **and after shutdown** ~~June 1, 2019~~ through the ~~end of the decommissioning phase or~~ the expiration of this permit~~, whichever comes first~~.

1. Upon termination of generation of electricity ~~or no later than June 1, 2019~~**and solely to the extent of continued periodic operation of the circulating water system as provided herein**, the permittee shall~~:~~ **cease water withdrawals for the circulating water system, except that the permittee shall be authorized, *e.g.*, for the purpose of providing dilution water consistent with the facility’s Off-Site Dose Calculation Manual, to operate one (1) circulating water pump of the permittee’s choosing once every rolling twenty-eight (28) day period for up to forty-eight (48) hours, for an average monthly maximum of 16 MGD.**

   ~~a. Operate the traveling screens with a maximum through-screen intake velocity no greater than 0.5 feet per second. Limited exceedances of the maximum through-screen velocity are authorized for the purposes of maintaining the CWIS and when the circulating water pumps are required to withdraw water to support decommissioning activities not to exceed five (5) percent of the time on a monthly basis.~~

   ~~b. Monitor the through-screen velocity at the screen at a minimum frequency of daily. Alternatively, the permittee shall calculate the daily maximum through-screen velocity using water flow, depth, and screen open area. For this purpose, the maximum intake velocity shall be calculated during minimum ambient source water surface elevations and periods of maximum head loss across the screens. The average monthly and maximum daily through-screen intake velocity shall be reported each month on the DMR. See Part I.B.1. of this permit.~~

   ~~c. Cease cooling water withdrawals for the main condenser and reduce total cooling water withdrawals to an average monthly rate of 7.8 MGD. Cooling water withdrawals at the salt service water pumps shall be limited to a maximum daily flow of 15.6 MGD.~~

~~d. Withdrawal of seawater using a single circulating water pump not to exceed five (5) percent of the time on a monthly basis is authorized to support decommissioning activities.~~

~~e. Continuously rotate the traveling screens when operating the circulating water pumps.~~

2. From the effective date of the permit until termination of generation of electricity, ~~no later than June 1, 2019~~**and solely to the extent of continued periodic operation of the circulating water system as provided herein**, the permittee shall ~~continuously rotate~~ **operate** the traveling screens **during circulating water use to the extent necessary or appropriate to mitigate UIEs, as defined above in Part I.D.12, or to reduce debris loading**.

**3. Upon termination of generation of electricity and in the absence of nuclear safety considerations, service water withdrawals at the service water pumps shall be limited to a maximum daily flow of 19.4 MGD and an average monthly flow of 15.6 MGD.**

~~3~~**4**. Any change in the location, design, or capacity of any CWIS, except as expressed in the above requirements, must be approved in advance and in writing by the EPA and MassDEP.

## II. The Final Permit's Volumetric Flow Limitations With Respect To Dilution Water And Service Water Must Be Revised To Reflect Post-Shutdown Needs

The Draft Permit provides, in Part I.F.1.c, that PNPS shall, post-shutdown, "[c]ease cooling water withdrawals for the main condenser and reduce total cooling water withdrawals to an average monthly rate of 7.8 MGD."[220] In Part I.F.1.d, "[w]ithdrawal of seawater using a single circulating water pump" is further limited so that it may not "exceed five (5) percent of the time on a monthly basis … to support decommissioning activities."[221] With respect to service water withdrawals, Part I.F.1.c of the Draft Permit limits such withdrawals via the "salt service water pumps … to a maximum daily flow of 15.6 MGD."[222]

As detailed below, these limits reflect calculation errors and do not fully account for PNPS's post-shutdown operational needs. As such, they should be revised, consistent with the proposed revisions provided above in Section I.D and below in Sections II.A and II.B.

### A. Circulating Water Withdrawal Limits

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[220] Draft Permit, Part I.F.1.c, at 33.

[221] *Id.*, Part I.F.1.d, at 33.

[222] *Id.*, Part I.F.1.c, at 33.

The Draft Permit contemplates operation of a single historic circulating water pump, primarily to supply dilution flow for the facility's NRC-authorized liquid radiological waste disposal system, and on an emergency basis for fire protection. Thus, this former circulating water will no longer serve a cooling function and therefore will not constitute cooling water pursuant to Section 316(b).[223]

Further, this dilution water will not contain any pollutants subject to EPA's or DEP's jurisdiction.[224] To the contrary, it will contain only liquid radioisotopes ("radiological wastes"), at NRC-approved discharge levels.[225] More specifically, at PNPS, "[t]he function of the liquid radioactive waste system is to collect, treat, store, and/or dispose of all radioactive liquid wastes."[226] Such wastes are initially "collected in sumps and drain tanks at various locations throughout the plant and … then transferred to the appropriate receiving tank for processing."[227] Liquid radiological wastes are classified and processed for disposal "as either clean (liquids having a varying amount of radioactivity and low conductivity), chemical (liquids having low concentrations of radioactive impurities and high conductivities), or miscellaneous radwastes (liquids having a high detergent or contaminant level, but with a low radioactivity concentration)."[228] Once processed, "[v]ery low levels of radioactivity may be released in plant effluents if they meet the limits specified in the [NRC] regulations"; "[t]hese releases are closely monitored and evaluated for compliance with NRC restrictions in accordance with the PNPS ODCM [Offsite Dose Calculation Manual]."[229] "If it is determined that the liquid radioactive waste meets the ODCM criteria for controlled release, it can be discharged on a controlled basis into the circulating water discharge canal through the liquid radioactive waste discharge header."[230] During this process, "the radioactivity level is continuously monitored," and "[a]ccidental discharge is protected against by instrumentation for detection and alarm of abnormal and administrative controls," so that "the discharge is automatically terminated if the activity exceeds preset levels."[231] That will remain the case when PNPS ultimately begins the

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[223] *See* 40 C.F.R. 125.92(e) (defining "cooling water" as "water used for contact or non-contact cooling").

[224] *See Train*, 426 U.S. at 25 (holding that "the 'pollutants' subject to regulation under the [Clean Water Act] do not include source, byproduct, and special nuclear materials"); *see also PG&E*, 461 U.S. at 207 (NRC retains "exclusive jurisdiction to license the transfer, delivery, receipt, acquisition, possession, and use of nuclear materials…. Upon these subjects, no role was left for the States." (citation omitted)).

[225] *See* 10 C.F.R. Part 20, Appendix B, Table 2.

[226] FSEIS at 2-13.

[227] *Id.*

[228] *Id.*

[229] *Id.*; *see also* Pilgrim Nuclear Power Station Offsite Dose Calculation Manual, Rev. 9 (2003) ("PNPS ODCM"), at 3/4-11 to -15 (providing radiation dosage limits at and beyond site boundary for radiological liquid effluents); 10 C.F.R. Part 20, Appendix B, Table 2 (providing NRC mandated radiological dose limits for members of public as well as facility personnel).

[230] FSEIS at 2-14; *see also* PNPS ODCM at 6-1.

[231] FSEIS at 2-14; *see also* PNPS ODCM at 3/4-3 ("The radioactive liquid effluent monitoring instrumentation channels shown in Table 3.1-1 shall be OPERABLE with their alarm/trip setpoints set to ensure that the limits of Controls 3.2.1 are not exceeded during periods when liquid wastes are being discharged via the radwaste discharge header.").

decommissioning process, during which "any radioactive liquids from operation of decommissioning activities in the facility will be processed and disposed of" via the liquid radioactive waste system, again consistent with the "[c]ontrols for limiting the release of radiological liquid effluents [that] are described in the facility's ODCM" and NRC regulations.[232]

In sum, the post-shutdown use of circulating water at PNPS for dilution purposes will not be cooling water and will contain no otherwise regulated "pollutants," as defined under the federal CWA or the MCWA. Because this is so, as a legal matter, the post-shutdown use of circulating water at PNPS consists, from EPA's and DEP's perspective, merely of the withdrawal and immediate release (without any legally meaningful alteration) of seawater. That activity is no different in principle from the type of water transfers that hydroelectric dams and some municipal water systems perform, for which no NPDES permit is necessary.[233] As the Supreme Court has repeatedly acknowledged, because the scope of the NPDES program covers only "discharges of pollutants," no permit is required for a water usage that is equivalent to merely "tak[ing] a ladle of soup from a pot, lift[ing] it above the pot, and pour[ing] it back into the pot," without more.[234] That analogy applies perfectly to PNPS's post-shutdown use of circulating water, meaning that it is unnecessary for that discharge to be covered by any NPDES permit authorization at all.[235]

It also bears repeating that there is no biological rationale for requiring a more stringent limit on post-shutdown water withdrawals and discharges, including of dilution water, than has been applied to PNPS during its electric-generating operations. As detailed above in the "Environmental Context" section, nearly 50 years of consistent, extensive and robust environmental monitoring has demonstrated that PNPS's historic permitted intakes and discharges, which are much greater in volume than those contemplated once Pilgrim shuts down, have had no demonstrable adverse impact on aquatic species. As such, it follows that PNPS's much smaller-volume post-shutdown discharges also will continue to result in no adverse

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[232] NRC, NUREG-0586, Supplement 1, Generic Environmental Impact Statement on Decommissioning of Nuclear Facilities, Vol. 1, Final Report (Nov. 2002) ("Decommissioning GEIS"), at 3-10.

[233] *See, e.g.*, 73 Fed. Reg. 33,697, 33,699 (June 13, 2008) ("[T]he agency concludes that water transfers, as defined by the rule, do not require NPDES permits because they do not result in the 'addition' of a pollutant."); *see also L.A. County Flood Control Dist. v. Nat. Res. Def. Council*, 133 S. Ct. 710, 712-13 (2013) (holding that "a 'discharge of pollutants' [does not] occur when polluted water 'flows from one portion of a river that is navigable water of the United States, through a concrete channel or other engineering improvement in the river,' and then 'into a lower portion of the same river'").

[234] *See L.A. County Flood Control Dist.*, 133 S. Ct. at 713 (quoting *Catskill Mountains Chapter of Trout Unlimited, Inc. v. New York*, 273 F.3d 481, 492 (2d Cir. 2001)); *S. Fla. Water Mgmt. Dist. v. Miccosukee Tribe*, 541 U.S. 95, 109-10 (2004) (same).

[235] *See, e.g.*, *Waterkeeper Alliance, Inc. v. EPA*, 399 F.3d 486, 504 (2d Cir. 2005) ("Unless there is a 'discharge of any pollutant,' there is no violation of the Act, and point sources are, accordingly, neither statutorily obligated to comply with EPA regulations for point source discharges, nor are they statutorily obligated to seek or obtain an NPDES permit.").

impact. Accordingly, the volumetric limitation on the use of dilution water, via Outfall 001, that is imposed in Part I.B.1 and also reflected in Part I.F.1.d of the Draft Permit should be deleted.[236]

Even if the Draft Permit's volumetric limitation on post-shutdown circulating water use is not deleted from the final Permit, the limitation needs to be adjusted and the relevant language of the Draft Permit, which refers to this discharge variously as "cooling water" and "circulating water," revised to avoid potential confusion.[237] More specifically, Part I.B.1 of the Draft Permit imposes a limitation on post-shutdown "discharge of cooling water to support shutdown operations through Outfall Serial Number 001" of no more than an average monthly volume of 11.2 million gallons per day ("MGD"), with a maximum daily flow of 224 MGD.[238] This limitation is apparently meant to be reflected also in Part I.F.1.d of the Draft Permit, which states that "[w]ithdrawal of seawater using a single circulating water pump not to exceed five (5) percent of the time on a monthly basis is authorized to support decommissioning activities," equating to 11.2 MGD given the design flow capacity of a single circulating water pump of 155,500 gallons per minute ("gpm").[239]

The language of both these provisions is potentially confusing, because it describes the discharge as "cooling water" and "circulating water," even though this water usage will serve neither of these purposes during PNPS's post-shutdown activities, but instead will be used solely for dilution water. To the extent this limitation is retained in the final Permit, Entergy therefore respectfully requests referring to this discharge consistently as "dilution water," as reflected in the proposed revisions provided in Section I.D above. Part I.B.1 also should be revised to make clear that the volumetric limits provided there are solely those related to dilution water use, and are exclusive of the flows that are separately authorized under the remainder of Part I.B, all of which ultimately empty through the same physical outfall as Outfall 001, even though they carry different Outfall Serial Numbers.

With respect to the volumetric limits themselves, Entergy agrees that the maximum daily flow of 224 MGD is adequate for dilution water – provided, again, that this limitation is meant to reflect only dilution water flow, and no other flows that will discharge via the same physical outfall, *e.g.*, service water, etc.

With respect to the average monthly flow, however, Entergy respectfully requests that they be revised to allow for the provision of dilution flow, consistent with the facility's ODCM, that reflects the use of up to one circulating water pump for a period not to exceed 48 hours, no more frequently than once each rolling 28-day period (to account for the short month of February, which allows for fewer days over which dilution water use can be averaged). In most circumstances, Entergy expects that it would need to run that single pump for only 24 hours or less to achieve the dilution level that NRC mandates for the relevant liquid radiological waste. However, unforeseen circumstances may arise during the post-shutdown phase – a new

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[236] *See* Draft Permit, Part I.B.1, at 11; *id.*, Part I.F.1.d, at 33.

[237] *See* Draft Permit, Part I.B.1, at 11; *id.*, Part I.F.1.d, at 33.

[238] *See* Draft Permit, Part I.B.1, at 11.

[239] *Id.*, Part I.F.1.d, at 33; *see also, e.g.*, FSEIS at 2-7 (providing design flow capacity of each circulating water pump).

operational dynamic for the PNPS facility – that may require up to an additional day of pump use, for conservatism. Likewise, while not expected, Entergy would like to retain the ability to withdraw and discharge seawater on an emergency basis for fire-protection purposes. On a monthly average basis, this flow dynamic equates to approximately 16 MGD.[240]

### B. Service Water Withdrawal Limits

Post-shutdown, PNPS also will need to make withdrawals from Cape Cod Bay for the service water system. As NRC has explained, during operation, this system serves "an essential role [during normal operations] in the mitigation of and recovery from accident scenarios involving the potential for core-melt," and thus it fulfills a vital nuclear-safety function.[241] NRC also has explained that service water remains necessary to ensure nuclear safety once a nuclear power plant shuts down and begins the decommissioning process. More specifically, after PNPS has ceased generating electricity, Entergy will be obligated to permanently remove all nuclear fuel from the reactor vessel and store it, initially, in PNPS's spent fuel pool. The spent fuel pool is "a specially designated water-filled basin" where spent fuel is placed before being moved to a different storage location, *e.g.*, dry-cask storage in an independent spent fuel storage installation ("ISFSI"), "[a]fter the fuel has cooled adequately."[242] Spent fuel pool cooling is necessary because "[e]ven after the nuclear reactor is shut down, the fuel continues to generate decay heat from the radioactive decay of fission products."[243] "Storing the spent fuel in a pool of water provides an adequate heat sink for the removal of heat from the irradiated fuel."[244] "Typically, transfer of spent fuel to an ISFSI occurs after the fuel has cooled for 5 years,"[245] which is also the maximum NPDES/MCWA renewal term allowed under federal and Massachusetts law.[246] Use of the service water system may remain necessary during that time in order to provide "spent fuel pool cooling" essential for safe and effective nuclear-fuel management.[247] Service water supports spent-fuel pool cooling.

PNPS's service water system consists of five service water pumps, each with a design flow capacity of up to 2,700 gallons per minute, providing for a maximum service water capacity of 13,500 gpm or approximately 19.4 MGD, employing all five pumps.[248] During PNPS's current electric-generating operations, up to four of the pumps are typically in use at one time, with the fifth kept in reserve.[249] Historically and currently (including under PNPS's current,

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[240] 155,500 gpm * 60 min/hr * 24 hr/day = 223.9 MGDD * 2 days = 447.8 MGD over 48 hours or 2 days. 447.8 MGD divided by 28 days is approximately equal to 16 MGD.

[241] NRC, NUREG/CR-5379, PNL-6560, RM, R9, Nuclear Plant Service Water System Aging Degradation Assessment, Phase I, Vol. 1 (June 1989), at iii.

[242] Decommissioning GEIS at 3-12 to -13.

[243] *Id.* at 3-12.

[244] *Id.*

[245] *Id.* at 3-13.

[246] *See* 40 C.F.R. § 122.46(a); G. L. c. 21, § 43(7); 314 Code Mass. Regs. § 3.11(8).

[247] *See* Decommissioning GEIS at 3-9.

[248] *See* FSEIS at 2-22.

[249] *See id.* at 2-9.

administratively continued, 1994-amended NPDES permit), therefore, service water usage has been authorized up to 19.4 MGD, but typically involved lower flows.[250]

As proposed in Part I.B.3 and further reflected in 1.F.1.c, the Draft Permit scrambles this history, and proposes to limit PNPS's service water withdrawals to a monthly average limit of 7.8 million gallons per day, with a daily maximum limit of only 15.6 million gallons per day.[251] These limits reflect a limitation that PNPS use no more than four service water pumps,[252] which reportedly is based on predictions by PNPS personnel that up to four service water pumps may be needed during post-shutdown operations at any given time.[253] While this may be correct, given the absence of operational experience in shutdown and the essential nuclear safety functions served by service water, Entergy respectfully requests that the final Permit authorize, on a maximum daily limit basis, all of them to be used, and allow four pumps to be used on a monthly average basis.

There also is no biological or other environmental rationale for reducing PNPS's currently allowed service-water usage during the post-shutdown period. As detailed above in the Environmental Context Section and in Sections I.A.2.a and I.A.2.b, the available scientific evidence, including data and object-specific studies amassed during nearly fifty years of biological monitoring, demonstrates the absence of demonstrable adverse impact to aquatic species in the vicinity of the Station reasonably attributable to its operations. If PNPS's current and historic water withdrawals and discharges have been sufficient to assure the protection of the aquatic ecosystem, then there is no basis for paring back its water usage after the facility has ceased its electric-generating operations and eliminated approximately 97% percent of its current water usage.

For all of these reasons, Entergy requests that the maximum daily limitation on service water use be revised in the final Permit to allow for the use of all five pumps, resulting in a maximum daily flow of up to 19.4 MGD. With respect to the average monthly limitation, Entergy requests that it be revised so as to allow for the use of up to four service water pumps each day, for an authorized average monthly flow of 15.6 MGD. Entergy anticipates that PNPS's actual service water needs may turn out in practice to be substantially lower than these conservatively large flow authorizations may suggest. To that end, Entergy also recommends that EPA and DEP allow PNPS to operate under the service water usage authorizations proposed here for up to two years following shutdown, at the end of which period Entergy may propose to modify the permit to align the monthly averages to reflect PNPS's actual post-shutdown experience.[254]

Similar to its concern, stated above, with respect to dilution water, Entergy also recommends that the language of Part I.F.1.c the Draft Permit with respect to service water be revised to avoid

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[250] *See* Modification of Authorization to Discharge Under the National Pollutant Discharge Elimination System, Federal Permit No. MA0003557 (Aug. 30, 1994) ("1994 Amended NPDES Permit"), Part I, at 6, 8-12.

[251] *See* Draft Permit, Part I.B.3, at 14; *id.*, Part I.F.1.c, at 33; *see also* Fact Sheet at 34.

[252] *See* Draft Permit, Part I.F.1.c, at 33; *see also id.*, Part I.B.3, at 14; Fact Sheet at 34.

[253] *See* Fact Sheet at 34 (citing telephone discussion with PNPS Senior Environmental Engineer Joe Egan on Dec. 21, 2015).

[254] *See* 40 C.F.R. § 124.5(a); G. L. c. 21, § 43(10); 314 Code Mass. Regs. § 3.13(1).

potential confusion.[255] Specifically, that portion of the Draft Permit directs that PNPS "shall … [c]ease cooling water withdrawals for the main condenser and reduce total cooling water withdrawals to an average monthly rate" that reflects the average monthly rate provided for service water usage in Part I.B.3 of the Draft Permit.[256] This language is confusing because service water is not "for the main condenser," only circulating water (which will become dilution water during the post-shutdown period) is. As such, it is unclear whether the average monthly limitation is meant to apply to service water or to dilution water. Proposed revisions are provided above in Section I.E.

## III. The Final Permit's Thermal Limitations And Authorizations For Backwashing Must Be Revised

### A. The Draft Permit's Authorization Of The Use Of "Thermal" And "Non-Thermal" Backwash Requires Revision

Parts I.A.2 and I.B.2 of the Draft Permit expands the current permit's regulation of "thermal backwashes" to regulate so-called "non-thermal backwashes" as well, both before and after shutdown.[257] "Thermal backwash" refers to a process used to control biofouling in the CWIS via non-chemical means: the plant is reduced to 50 percent power, seawater is heated to approximately 105°F, and two of PNPS's traveling screens are rotated in reverse to allow this heated seawater to flow back over the screens and into the intake embayment.[258] Under PNPS's current permit, thermal backwashes are authorized at a frequency of up to 3 hours per day, twice a week, subject to a maximum daily flow of 255 MGD and a maximum daily temperature of 120°F.[259] These thermal backwashes are typically conducted only 3 to 5 times per year, and scheduled so as to be coordinated with the highest tide.[260] Additionally, the current permit allows for additional backwashes ("unscheduled backwashes") as necessary to address "[i]nfrequent, abnormal environmental conditions" that would not be adequately addressed by the regularly scheduled thermal backwashes, *e.g.*, as a result of storm events, and requires that "[t]hese conditions will be described in the subsequent monthly DMR submittal."[261]

As mentioned, the Draft Permit expands the coverage of the discharge limitations provided with respect to Outfall Serial Number 002 to include "thermal and non-thermal backwash."[262] For the pre-shutdown period, both are authorized, provided that they are limited to a duration of no more than 3 hours per day, and a frequency of no more than once per week, with a maximum daily effluent temperature limitation of no more than 115°F and a daily maximum flow limitation of

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[255] *See* Draft Permit, Part I.F.1.c, at 33.

[256] *Id.*; *see also id.*, Part I.B.3, at 14.

[257] *See id.*, Part I.A.2, at 5; *id.*, Part I.B.2, at 13; Fact Sheet at 25.

[258] *See* FSEIS at 2-11.

[259] *See* 1994 Amended NPDES Permit, Part I, at 8.

[260] *See* FSEIS at 2-11.

[261] 1994 Amended NPDES Permit, Part I, at 8.

[262] *See* Draft Permit, Part I.A.2, at 5; *id.*, Part I.B.2, at 13; Fact Sheet at 25.

28 MGD.[263] For the post-shutdown period, thermal backwashing is prohibited, but non-thermal backwashing continues to be authorized, subject to the same frequency and daily maximum flow limits.[264]

Neither the Draft Permit nor the Fact Sheet, however, defines the term "non-thermal backwash," except insofar as the Fact Sheet states that these are "occasional" and "conducted as necessary," but "which do not use heated water."[265] To the extent that the term "non-thermal backwashes" is meant to refer to the unscheduled backwashes authorized under the current permit to address "[i]nfrequent, abnormal environmental conditions," it is incorrect to describe them as "non-thermal backwashes" that "do not use heated water." Unscheduled backwashes in fact do involve the use of heated seawater to control biofouling, except that the water typically is heated to a level below that normally which is used for regularly scheduled thermal backwashes, *i.e.*, below 105°F.

Entergy therefore recommends that the final Permit delete all references to "non-thermal backwashes" in Part I.A.2 and Part I.B.2. Instead, with respect to Part I.A.2, the final Permit should limit regularly scheduled thermal backwashing as currently specified in the Draft Permit – *i.e.*, with the same frequency, duration, daily maximum flow and daily maximum temperature limitations as currently appear in Part I.B.2 – but restore the current permit's authorization to conduct more frequent, unscheduled backwashing, as necessary to respond to infrequent, abnormal environmental conditions. Such restoration is necessary, because of the continued potential that more frequent backwashing may be necessary due to events, such as storms, that may occur shortly after a regularly scheduled thermal backwash. We therefore suggest revising footnote 4 of Part I.A.2 (addressed to "Discharge Duration") as follows:

> The discharge from a thermal backwash shall not be more frequent than three hours per event and not more frequent than once per week per intake bay. In addition, the time between thermal backwash events shall be at least seven (7) consecutive calendar days. For example, if a thermal backwash occurred on a Tuesday, the next thermal backwash could occur no earlier than on the following Tuesday. **More frequent unscheduled backwashes, at a temperature not to exceed 105°F, shall be authorized to the extent necessary to respond to infrequent, abnormal environmental events.** The permittee shall record the backwash duration for each event and the backwash frequency on a monthly basis. **Such reports shall also describe the conditions necessitating any unscheduled backwashes that were undertaken at a frequency in excess of once per week during the reporting month.**~~The permittee shall explain any exceedance of the discharge frequency and/or duration on the DMR cover~~

[263] *See* Draft Permit, Part I.A.2, at 5.

[264] *Id.*, Part I.B.2, at 13.

[265] Fact Sheet at 11.

> ~~letter. The frequency and duration of non-thermal backwashes shall be reported in an attachment to the DMR for each month.~~[266]

Importantly, as the Fact Sheet acknowledges, PNPS's current and historic practices with respect to backwashing have been determined by both EPA and DEP to have resulted in no appreciable harm to the balanced indigenous population or community of fish, shellfish and wildlife in and on Cape Cod Bay.[267] Revising Part I.A.2, as suggested above, will not represent any change to PNPS's historic and current use of backwashing for the purpose of biofouling control in the CWIS, and thus finds ample legal support under both Section 316(a) of the CWA and the MWQS.[268]

With respect to the post-shutdown period, Part I.B.2 of the Draft Permit should be revised, consistent with the procedure that PNPS uses and historically has used for the type of unscheduled backwashes that will be the only type of backwash authorized during this period.[269] Specifically, rather than specifying a "Discharge Duration" of only once per week, Part I.B.2 should include the following footnote, which is modeled on the revised language suggested above for footnote 4 to Part I.A.2:

> The discharge from a backwash shall not be more frequent than once per week per intake bay. In addition, the time between scheduled backwash events shall be at least seven (7) consecutive calendar days. For example, if a scheduled backwash occurred on a Tuesday, the next scheduled backwash could occur no earlier than on the following Tuesday. More frequent unscheduled backwashes shall be authorized to the extent necessary to respond to infrequent, abnormal environmental events. The permittee shall record the backwash duration for each event and the backwash frequency on a monthly basis. Such reports shall also describe the conditions necessitating any unscheduled backwashes that were undertaken at a frequency in excess of once per week during the reporting month.

Finally, Part I.B.2.a of the Draft Permit must be revised, consistent with the Comments provided in Section I.A. Specifically, consistent with our comments above in Section I.A, the words "and not later than June 1, 2019" that follow the phrase "beginning on the date following termination of electricity generation" should be deleted.[270]

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[266] *See* Draft Permit, Part I.A.2, at 6 n.4; *see* 1994 Amended NPDES Permit, Part I, at 8.

[267] *See* Fact Sheet at 50; *id.*, Attach. C, at 33.

[268] *See* 40 C.F.R. § 125.73(a), (c); 314 Code Mass. Regs. § 4.05(4)(a)(2)(c).

[269] *See* Draft Permit, Part I.B.2, at 13.

[270] *See id.*

### B. The Final Permit's Thermal Discharge Limits With Respect To Post-Shutdown Service Water Discharges And Pre-Shutdown Circulating Water Discharges Must Be Revised

Prior to PNPS's anticipated shutdown, the Draft Permit maintains the thermal limitations for circulating water discharges contained in PNPS's current NPDES permit, which allows PNPS to discharge heated effluent with a maximum daily temperature of 102°F and a temperature rise or "delta T" (as measured by the difference between the intake and the discharge water temperatures) of up to 32°F.[271] Consistent with this current NPDES permit, there are no thermal limitations on service water discharges prior to shutdown.[272]

After PNPS's anticipated shutdown, however, the Draft Permit proposes more restrictive limits for service water discharges that may be problematic for PNPS's post-shutdown operations. As to circulating water, the Draft Permit reduces the effluent temperature limits to an average monthly cap of 80°F, with a maximum daily limit of 85°F and a delta T of 3°F.[273] Entergy expects that these limitations should be manageable under PNPS's post-shutdown regime, provided that reduced flows throughout the system do not contribute to increased effluent temperatures and delta Ts.

With respect to service water discharges, the Draft Permit conditions are not sufficiently supported in at least two respects. First, it is unclear whether an 85°F maximum daily cap on effluent temperature for service water can reasonably support the use of service water for necessary nuclear-safety functions post-shutdown, particularly given that this period will represent a greatly reduced flow dynamic compared to PNPS's historic electric-generating operations. Effluent temperature is a function of many variables, including flow, which in turn is a function of the number of service water pumps available to generate that flow. As discussed above in Section II.B, the Draft Permit proposes to limit the number of service water pumps available for PNPS's use compared to historic operations, while at the same time imposing thermal limits on service water discharge for the first time in the facility's history. Such a regime may present a needlessly challenging dynamic for Pilgrim. The Draft Permit's limitations also need to be set in a manner that properly accounts for the fact that PNPS's instruments have inherent limitations on their accuracy, in that they can accurately measure temperature only within 1°F of the actual water temperature.

Further, there is substantial uncertainty concerning what the typical effluent temperature of a service water discharge alone likely will be. Historically separate temperature monitoring has not been required for the service water discharge at PNPS, in recognition of the fact that this discharge has almost always been commingled with, and heavily diluted by, the much larger circulating water discharge.[274] As a result, there is only limited temperature monitoring data that reflects that reflects the discharge associated with service water alone: such data would be from

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[271] *Compare* Draft Permit, Part I.A.1, at 3 *with* 1994 Amended NPDES Permit, Part I, at 6.

[272] *Compare* Draft Permit, Part I.A.4, at 9 *with* 1994 Amended NPDES Permit, Part I, at 10.

[273] *See* Draft Permit, Part I.B.1, at 11.

[274] *See* 1994 Amended NPDES Permit, Part I, at 10.

periods when PNPS has taken an outage, which tend to be highly infrequent, typically occurring on a 24-month cycle.[275] Accordingly, the maximum daily temperature limit for post-shutdown service water discharges must be revised; given the paucity of useful historic temperature monitoring data for service water alone that can serve as a baseline, Entergy suggests a limit of 90°F, subject to reduction upon review after a year of post-shutdown operations.

The 3°F delta T limitation for service water is as, if not more, unsupported. As a matter of physics, the temperature rise or delta T for a fluid heating system is, in large part, a function of volumetric flow. More specifically, delta T (or $\Delta T$) is a function of both the volumetric flow rate ($Q$) and the heat flow or heat rejection rate ($H$), as represented by the following equation:

$$\Delta T = \frac{H}{Q C_p \rho}$$

where $C_p$ and $\rho$ represent the specific heat capacity and density of the fluid (*i.e.*, water), values that are essentially constant. As can be seen from the equation above, delta T and volumetric flow have an inverse relationship such that, all else equal, the delta T will always be greater if the flow rate is less. Yet the Draft Permit proposes to impose the same delta T limitation on service water discharges as it does on circulating water discharges, even though the allowed volumetric flow of circulating water discharges post-shutdown is more than 15 times greater (244 million gallons per day versus only 15.6 million gallons per day).[276]

The only basis cited in the Fact Sheet for imposing the same thermal limitations on two discharges that are so dissimilar is a single e-mail message from PNPS personnel stating that PNPS expects the delta T of an effluent that EPA "assumed" to be service water discharge likely "will be up to 3°F above the intake temperature, presumably due to [the] fact that even after the shutdown there will be some ongoing equipment cooling discharges associated with the [service water] system."[277] The Fact Sheet admits, however, that service water, as opposed to circulating water, is "not specified" in the e-mail being relied upon.[278] Even assuming that the 3°F applies to service water, the Fact Sheet omits the fact that PNPS has also stated in conversations with EPA that (1) 3°F represents the low end of an expected range of 3°F to 5°F for delta T post-shutdown, and (2) the range is necessarily uncertain given the paucity of historic temperature monitoring data reflecting only service water discharges, as discussed above.

The Fact Sheet makes no attempt to show that the 3°F delta T for post-shutdown service water discharges is technically grounded or otherwise rational. This is particularly true given the Fact Sheet's acknowledgement that "EPA concludes … that a continued § 316(a) variance for temperature allowing a delta T of 32°F during normal (pre-shutdown) operations will assure the protection and propagation of a balanced, indigenous population (BIP) of shellfish, fish and

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[275] *See* FSEIS at 2-13, 2-100.

[276] *Compare id.* at 11 *with id.*, Part. I.B.3, at 14.

[277] *See* Fact Sheet at 23-24 (citing e-mail from Joe Egan of PNPS dated Oct. 28, 2015).

[278] *Id.* at 24.

wildlife in and on the body of water into which the discharge is made."[279] The Fact Sheet points to no basis for concluding that the much more stringent 3°F limit for service water is necessary post-shutdown, given that the health of the biota already is "assured" by a 32°F limit.[280] Accordingly, the 3°F delta T limit for post-shutdown service water discharges must be revised; given the paucity of useful historic temperature monitoring data for service water alone that can serve as a baseline, Entergy suggests a limit of 10°F, subject to reduction upon review after a year of post-shutdown operations.

Finally, the Draft Permit should be modified in one final respect: for the remainder of PNPS's electricity-generating operations, *i.e.*, pre-shutdown, Part I.C.11 carries forward conditions limiting the rate of change in delta T for circulating water discharges (Outfall 001), which also are found in the 1994 Amended NPDES Permit, but which never have had any application to PNPS's generating activities and still do not. Specifically, Part I.C.11.a provides that the rate of change in delta T shall not exceed "[a] 3°F rise or fall in temperature for any sixty (60) minute period during normal steady state operation," while Part I.C.11.b limits the rate of change in delta T to 10°F over the same period "during normal load cycling."[281]

Under "normal steady state operations," however, there are no circumstances in which the delta T for the circulating water discharge would rise or fall by more than 3°F in an hour. Such changes in delta T can be reasonably expected only under special circumstances, such as a scheduled refueling outage, *i.e.*, *not* during "normal steady state operations." "[N]ormal load cycling" is even more confusing. As a nuclear power plant, PNPS is a "baseload" facility, meaning that it normally generates and supplies electricity to the grid on a constant basis, with the only exceptions being scheduled refueling outages.[282] It therefore does not "cycle" its load – *i.e.*, increase or decrease the amount of electricity supplied in response to changes in demand – as, say, a peaking unit does. While the conditions carried forward in Part I.C.11 of the Draft Permit have no possible application to PNPS's operations, they have recently served to breed confusion concerning the scope of PNPS's obligations under its current 1994 Amended NPDES Permit.[283] In the interest of avoiding such confusion and promoting clarity, therefore, Entergy recommends the deletion of Part I.C.11 of the Draft Permit.

## IV. The Draft Permit's Proposed Changes To PNPS's Effluent Discharge Concentration Limits For Chlorine And Boron Lack Technical Support, Interfere With NRC Mandates, And Must Be Revised

With respect to PNPS's pre- and post-shutdown operations, the Draft Permit proposes limits on the allowable concentrations of certain contaminants – in particular chlorine and boron – in effluent discharged via Outfalls 001 (circulating water), 010 (service water), 011 (internal outfall

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[279] Fact Sheet at 24; *see also generally* Fact Sheet, Attach. C (presenting DEP's species-by-species analysis of effects of pre-shutdown thermal discharge on marine organisms, and ultimately concluding that effects are either *de minimis* or otherwise do not warrant alteration of the discharge).

[280] *See* 33 U.S.C. § 1326(a).

[281] Draft Permit, Part I.C.11, at 31; *see also* 1994 Amended NPDES Permit, Part I, at 3.

[282] *See, e.g.*, FSEIS at 8-7 n.(d), 8-44.

[283] *See* Letter from Elise N. Zoli, on behalf of PNPS, to Margaret Sheehan, Ecolaw (Dec. 7, 2012), at 13.

for demineralizer reject water, station heating and service water systems), and 014 (various process and wastewaters from the waste neutralization sump). As detailed below, the pre- and post-shutdown limits imposed with respect to the use of chlorine in circulating water and/or service water are technically unsupported, have the potential to create inconsistency with NRC nuclear-safety mandates, and therefore must be revised. With respect to boron, the limits imposed by the Draft Permit appear to be manageable, but the Draft Permit's characterization of the relevant discharges for Outfalls 011 and 014 must be clarified to be consistent with the Water Flow Diagram provided in the Fact Sheet, and the monitoring requirements specified in the Draft Permit for boron must be revised to make them internally consistent with the sampling requirements specified in footnote 6 to Parts I.C.4 and I.C.5 of the Draft Permit.

### A. Legal Framework

In general, NPDES permit limits are based on applicable technology- and/or water-quality based requirements.[284] More specifically, with respect to technology-based effluent limitations, EPA has promulgated national effluent guideline limitations ("ELGs") applicable to various industrial categories, which establish such limits for various pollutant discharges from individual facilities within the relevant industrial category.[285] In the absence of an applicable ELG, technology-based limits are established case-by-case on the basis of EPA's best professional judgment, considering the factors identified in EPA's regulations as being relevant.[286] In addition to technology-based limits, more stringent water-quality-based limits also may be imposed to the extent necessary to ensure that the receiving waterbody will meet applicable water quality standards, including the MWQS, which are allowed to be more stringent than the national water quality standards that EPA has set under the CWA.[287] Finally, the "antibacksliding" provisions of the CWA provide that a NPDES permit generally may not be renewed, reissued or modified with limitations or conditions less stringent than those contained in the previous permit unless certain conditions are met.[288]

### B. Chlorine

The Draft Permit's limitations with respect to chlorine in PNPS's pre-shutdown circulating water discharge and post-shutdown service water discharge require revision, as explained below. These limitations are particularly inappropriate considering the role that chlorination plays in nuclear operations, particularly with respect to the service water system. As explained above, the service water system at PNPS, as at all nuclear power plants, is a vital system necessary to ensure nuclear and radiological safety, and remains so even after the facility shuts down and begins the decommissioning process.[289] Because of its nuclear-safety function, ensuring that the service water system and all of its components are kept properly maintained and functioning is

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[284] *See* 33 U.S.C. § 1311(b); 40 C.F.R. § 125.3.

[285] *See* 40 C.F.R. §§ 122.43(a) & (b), 122.44(a)(1).

[286] *See* 40 C.F.R. § 125.3(c)(3), (d).

[287] *See* 33 U.S.C. § 1311(b)(1)(C).

[288] *See* 33 U.S.C. §§ 1313(d)(4), 1342(o); 40 C.F.R. § 122.44(*l*).

[289] *See supra* Section II.B.

likewise of critical importance. To that end, "[t]he service water system is continuously chlorinated in order to control nuisance biological organisms, such as mollusks, barnacles, algae and other organisms, in the service water system,"[290] and continuous chlorination to prevent such biofouling is necessary as long as the service water system continues to withdraw seawater on a regular basis.[291] Historically, such chlorination has been allowed, including under PNPS's current 1994 Amended NPDES Permit, provided that the concentration of chlorine in the service water discharge (represented in the permit as "Total Residual Oxidants" or "TRO") does not exceed an average monthly limit of 0.5 mg/L or a daily maximum of 1.0 mg/L, which then would be diluted by the larger circulating water discharge to a concentration no higher than 0.1 mg/L prior to being discharged to Cape Cod Bay.[292] The service water system also is equipped with diffusers designed to ensure that these limits are not exceeded.[293]

### 1. Pre-Shutdown Limits

#### a. Circulating Water

With respect to pre-shutdown chlorine limits for circulating water, the Draft Permit proposes reducing the TRO limits[294] for PNPS's pre-shutdown circulating water usage to a daily maximum of 13 µg/L and an average monthly limit of 7.5 µg/L, on the basis that, "[t]o EPA's knowledge, there has not been any prior hydrodynamic modeling conducted that would provide an estimate of dilution for the discharge from the discharge canal" sufficient to assure that the current TRO limit of 0.1 mg/L is supported.[295]

Entergy respectfully requests that its current permit limit – *i.e.*, a daily and average monthly maximum of 0.1 mg/L – be retained for at least the next two years, *i.e.*, through 2018, as this level of chlorination has been demonstrated to be adequate, in PNPS's operational experience, to control biofouling. The following information supports the continued retention of these TRO limits.

Under the Steam Electric Power Generating ELGs that are applicable to PNPS's pre-shutdown operations, the technology-based TRO limit for an electric-generating facility such as PNPS is 0.2 mg/L.[296] PNPS's current TRO limits for pre-shutdown circulating water usage are half of that, and therefore already more stringent than the applicable technology-based limit.[297] With

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[290] *See* FSEIS at 2-9.

[291] *See* NRC Generic Letter No. 89-13 (July 18, 1989), Enclosure 1, at 1 ("The service water system should be continuously … chlorinated … whenever the potential for a macroscopic biological fouling species exists….").

[292] 1994 Amended NPDES Permit, Part I, at 2, 10.

[293] *See* FSEIS at 2-9.

[294] TRO is used as the sampling parameter for PNPS's effluent limitations on chlorine, rather than total residual chlorine ("TRC"), because PNPS withdraws and discharges seawater, which naturally contains bromide compounds. *See* 40 C.F.R. § 423.11(a).

[295] *See* Draft Permit, Part I.A.1, at 3; Fact Sheet at 22-23.

[296] *See* 40 C.F.R. § 423.13(b)(1).

[297] *See* 1994 Amended NPDES Permit, Part I, at 2.

respect to water-quality based limits, the narrative criteria and designated uses of Cape Cod Bay provide, respectively, that in Cape Cod Bay the concentration of chlorine must not "interfere with the propagation of fish or shellfish, or adversely affect populations of non-mobile or sessile benthic organisms,"[298] must not be "toxic to humans, aquatic life or wildlife,"[299] and must not otherwise compromise the designated use of Cape Cod Bay as "excellent habitat for fish, other aquatic life and wildlife, including their reproduction, migration, growth and other critical functions, and for primary and secondary contact recreation."[300] For the reasons detailed above in the "Environmental Context" Section, there is no basis to believe that PNPS's current TRO limits do not already assure compliance with these standards, as continuous investigation and monitoring of the aquatic community of Cape Cod Bay have detected no demonstrable impact on RIS from PNPS's more than four decades of operation, during which time the current TRO limits have continued in place.[301] Further, EPA's and DEP's prior approval of PNPS's current TRO limits necessarily reflects a determination that compliance with those limits are sufficient to comply with MWQS, including narrative criteria and designated uses. Any change of position by the agencies with respect to that determination must therefore be explained, otherwise it constitutes arbitrary and capricious agency action.[302]

The current TRO limits also satisfy the MWQS's numeric water quality criteria for chlorine. As noted above, the MWQS adopt EPA's National Recommended Water Quality Criteria for Aquatic Life,[303] which provide for an acute limit in marine waters of no more than 0.013 mg/L and a chronic limit in marine waters of no more than 0.0075 mg/L.[304] Using the same methodology as EPA and DEP recently used in the renewal of Canal Generating Station's NPDES/MCWA permit, PNPS's existing TRO limit of 0.1 mg/L is "more stringent than any limit that would be derived based on the State of Massachusetts' acute water-quality standard for chlorine in marine water and the dilution provided by the receiving water."[305] As explained in the Canal permit's fact sheet, the necessary stringency of a TRO limit of 0.1 mg/L is supported if the receiving waterbody (here, Cape Cod Bay) can be assured to provide a minimum dilution factor of at least 7.7 (0.1 mg/L divided by 0.013 mg/L).[306] In order for the circulating water effluent of PNPS to be diluted by a factor of 7.7, approximately 5,336 cubic feet per second

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[298] 314 Code Mass. Regs. § 4.05(5)(b).

[299] *Id.* § 4.05(5)(e).

[300] *Id.* § 4.05(4)(a).

[301] *See supra*, "Environmental Context."

[302] *See Fox Television Stations, Inc.*, 556 U.S. at 515; *Alliance to Protect Nantucket Sound, Inc. v. Energy Facilities Siting Bd.*, 448 Mass. 45, 56 (2006) (recognizing that "[a] party to a proceeding before a regulatory agency … has a right to expect and obtain reasoned consistency in the agency's decisions" (citation omitted)).

[303] *See* 314 Code Mass. Regs. § 4.05(5)(e).

[304] *See* EPA, *National Recommended Water Quality Criteria – Aquatic Life Criteria Table*, https://www.epa.gov/wqc/national-recommended-water-quality-criteria-aquatic-life-criteria-table (last visited July 23, 2016).

[305] *See* EPA, Fact Sheet, Draft National Pollutant Discharge Elimination System (NPDES) Permit to Discharge to Waters of the United States, NPDES Permit No. MA0004928 ("Canal Fact Sheet"), at 15.

[306] *Id.* at 16.

(“cfs”) of dilution flow is needed in Cape Cod Bay near the discharge point, given the circulating water discharge volume of 447 MGD, or 693 cfs (693 cfs * 7.7 = 5,336 cfs).[307]

Volumetric flows in Cape Cod Bay near the discharge point were studied in connection with winter flounder larval transport studies that are relied on by the AEI Report, discussed above in the “Environmental Context” section.[308] In those studies, the volumetric flow across a transect of Cape Cod Bay along the coast near PNPS was estimated, over periods of approximately one month, for the purpose of estimating the transport rate of larvae potentially susceptible to entrainment by the Station.[309] These studies estimated volumetric flows in Cape Cod Bay across the transect defined by the study area that range from 1,141 $m^3$/s (approximately 40,294 cfs), which appears to be an outlier, to 86,141 $m^3$/s (over 3 million cfs); the average of all the estimates is 50,636.8 $m^3$/s (approximately 1.8 million cfs).[310] Even if the dilution flow available to PNPS’s circulating water discharge in Cape Cod Bay were only 0.3 percent of the average flows as estimated by these studies, it would still be more than enough to assure achievement of the requisite level of dilution necessary for compliance with the acute marine chlorine standard.[311] Moreover, as was the case for Canal Generating Station, retention of the 2-hour per day limit on chlorination of PNPS’s circulating water system during the pre-shutdown period, consistent with the applicable Steam Electric ELGs, is sufficient to ensure that there will be no chronic chlorine exposure to aquatic life, rendering the chronic marine chlorine standard also satisfied.[312]

#### b. Service Water

The current permit allows the service water system to be chlorinated continuously, provided that TRO concentration does not exceed a daily maximum of 1.00 mg/L or a monthly average of 0.5 mg/L prior to mixing with any other streams.[313] The propriety of these limits, which the Draft Permit has retained, is fully supported.[314]

With respect to technology-based limitations, the current daily TRO limit for service water of 1.0 mg/L is nominally higher than the 0.2 mg/L daily maximum limit provided for under the ELGs, and the duration of chlorination exceeds the ELG limit of up to 2 hours per day.[315] As the current permit recognizes however, the TRO concentration of PNPS’s service water discharge

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[307] *See id.*

[308] *See* AEI Report at 11; Entergy Nuclear Generation Company (“ENGC”), *Study of Winter Flounder Larval Transport in Coastal Cape Cod Bay and Entrainment at Pilgrim Nuclear Power Station* (Spring 2004) (“ENGC (2004)”); ENGC, *Study of Winter Flounder Larval Transport in Coastal Cape Cod Bay and Entrainment at Pilgrim Nuclear Power Station* (Dec. 2002) (“ENGC (2002)”).

[309] *See* ENGC (2004), at 2-3 to -5, 4-1 to -3; ENGC (2002), at 2-1 to -6, 4-1 to -9.

[310] ENGC (2004), at 4-3 (Table 4-1); ENGC (2002), at 4-6 (Table 4-1).

[311] *See* Canal Fact Sheet at 16 (supporting acute marine chlorine limit using similar analysis).

[312] *Id.* at 16-17.

[313] *See* 1994 Amended NPDES Permit, Part I, at 2.

[314] *See* Fact Sheet at 35.

[315] 40 C.F.R. § 423.13(b).

typically meets or is more stringent than the ELG daily maximum limit due to dilution flow provided by the much larger circulating water discharge during PNPS's normal electricity-generating operations: in order to ensure dilution of TRO from 1.0 mg/L to 0.1 mg/L, a minimum dilution factor of 10 is needed, and given that circulating water discharge flow volume of 447 MGD is more than 23 times that of the maximum service water discharge volume of 19.4 MGD (assuming all five pumps operating), that level of dilution is assured provided that circulating water is flowing. The only circumstances in which the necessary level of dilution may not be assured is during reactor shutdowns, when circulating water flow is absent. As the NRC has provided, however, chlorination of the service water system remains necessary during those times for nuclear-safety reasons, which EPA and DEP lack authority to countermand.[316]

With respect to water-quality based limits, the same reasons detailed above support the retention of PNPS's current TRO limits for service water as they do for circulating water. EPA and DEP's prior determination that achievement of these limits (including the maximum limit prior to release into Cape Cod Bay of 0.1 mg/L for all discharges) suffices to ensure compliance with the MWQS, combined with the demonstrated absence of environmental harm, establishes that narrative water quality criteria and designated uses of Cape Cod Bay are protected. Further, with respect to numeric criteria, the minimum amount of dilution flow needed to assure a dilution factor of at least 7.7 for the combined maximum circulating and service water discharge volumes of 466.4 MGD is 866.6 cfs, still less than 2 percent of average Cape Cod Bay flows past the station as estimated by prior studies.[317] Thus, the existence of the requisite amount of dilution flow in Cape Cod Bay for the combined discharge is reasonably assured and retention of the current permit's TRO limits for service water prior to shutdown is supported.

### 2. Post-Shutdown Limits

#### a. Circulating Water

The Draft Permit proposes prohibiting chlorination of the circulating water system after PNPS shuts down.[318] Entergy does not object to this change, as it expects continued chlorination of this system will not be necessary during the post-shutdown period, when one pump will be used only on an intermittent basis for providing radiological waste dilution water.[319] Thus, there will be no chlorine discharge associated with Outfall 001 post-shutdown.

#### b. Service Water

With respect to the post-shutdown period, the Draft Permit proposes a significant reduction in the allowable concentration of chlorine in PNPS's service water discharge, limiting TRO to an average monthly concentration limit of only 7.5 μg/L and a daily maximum concentration of only 13 μg/L.[320] Under PNPS's current permit, the service water system may be continuously

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[316] *See* NRC Generic Letter No. 89-13 (July 18, 1989), Enclosure 1, at 1; *English*, 496 U.S. at 84-85.

[317] *See supra*, Section IV.B.1.a.

[318] *See* Draft Permit, Part I.B.1.a, at 11.

[319] *See supra*, Section II.A.

[320] *See* Draft Permit, Part I.B.3, at 14.

chlorinated such that TRO does not exceed a daily maximum limit of 1.0 mg/L and an average monthly limit of 0.5 mg/L prior to mixing with any other streams.[321] During PNPS's electricity-generating operations, these streams would include the dominant circulating water discharge, which would be sufficient to dilute the concentration of all TRO being discharged to Cape Cod Bay to a concentration at or below 0.1 mg/L, as detailed above.[322] The Fact Sheet's explanation for the Draft Permit's proposed reduction is that the termination of most circulating water discharge via Outfall 001 may mean that compliance with the current permit limits is no longer assured, and so the Fact Sheet welcomes the submission of additional information that would support a different effluent limit.[323]

Entergy respectfully requests that EPA revise the final Permit's TRO limitations for PNPS's post-shutdown service water discharges to reflect a monthly average of 0.25 mg/L and a daily maximum of 0.5 mg/L, prior to discharge to Cape Cod Bay. PNPS can comply with these limits, even in the absence of circulating water, for example, by alternating the chlorination of service water pumps while using other pumps to provide dilution flow: *e.g.*, two pumps may be chlorinated to a maximum of 1.0 mg/L, the current TRO limit, while two other pumps provide a dilution factor of 2, diluting the total discharge from all four pumps to 0.5 mg/L. The propriety of the 0.5 mg/L daily maximum and 0.25 mg/L average monthly TRO limitations is supported by the following information.

First, with respect to applicable technology-based limits, and contrary to EPA's analysis in the Fact Sheet, the Steam Electric ELGs no longer apply during the post-shutdown period of PNPS.[324] During that period, PNPS will no longer be "a generating unit … whose generation of electricity results primarily from a process utilizing … nuclear fuel in conjunction with a thermal cycle employing the steam water system as the thermodynamic medium," as PNPS will no longer generate electricity by any process or using any fuel, so the Steam Electric ELGs will be facially inapplicable.[325] Indeed, EPA's promulgation of the Steam Electric ELGs implicitly recognizes that units that have shut down are not properly made subject to them, as EPA specifically excluded data pertaining to such units from its consideration in formulating the ELGs, on the ground that such data was not representative of the relevant types of facilities.[326] Because the Steam Electric ELGs do not properly apply to PNPS after it has shut down, and in the absence of any other category of ELGs that are applicable, EPA must set technology-based effluent limitations for PNPS's post-shutdown period using its best professional judgment.[327] Given the nuclear-safety-related function of service water cooling and EPA and DEP's lack of

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[321] *See* 1994 Amended NPDES Permit, Part I, at 2.

[322] *See id.*

[323] Fact Sheet at 23.

[324] *See* Fact Sheet at 14-15; 40 C.F.R. Part 423.

[325] 40 C.F.R. § 423.10.

[326] *See* 80 Fed. Reg. 67,838, 67, 870 (Nov. 3, 2015).

[327] *See* 40 C.F.R. § 125.3(c)(3).

authority to limit that function, discussed above, continuous chlorination will continue to be required.[328]

With respect to water-quality based limits, the TRO limits that Entergy requests represent a substantial reduction in total chlorine loading from the level that, as discussed above, EPA and DEP already have approved as being sufficient to assure compliance with applicable narrative and numeric criteria and designated uses of Cape Cod Bay, and that has been shown to have had no negative impact on Cape Cod Bay's aquatic community over the past 40+ years of PNPS's operations.[329]

More specifically, EPA and DEP previously have determined that, even accounting for the volume and timing of PNPS's chlorination of its circulating and service water discharge, the TRO limit reflected in the current permit – *i.e.*, a daily maximum and average monthly concentration, prior to discharge to Cape Cod Bay, of no more than 0.1 mg/L – satisfies the MWQS. Under that limit, and given the volume and chlorination treatment of PNPS's circulating and service water discharges, the total amount of chlorine that is released to Cape Cod Bay is approximately 21,500 g per day, calculated as follows, assuming daily maximum flows:

**<u>Circulating Water (chlorinated for 2 hours per day)</u>**

(311,000 gpm / 0.264 L/min) * 120 min/day = 141,363,636.4 L of flow per day

141,363,636.4 L * (0.1 mg/L / 1,000 mg/g) = <u>14,136.4 g Cl released per day</u>

**<u>Service Water (continuously chlorinated)</u>**

(13,500 gpm / 0.264 L/min) * 60 min/hr * 24 hr/day = 73,636,363.6 L of flow per day

73,636,363.6 L * (0.1 mg/L / 1,000 mg/g) = <u>7,363.6 g Cl released per day</u>

**<u>Total Current Daily Release of Cl</u>: 21,500 g**

Accounting for the reduction in chlorination post-shutdown due to discontinued chlorination of circulating water, the total amount of chlorine released to Cape Cod Bay under the TRO limits that Entergy proposes for its service water discharge will be substantially reduced – *i.e.*, reduced to a level *below* that which EPA and DEP have previously blessed as compliant with water quality standards. For example, assuming those limits are achieved using the four-pump alternating dilution plan suggested above, the amount of chlorine discharged to Cape Cod Bay from the post-shutdown use of service water would be less than 5,900 g on a daily basis, as follows:

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328 *See supra*, Sections II.B and IV.A.1.b.

329 *See supra*, Sections IV.A.1.a. and IV.A.1.b.

(10,800 gpm / 0.264 L/min) * 60 min/hr * 24 hr/day = 58,909,090.9 L of flow per day

58,909,090.9 L * (0.5 mg/L / 1,000 mg/g) = 5,890.9 g Cl released per day

Thus, under the TRO limits that Entergy has suggested for post-shutdown service water, total pollutant loading for chlorine would be less than 30 percent of the amount of pollutant loading for chlorine that exists under PNPS's current operations, which, again, EPA and DEP have already determined are in compliance with water quality standards.

Setting these limitations in the final Permit would not violate statutory or regulatory prohibitions against backsliding. Under Section 303(d)(4)(B) of the CWA, an effluent limitation may be revised to be less stringent than that reflected in a prior permit if the quality of the receiving waters is in attainment with water quality standards – as Cape Cod Bay is with respect to chlorine[330] – and the proposed limitation is both consistent with the state's antidegradation policy and continues to assure compliance with applicable water quality standards.[331] Independently, Section 402(o) of the CWA prohibits backsliding only in cases where the new effluent limitation is "less stringent than the comparable effluent limitations established" in the previous permit, and even in such cases allows backsliding where, *inter alia*, "material and substantial alterations or additions to the permitted facility … justify the application of a less stringent effluent limitation."[332]

Viewed under any of these frameworks, the TRO limitations for post-shutdown service water discharges that Entergy requests here meet these standards. The revised TRO limits that Entergy proposes are not "less stringent" than the current permit limits, because the current permit limits are not in fact "comparable" within the meaning of Section 402(o) due to the substantial differences in the volumes of the effluents being discharged under each, which more than makes up for the difference in the allowable concentration of TRO.[333] Further, because the TRO limits that Entergy proposes result in a net reduction of chlorine being discharged to Cape Cod Bay, it necessarily assures continued attainment of federal and Massachusetts water quality standards, and results in no "increased" discharge that might trigger Massachusetts's antidegradation regulations,[334] with the result that Section 303(d)(4)(B) of the CWA also is satisfied.[335]

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[330] *See* DEP, *Massachusetts Year 2014 Integrated List of Waters: Final Listing of the Condition of Massachusetts' Waters Pursuant to Sections 305(b), 314 and 303(d) of the Clean Water Act* (December 2015) (listing no impairment of any waterbody with respect to chlorine); Letter from Kenneth Moraff, EPA, to Martin Suuberg, DEP (Feb. 23, 2016), at 1 ("[B]y this letter, EPA hereby approves Massachusetts' 2014 Section 303(d) list.").

[331] 33 U.S.C. § 1313(d)(4)(B).

[332] *Id.* § 1342(o)(1), (2)(A); *see also* 40 C.F.R. § 122.44(*l*)(2), (2)(i)(A) (providing for anti-backsliding prohibitions comparable to Section 402(o)'s).

[333] *See, e.g.*, *Cmtys. for a Better Envt. v. State Water Res. Control Bd.*, 132 Cal. App. 4th 1313, 1331 (Cal. App. 1st Dist. 2005) (holding, consistent with determination by EPA, that new limit which provides for "no net loading" of dioxin did not violate anti-backsliding prohibitions).

[334] *See* 314 Code Mass. Regs. § 4.04.

[335] *See* 33 U.S.C. § 1313(d)(4)(B).

In short, there is an adequate factual and legal basis for EPA and DEP to set the post-shutdown TRO limits for service water usage at a daily maximum of 0.5 mg/L and an average monthly maximum of 0.25 mg/L. Entergy respectfully requests that these limits be incorporated into Part I.B.3 of the final Permit. In all events, we stress again that chlorination of the nuclear-safety-related service water system must, and therefore will, be ultimately governed by nuclear-safety needs, irrespective of NPDES/MCWA permit limits.

### C. Boron

With respect to boron, its importance to nuclear safety cannot be overstated – boron is employed as an emergency shutdown control on reactivity, in the event the control rod and related reactivity control systems are rendered inoperable or are otherwise dysfunctional. The system for which sodium pentaborate is employed must therefore be tested monthly, and that is where the sodium pentaborate solution is generated. As the Fact Sheet itself recognizes, boron in the form of sodium pentaborate is used at PNPS (and indeed most nuclear power plants) as a neutron poison to control (*i.e.*, reduce) the level of activity of the nuclear fuel.[336] Thus, the use of boration in PNPS's operations, and therefore the need to discharge borated effluent, is a vital component of ensuring nuclear and radiological safety at PNPS, and the conditions ultimately imposed by the NPDES renewal permit must not be allowed to compromise those functions. For this reason, and to be clear, limits on boron at any given time in emergency circumstances will be determined by the nuclear safety needs and must be accounted for in the Draft Permit.

With respect to the concentration limits applicable to boron, no technology-based limits are established by the Steam Electric ELGs,[337] and there are no numeric water-quality criteria at the federal or Massachusetts state levels for marine waters, although it has been noted that that the naturally occurring concentration of boron in seawater is 4.5 mg/L, which is presumed to have no effect on aquatic life.[338] The Draft Permit imposes an effluent concentration limit of no more than 5.6 mg/L, which the Fact Sheet describes as consistent with the limitation on boron discharges via the circulating water system (Outfall 001) that historically limited PNPS to an increment of 1.0 mg/L above the background ambient concentration of boron in seawater (typically 4.6 mg/L).[339] This incremental limitation is derived from Water Quality Guidelines issued for boron by the Canadian provincial government of British Columbia in 1992.[340] The Draft Permit also requires monthly reporting of background ambient concentrations of boron to ensure that the 1.0 mg/L incremental limit is maintained.[341]

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[336] *See* Fact Sheet at 41.

[337] *See* 40 C.F.R. Part 423.

[338] *See* EPA, *National Recommended Water Quality Criteria – Aquatic Life Criteria Table*, https://www.epa.gov/wqc/national-recommended-water-quality-criteria-aquatic-life-criteria-table (last visited July 23, 2016); EPA, *Quality Criteria for Water* (1986); 314 Code Mass. Regs. § 4.05(5)(e).

[339] *See* Draft Permit at 24, 28; Fact Sheet at 42; 1994 Amended NPDES Permit at 5.

[340] *See* Fact Sheet at 42.

[341] *See* Draft Permit at 26 n.6.

Insofar as these boron limitations remain consistent with the historic, incremental limitation that PNPS not discharge boron at a concentration greater than 1.0 mg/L above the ambient level naturally found in Cape Cod Bay, Entergy expects that these limitations should be manageable, with the caveat that, again, the ultimate decision as to the level of boration at PNPS must, and therefore will, ultimately be dictated by nuclear-safety considerations.

The Draft Permit's descriptions in Part I.C.4 and Part I.C.5, however, of Outfalls 011 and 014, as they relate to PNPS's other discharges, are inaccurate and must be revised. Specifically, Part I.C.4 of the Draft Permit authorizes PNPS to "discharge station heating system water, closed-cycle cooling water from heat exchangers of the Turbine Building Closed Cooling Water (TBCCW) system and Reactor Building Closed Cooling Water (RBCCW) system, drainage from the floor drains in the boiler room (station heating water), SSW system chlorinated salt water from various sumps in the Turbine and Reactor buildings, and reject water from the demineralizer system [] through **Internal Outfall Serial Number 011** which is directed through the drain line associated with Outfall 005 and discharged to the discharge canal and ultimately to Cape Cod Bay."[342] Part I.C.5 of the Draft Permit states that PNPS is authorized to discharge water from the same sources "through **Outfall Serial Number 014** to the discharge canal and ultimately to Cape Cod Bay."[343]

Read together, these descriptions are inaccurate, potentially confusing, and inconsistent with the Water Flow Diagram included in the Fact Sheet, which was supplied by Entergy. To begin, the inclusion of "closed-cycle cooling water" as a source in both Part I.C.4 and I.C.5 is erroneous and thus should be deleted, as PNPS has no closed-cycle cooling system to generate such water.

Further, and as reflected in the Water Flow Diagram, not all waters discharged via Outfall 011 are directed to storm drain Outfall 005 prior to being discharged into the Bay. Instead water from the standby liquid control, TBCCW, RBCCW, and other systems are gathered in a "waste neutralizing sump" before being directed to Outfall 011, and from there these radiologically contaminated waters are then directed to Outfall 014 prior to being discharged into Cape Cod Bay.[344] All other source waters discharged via Outfall 011, which are free of potential radiological contamination, are directed to storm drain Outfall 005 before being discharged to Cape Cod Bay.[345]

Accordingly, Entergy suggests the following revisions to the relevant language of Part I.C.4 and I.C.5 of the Draft Permit:

> **Part I.C.4**
>
> During the period beginning on the effective date and lasting through the expiration date, the permittee is authorized to discharge station heating system water, ~~closed-cycle cooling~~ water

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[342] *Id.*, Part I.C.4, at 24.

[343] *Id.*, Part I.C.5, at 28.

[344] *See* Fact Sheet, Fig. 4.

[345] *Id.*

> from heat exchangers of the Turbine Building Closed Cooling Water (TBCCW) system and Reactor Building Closed Cooling Water (RBCCW) system, **reject water from the emergency standby liquid control (SLC) system,** drainage from the floor drains in the boiler room (station heating water), SSW system chlorinated salt water from various sumps in the Turbine and Reactor buildings, and reject water from the demineralizer system * through **Internal Outfall Serial Number 011,** which **(with the exception of TBCCW, RBCCW, and SLC water from the waste neutralizing sump)** is directed through the drain line associated with Outfall 005 and discharged to the discharge canal and ultimately to Cape Cod Bay. Such discharges shall be limited and monitored by the permittee as specified below[.][346]
>
> **Part I.C.5**
>
> During the period beginning on the effective date and lasting through the expiration date, the permittee is authorized to discharge ~~station heating system water, closed-cycle cooling~~ water from heat exchangers of the Turbine Building Closed Cooling Water (TBCCW) system and Reactor Building Closed Cooling Water (RBCCW) system, ~~drainage from the floor drains in the boiler room (station heating water),~~ SSW system chlorinated salt water from various sumps in the Turbine and Reactor buildings, and reject water from the emergency standby liquid control system* **from the waste neutralizing sump and Outfall 011** through **Outfall Serial Number 014** to the discharge canal and ultimately to Cape Cod Bay. Such discharges shall be limited and monitored by the permittee as specified below[.][347]

Finally, the monitoring requirements for boron specified in Part I.C.4 and I.C.5 of the Draft Permit are internally inconsistent and should be revised for clarification. Specifically, in both places, the Draft Permit specifies that monitoring for boron should be conducted via "grab" sampling once per month, but goes on in footnote 6 to provide that "the permittee shall provide the concentration of boron in the tank before release, and the *calculated* boron concentration in the discharge canal before mixing with Cape Cod Bay water," and that "boron concentration shall not exceed 1.0 mg/l above background, *by calculation*, in the discharge from the discharge canal."[348] Footnote 6 goes on to provide the method by which the permittee is "[t]o *calculate* the estimated concentration of boron in the discharge canal."[349]

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346 *Compare id. with* Draft Permit, Part I.C.4, at 24.

347 *Compare* Fact Sheet, Fig. 4, *with* Draft Permit, Part I.C.5, at 28.

348 Draft Permit, Part I.C.4, at 26 n.6 (emphases added). The Draft Footnote incorporates this footnote by reference in Part I.C.5 as well. *See id.*, Part I.C.5, at 28 ("See pages 25 to 27 for explanation of footnotes.").

349 Draft Permit, Part I.C.4, at 26 n.6 (emphasis added).

According to footnote 6 to Part I.C.4 and I.C.5, therefore, the concentration of boron in the discharge canal that PNPS is required to report for purpose of its monitoring obligation is plainly intended to be derived by calculation, not measured via “grab” sampling, although sampling still will be required in order to demonstrate the ambient concentration of boron in seawater, as footnote 6 reflects.[350] To avoid confusion, and to align the reporting obligation as reflected in Part I.C.4 and I.C.5 of the Draft Permit with the obligations as described in more detail in footnote 6 thereto, Entergy recommends that the description of the “Sample Type” in each place be changed from “Grab” to “Grab/Caluclated.”

## V. The Definition Of “Toxic Pollutants” Should Be Clarified To Ensure That It Excludes Radioisotopes

The Draft Permit, in Part I.C.8, imposes various conditions with respect to discharges of “any toxic pollutant.”[351] That term is defined in Part II of the Draft Permit to mean “any pollutant listed as toxic under Section 307(a)(1) or, in the case of ‘sludge use or disposal practices’ any pollutant identified in regulations implementing Section 405(d) of the CWA.”[352] On its face, this definition does not exclude radioisotopes, and some of the elements listed as “toxic pollutants” pursuant to Section 307(a)(1) of the Clean Water Act potentially may exist as radioisotopes, *e.g.*, antimony.[353]

The Fact Sheet acknowledges, however, that consistent with the discussion above concerning NRC’s exclusive role in regulating radiological safety matters,[354] the CWA does not authorize EPA to regulate discharges of radioisotopes to the waters of the United States from NRC-regulated facilities.[355] Indeed, the Fact Sheet disclaims any such intent to regulate radioisotope discharges, stating that “the draft permit addresses only the chemical aspects of water quality and does not regulate radioactive materials encompassed within the [AEA’s] definitions of source, byproduct, or special nuclear materials.”[356] Consistent with this recognition, the term “toxic pollutant” should therefore be defined in the Draft Permit in a manner that excludes radioisotopes.

## VI. The Final Permit’s Biological Monitoring Requirements Require Revision

### A. The Draft Permit Should Not Require Continued Biological Monitoring After PNPS Has Shut Down

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[350] *See id.* (“In order to confirm that the background concentration of boron is approximately 4.6 mg/l, the permittee shall sample the ambient water at the intake for boron once per month during the same day that the batch discharge of boron occurs.”).

[351] *See* Draft Permit, Part I.C.8, at 30.

[352] *Id.*, Part II.E.1, at 16; *see also* 40 C.F.R. § 401.15 (listing toxic pollutants).

[353] *See* 40 C.F.R. § 401.15.

[354] *See supra*, Part I.A.2.

[355] *See* Fact Sheet at 37; *see also Train*, 426 U.S. at 25.

[356] Fact Sheet at 37; *see also id.* at 44.

Attachment B to the Draft Permit, which details the biological monitoring requirements provided for in Part I.G thereof,[357] imposes a series of impingement and entrainment sampling obligations on PNPS, many of which simply carry forward already-existing obligations to the final years of PNPS's electricity-generating operations; others, however, impose new obligations that are unsupported. More specifically, Attachment B provides for continued impingement and entrainment sampling *even after* PNPS has shut down and terminated the vast majority of its historic water usage. Post-shutdown entrainment monitoring is proposed to be conducted on a twice-monthly basis, with 3 entrainment samples being collected during each sampling week, representing morning, afternoon and evening, respectively.[358] With respect to post-shutdown impingement sampling, Attachment B proposes once-weekly sampling during those weeks in which circulating (or more accurately, dilution) water is used, again with 3 samples being collected, each to represent morning, afternoon, and evening, respectively.[359]

To the extent that the Draft Permit seeks to impose biological monitoring requirements on PNPS even after it has ended the primary circulating water withdrawals that precipitated those monitoring requirements in the first place, those conditions are impermissible as a matter of law. It is well-established that NPDES permit conditions, to be valid, must be related to the "discharge of [some] pollutant" from a point source that requires NPDES authorization in the first instance.[360] Thus, courts have held that EPA "is powerless to impose permit conditions unrelated to the discharge itself."[361] With respect to Massachusetts law, DEP's authority to impose permit conditions is similarly limited: the agency is authorized to impose conditions that "provide for and assure compliance with all applicable requirements of the [G. L. c. 21, §§ 26-53] and the [Clean Water Act]," including "monitoring requirements *and other means of verifying the compliance of the discharge with a permit*."[362]

In short, once PNPS shuts down and discontinues the vast majority of its historic water usage, it no longer will be making more than negligible use of dilution water.[363] As such, there will be no environmental impact *related to its withdrawal and/or discharge* for which either EPA or DEP may require continued biological monitoring. That is especially true here given the fact that, as detailed above in the "Environmental Context" section and below in Part VII, more than 40 years of biological monitoring to date has failed to show any harm to the biota as a result of PNPS's operations in all that time. The requirements in Attachment B to the Draft Permit that PNPS undertake continued biological monitoring even after shutdown therefore must be deleted.

In addition, Entergy also proposes that, in the years prior to PNPS's anticipated shutdown date, the Draft Permit gradually reduce the frequency of monitoring year by year, as follows:

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[357] *See* Draft Permit, Part I.G, at 33-34.

[358] *See id.*, Attach. B, § 2.

[359] *See id.* § 1.

[360] *See* 33 U.S.C. §§ 1311(a), 1342(a).

[361] *Nat. Res. Def. Council v. EPA*, 859 F.2d 156, 170 (D.C. Cir. 1988).

[362] 314 Code Mass. Regs. § 3.11(2)(a), (2)(a)(5) (emphasis added).

[363] *See supra*, Part II.A.

| Year (Operating Status) | Entrainment Sampling | Impingement Sampling | Area Swept/Bay Monitoring. |
|---|---|---|---|
| 2016 | Current framework, *i.e.*, 3x/wk. | Current framework, *i.e.*, 3x/wk. | Current framework. |
| 2017, unless shutdown*. | Reduction in current framework to 1x/wk. | Reduction in current framework to 1x/wk. | Discontinued. |
| 2018, unless shutdown*. | Reduction in then-current framework to 1x/mth. | Reduction in then-current framework to 1x/mth. | Discontinued. |
| 2019. | Discontinued. | Discontinued. | Discontinued. |

*Upon shutdown, all I&E monitoring is discontinued.

EPA has authority to set (including by reducing) the appropriate level of I&E monitoring.[364] The gradual reduction in sampling during what are expected to be the last years of PNPS's predominant water withdrawals is supported by the fact that, as discussed above in the "Environmental Context" section and in Sections I.A.2.a and I.A.2.b of the "Discussion of Draft Permit Language" Section, PNPS's existing CWIS already complies with Section 316(b) standards for I&E applicable to existing facilities, and it has been demonstrated that no more than *de minimis* adverse environmental impacts attributable to I&E at PNPS have resulted to the Cape Cod Bay ecosystem. Given the demonstrated stability of the ecosystem, and the short amount of time remaining on PNPS's continuing use of circulating water, the benefits of continued I&E monitoring at the same level of intensity as it has historically been done are *de minimis*, and therefore outweighed by their likely costs.

### B. The Draft Permit Should Not Require Entrainment Sampling To Be Conducted In The Intake Bays

Attachment B provides that, irrespective of whether sampling occurs before or after PNPS shuts down, "[e]ntrainment samples shall be collected from a representative location within the intake structure if feasible."[365] Requiring sampling to be conducted from within the intake bay is unprecedented for this facility, which currently and historically has conducted such sampling "by suspending a 60-centimeter … diameter plankton net (with flowmeter) in the discharge canal approximately 30 meters … from the headwall."[366] That is for good reason, as sampling in the intake bay itself poses numerous logistical challenges. Neither the Fact Sheet nor any of its Attachments provides any reason why sampling within the intake bay should now be required. Entergy submits that the requirement that entrainment sampling be conducted in the intake bays themselves be deleted, and that such sampling be permitted to be conducted in the discharge

[364] *See* 40 C.F.R. § 125.94(c)(7), (g); § 125.96(a), (b), (f).

[365] Draft Permit, Attach. B, § 2.

[366] FSEIS at 4-14.

canal (as Attachment B itself contemplates in the event that intake-bay sampling "is not feasible," which is the case here).[367]

### C. The Draft Permit's Definition Of "Unusual Impingement Events" Is Over Inclusive

Part I.D.12 of the Draft Permit proposes changes to the condition of PNPS's current 1994 Amended NPDES Permit that requires PNPS to account for "Unusual Impingement Events" ("UIEs").[368] Specifically, Part I.D.12 of the Draft Permit proposes defining UIEs to mean "the impingement of twenty (20) or more total fish of all species impinged per hour … includ[ing] fish in the traveling screens and the intake bays."[369] Upon learning of a UIE, Part I.D.12 of the Draft Permit requires PNPS to notify DEP and EPA of the event within 12 hours, and to follow up within 5 business days by providing a written report detailing (1) the number, species and size ranges of fishes impinged, including measurement to the nearest centimeter of the total length of a "representative sample of 25% of fish specimens from each species, up to a maximum of 50 total fish specimens"; (2) the date and time of occurrence; (3) PNPS personnel's "opinion … as to the reason the incident occurred"; and (4) "remedial action that [PNPS] recommends to reduce or eliminate this type of incident in the future."[370]

These conditions are problematic in multiple respects and require revision. First, the definition of UIEs as being every impingement event where 20 or more fish are impinged within an hour is over inclusive. Such events are not at all "unusual" at PNPS, since most of the fish species that have been found impinged at the facility travel in large schools. Instead, if UIEs should be defined by a numerical threshold – they currently are not in the 1994 Amended NPDES Permit, presumably leaving it to the best professional judgment of PNPS personnel[371] – Entergy suggests that the threshold be defined as the impingement of 1,000 or more total fish over the course of the continuous impingement event. That definition is consistent with historical data, which show that such events have tended to occur only infrequently – on average less than once per year over PNPS's 40+-year operating history, and in many years, not all.[372]

Second, the condition requiring PNPS to develop a remediation plan for UIEs is inappropriate insofar as it imposes that obligation even with respect to UIEs for which PNPS's operations are not responsible. As EPA has recognized, Section 316(b) is not concerned with minimizing the "impingement" of dead or "naturally moribund" fish (*i.e.*, fish that already are close to death for reasons unrelated to the facility's operations), and such impacts are therefore excluded from the

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[367] *See* Draft Permit, Attach. B, § 2.

[368] *Compare* Draft Permit at 31 *with* 1994 Amended NPDES Permit at 13.

[369] Draft Permit, Part I.D.12, at 31.

[370] *Id.*

[371] *See* 1994 Amended NPDES Permit, Part I, at 13.

[372] *See* Fact Sheet, Attach. D, at 21-22 & Table 2; *see also* NAI, Marine Ecology Studies: Pilgrim Nuclear Power Station, January – December 2014 (2015).

Section 316(b) analysis.[373] There is every reason to believe that most if not all of the historic UIEs at PNPS are of dead or "naturally moribund" fish.

It is well documented and established in scientific literature that many large impingement events at power plants are due to natural causes and have nothing to do with the operation of the power plants' cooling systems. Specifically, multiple studies have confirmed that large impingement events, particularly those involving clupeid fish, are a common occurrence at many power plants during the colder months, and have identified "cold shock," as a function of out-of-season migration, as the culprit.[374] "Cold shock" is the "acute decrease in ambient temperature that has the potential to cause a rapid reduction in body temperature, resulting in a cascade of physiological and behavioural responses," and may be caused by, among other things, "rapid changes in seasonal temperatures."[375] The "physiological and behavioural responses" that cold shock induces in fish may include reduced swimming ability that tends to "compromise foraging and impede predator evasion,"[376] rendering fish that sustain cold shock essentially moribund, and thus far more likely to be impinged as a result, although the fish likely would have succumbed to predators or to starvation in any event.[377]

The timing and makeup of PNPS's historic large impingement events suggest that most of them likely were due to cold shock, or perhaps secondary consequences of predation. Notably, as summarized in Attachment D to the Fact Sheet, more than half of these events were dominated by the impingement of clupeids, predominantly Atlantic menhaden.[378] Clupeids, including menhaden and alewife in particular, have been shown to be particularly susceptible to natural mortality and subsequent impingement by cooling water intake systems, due not only to cold shock, but also (at least in the case of menhaden) to anoxia caused by crowding as a result of "large schools being chased into small confined embayments by predators such as bluefish and striped bass."[379] Also consistent with cold shock as the explanation is the fact that, with few exceptions, nearly all of these large impingement events occurred in the autumn months of

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[373] *See, e.g.*, 40 C.F.R. §§ 125.92(o), 125.94(a)-(c) (setting standards with which existing facilities must comply to minimize "impingement mortality," which is defined to mean "death *as a result of impingement*" (emphasis added)); EPA, Technical Development Document for the Final Section 316(b) Phase II Existing Facilities Rule (May 19, 2014), at 11-4 (excluding studies that reported only instantaneous impingement mortality, in part because they "might reflect already injured, nearly dead, or already dead fish ('naturally moribund') that were impinged by the screen").

[374] *See, e.g.*, B.A. Fost, *Physiological & Behavioral Indicators of Shad Susceptibility to Impingement at Water Intakes* (Univ. of Tenn. 2006), at 33 (concluding that threadfin and gizzard shad that suffer from cold shock are rendered moribund and therefore more susceptible to impingement); *see generally* EPRI, *The Role of Temperature and Nutritional Status in Impingement of Clupeid Fish Species* (Mar. 2008); EPRI, *Bioindicators of Performance and Impingement Susceptibility of Gizzard and Threadfin Shad* (July 2011).

[375] M.R. Donaldson, *et al.*, *Cold Shock and Fish*, 73 J. Fish. Biol. 1491, 1492 (2008).

[376] *Id.* at 1508.

[377] *See* Fost, *supra* note 283, at 33 ("It is assumed that moribund fish would not recover and die regardless of impingement," because they are "more susceptible than healthy [fish] to natural predation").

[378] *See* Fact Sheet, Attach. D, at 21-22, Table 2.

[379] EPRI 2008, at 2-10 (also noting cold shock as a potential cause of natural mass-mortality in clupeids, including menhaden).

September through November, times when unexpectedly large shifts in ambient temperatures giving rise to cold shock might reasonably be expected to occur.[380]

Both of these facts suggest that cold shock, not PNPS's cooling system, has been behind the majority of historic large impingement events at PNPS since it began operating, and is likely to be responsible for additional large impingement events in the future. With respect to such events, "remedial action" is neither warranted nor possible, contrary to the requirement imposed by Part I.D.12.d.[381] Entergy therefore proposes that the Part I.D.12.d of the Draft Permit be revised so as to provide that investigation and remedial action should be undertaken only in the event that impingement is not a function of natural events, such as cold shock, but instead related to PNPS's operations.

Entergy also proposes, in lieu of the new requirement under Part I.D.12.a that PNPS personnel must measure the length of as many as 50 impinged fish – a change the Fact Sheet makes no attempt to explain – that the requirement of the current permit that "[t]he kinds, sizes, and approximate number of fish involved in the incident" be recorded be retained instead.[382] Such report should also be allowed to be made based on visual observation, if properly documented and recorded.

## VII. Irrespective Of Whether PNPS Shuts Down In 2019, Its Operations Will Not Have Significant Impacts On Listed Species Or Essential Fish Habitat

The Fact Sheet, in its discussion of the potential impacts of PNPS's CWIS on threatened and endangered species ("listed" species) and essential fish habitat ("EFH"), states several times that Entergy expects to terminate electricity generation at PNPS as of June 1, 2019.[383] In addition, as specified below, the Fact Sheet includes language that could be understood as predicating EPA's determination that continued operation of PNPS's CWIS will have no significant adverse impacts on listed species or EFH on PNPS's expected shutdown. Entergy respectively submits that the Fact Sheet should make clear that EPA's conclusion that renewal of PNPS's NPDES permit is appropriate is based on *status quo* operation, and is not contingent on the plant's shutdown in 2019.

The Fact Sheet and its attachments provide a thorough analysis of the potential impacts from operation of PNPS's CWIS on listed species and EFH, both during continued operations and after shutdown.[384] With respect to listed species, the Fact Sheet presents a robust summary of information for each of eight listed species[385] identified by the National Marine Fisheries Service ("NMFS") as potentially inhabiting the area of Cape Cod Bay affected by PNPS operations (the

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[380] *See* Fact Sheet, Attach. D, at 21-22, Table 2.

[381] *See* Draft Permit, Part I.D.12, at 31.

[382] *See* Draft Permit, Part I.D.12, at 31; 1994 Amended NPDES Permit, Part I, at 13.

[383] *See*, *e.g.*, Fact Sheet at 55, 63, 64, 65, 68-70.

[384] *See id.* at 54-71 and Attachs. B, C and D.

[385] Specifically, Atlantic Sturgeon, North Atlantic Right Whale, Humpback Whale, Fin Whale, Kemps Ridley Sea Turtle, Leatherback Sea Turtle, Loggerhead Sea Turtle, and Green Sea Turtle.

"action area"), including on a seasonal basis. The Fact Sheet also incorporates the conclusions previously reached by NMFS in its 2012 Endangered Species Act ("ESA") consultation with NRC.[386] In that consultation, which was completed before Entergy announced its intention to cease electric-generation at PNPS, NMFS conducted a comprehensive review of potential direct and indirect impacts of PNPS's continued operation on listed species during the 20-year license renewal term.

### A. NMFS's Findings Confirm PNPS's Operations Do Not Affect Listed Species Or Essential Fish Habitat

NMFS's review found that PNPS's thermal discharge is unlikely to adversely impact listed species or their prey, due to its limited size relative to Cape Cod Bay, its rapid dissipation, and the ease with which it is avoided.[387] NMFS also found that, because early life stages of listed species are either not present or too large to be entrained, and sub-adult and adults are likely strong enough swimmers to avoid becoming impinged, impingement or entrainment of any Atlantic sturgeon, whales, or sea turtles is extremely unlikely to occur.[388] After reviewing the best available scientific evidence on the potential direct impacts of PNPS's impingement and entrainment and discharge of thermal effluent (and other pollutants) on the eight listed species, as well as the potential indirect impacts on those species' prey, NMFS concluded:

> based on information from NRC, Entergy, and other sources, all effects to listed species will be insignificant or discountable. Therefore, the *continued operation* of PNPS under the terms of a renewed operating license is not likely to adversely affect any listed species under NMFS jurisdiction.[389]

Importantly, NMFS's review included an assessment of the potential for migratory sea turtles to remain unseasonably long in the Action Area due to the presence of the thermal discharge, thereby becoming vulnerable to "cold stunning" in the fall.[390] Based on its review, NMFS concluded:"[g]iven the transient nature of the thermal plume, its presence at the surface, and the small size of the area that would have temperatures that would support sea turtles, it is extremely unlikely that sea turtles would seek out and use the thermal plume for refuge from falling temperatures in the Bay" and therefore "extremely unlikely that the discharge of heated effluent increases the vulnerability of sea turtles in the action area to cold stunning."[391] With respect to whales, NMFS also found that, although Cape Cod Bay is designated as right whale critical habitat, PNPS's thermal effluent is no longer detectable within that habitat, and other discharged pollutants are no longer distinguishable from background, such that "*continued operation* of

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[386] *See id.* at 65 (citing Letter from Daniel S. Morris, NMFS, to Andrew S. Imboden, NRC (May 17, 2012) ("2012 ESA Consultation letter")).

[387] *See* 2012 ESA Consultation Letter at 15-24.

[388] *See id.* at 7-9.

[389] *Id.* at 30 (emphasis added).

[390] *Id.* at 20-21.

[391] *Id.*

PNPS will have no effect on right whale critical habitat."[392] Thus, NMFS's conclusion that PNPS's CWIS is "not likely to adversely affect" listed species is premised on PNPS's *continued operation* (*i.e.*, generation of electricity) throughout the 20-year license renewal period; it is not contingent on the cessation of electric-generation in 2019 or in any other year prior to the expiration of the license renewal term.

The Fact Sheet states that, "consistent with the conclusion NMFS reached in 2012," renewal of PNPS's NPDES permit "is not likely to adversely affect . . . any species listed as threatened or endangered by NMFS or any designated critical habitat."[393] However, in contrast to NMFS's conclusion, the Fact Sheet includes statements that could be interpreted as making EPA's determination contingent upon the expected cessation of electric-generation in 2019. In particular, the Fact Sheet states that "[i]t is EPA's opinion that the operation of this facility, *as governed by this permit action*, is not likely to adversely affect the listed species or any of their critical habitat . . . ."[394] The Fact Sheet also states that "[b]ecause the draft permit includes effluent limitations and conditions that are *as stringent as or more stringent than* the conditions assessed in the 2102 consultation, the effects of the draft permit on threatened and endangered species and critical habitat, as described above, have already been considered and EPA has determined that re-initiation of consultation is not necessary at this time."[395]

Because the Draft Permit currently includes a mandatory shutdown provision, the phrase "*as governed by this permit action*" could be interpreted as conditioning EPA's "not likely to adversely affect" determination on PNPS's shutdown. Likewise, because the Fact Sheet includes effluent limitations and conditions that apply post-shutdown, the reference to permit effluent limitations and conditions that are "*more stringent than*" the conditions assessed by NMFS could be taken as premising EPA's determination that "re-initiation of consultation is not necessary" on PNPS's expected termination of electric-generation in 2019. Neither of these interpretations is correct.

As explained above, NMFS's conclusion that PNPS's CWIS is "not likely to adversely affect" listed species assumed PNPS's continued operation for the 20-year duration of its renewed operating permit. Therefore, any interpretation of EPA's determinations as being contingent on cessation of electric-generation would be directly *contrary* to NMFS's conclusion. Entergy therefore requests that EPA revise the Fact Sheet to make it clear that, consistent with NMFS's conclusion, its determination that PNPS's continued operation is "not likely to adversely affect" listed species is not contingent upon the expected cessation of electric-generation.

With respect to EFH, the Fact Sheet states that

> EPA and MassDEP have concluded that the *current permit limits* will assure the protection and propagation of the balanced, indigenous population and that there are likely to be no adverse

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[392] *Id*. at 30 (emphasis added).

[393] Fact Sheet at 65.

[394] *Id*. (emphasis added).

[395] *Id*. (emphasis added).

> effects from the thermal plume on benthic flora, benthic fauna, and pelagic fish, including species for which EFH has been designated.[396]

This conclusion is supported by EPA's and DEP's comprehensive analysis of PNPS's *existing* thermal discharge limits in Section 7 of the Fact Sheet and in Attachments B and C. As explained in the Fact Sheet "[t]he thermal plume from [PNPS] is relatively small compared to the receiving water and dissipates rapidly. *Over 40 years of biological monitoring data demonstrate that the variance-based limits will assure the protection and propagation of a balanced, indigenous community of shellfish, fish and wildlife*."[397]

However, similar to its conclusions regarding impacts to listed species, EPA includes two rationales among its reasons for this conclusion that would appear to premise this determination on PNPS's shutdown:

- Following termination of electrical generation at PNPS, the facility will cease discharges of non-contact cooling water from the main condenser, which will drastically reduce the maximum effluent temperature and rise in temperature compared to the existing conditions.

- The draft permit establishes requirements related to the CWIS that reduce cooling water withdrawals from Cape Cod Bay by 96%, prohibit cooling water withdrawals for the main condenser, and require the facility to achieve a through-screen velocity no greater than 0.5 fps. These conditions become effective upon terminating electrical generation at the plant and no later the June 1, 2019 and are expected to reduce impingement and entrainment of all aquatic life by 96%. These conditions will also significantly reduce the temperature differential and extent of the thermal plume.[398]

As explained above in the Environmental Context Section and reflected in the Fact Sheet, the best available evidence demonstrates that current discharge limits have assured, and will in the future continue to assure, the "protection and propagation of a balanced, indigenous community of shellfish, fish and wildlife."[399] Therefore, Entergy requests that the Fact Sheet be revised to make clear that, even if the more stringent thermal discharge limits associated with the expected shutdown do not come into play, PNPS operations would continue to "adequately protect all aquatic life, including those with designated EFH in Cape Cod Bay."[400]

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[396] *Id*. at 70.

[397] *Id*.

[398] *Id*. at 70-71.

[399] *Id*. at 70.

[400] *See id.* at 71.

With respect to operations beyond shutdown, the Fact Sheet correctly notes that any impacts on listed species (and EFH) from PNPS's operations would only be further reduced.[401] Importantly, while both EPA and NMFS acknowledge in their analyses that minimal impacts to listed species may occur beyond shutdown, neither agency found the need for an incidental take permit.

### B. Additional Evidence Confirms The Lack Of Any Credible Evidence That PNPS's Operations Have Had Or May Be Expected To Have An Effect On Cape Cod Bay's Aquatic Ecosystem, Including With Respect To Endangered Species

In 2012, in the context of proceedings before NRC, Dr. Michael Scherer, a leading fisheries biologist who has managed aspects of PNPS's biological monitoring programs since 1973 and supervised or otherwise participated in the aquatic studies conducted as part of that program since 1974, provided sworn testimony.[402] Dr. Scherer's analysis further confirms that "the continued operation of PNPS [would] have no discernible effects on [species protected under the federal Endangered Species Act, or 'ESA']," or on non-listed species including river herring and winter flounder.[403] Specifically, Dr. Scherer evaluated eleven (11) listed species, including shortnose sturgeon and Atlantic sturgeon, four different species of sea turtles and five different species of whales.[404] With respect to sturgeon, shortnose sturgeon "generally do not migrate beyond the estuary associated with their natal river," and the nearest such river to PNPS is 62 miles away, with the result that shortnose sturgeon are unlikely ever to encounter PNPS's CWIS.[405] While Atlantic sturgeon are potentially present in Cape Cod Bay, they would likely be present only in their adult life stages, whose size makes them not susceptible to entrainment and whose swimming abilities make them not susceptible to impingement.[406] Confirming this analysis, historic entrainment and impingement data from PNPS reflect that no Atlantic sturgeon or sturgeon remains have ever been observed to be entrained, impinged, or seen by dive teams charged with clearing the trash racks at PNPS.[407]

With respect to sea turtles, prevailing currents in Cape Cod Bay are such that loggerhead, green, and leatherback turtles are unlikely to encounter PNPS's CWIS, and no remains from these species or the Kemps Ridley turtle have ever been found impinged on the trash racks of PNPS's CWIS.[408] As for the five endangered whale species – North Atlantic right whales, humpback whales, fin whales, sei whales and sperm whales – the only potential impacts from PNPS's CWIS are indirect impacts to these species' foraging of other aquatic species, and such impacts are likely to be trivial. Four of the whale species (all except for the sperm whale) feed in dense

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[401] *Id*. at 64, 70-71.

[402] Scherer ALSB Aff. ¶¶ 3-4.

[403] *Id.* ¶ 5.

[404] *Id.* ¶ 17.

[405] *Id.* ¶ 20.

[406] *Id.* ¶¶ 27-28.

[407] *See* 2014 Update at 17-18.

[408] Scherer ASLB Aff. ¶¶ 29-47.

areas populated by small, planktonic organisms, which tend to be located in the northeast and southern portion of Cape Cod Bay away from PNPS's CWIS, or small schooling fish – neither of which is entrained or impinged at PNPS in numbers great enough to have any noticeable impact on the amount of forage available to these species.[409] With respect to sperm whales, data reported by the National Oceanographic and Atmospheric Administration ("NOAA") indicate that this species is rarely cited in Cape Cod Bay, and the species it forages tend to be deep-water species or those with swimming abilities that render them not susceptible to impingement or entrainment.[410]

## VIII. Certain Requirements For Electrical Vaults Are Unsupported.

As detailed below, a number of new permit requirements related to stormwater discharges are unwarranted because they are duplicative of other monitoring and reporting requirements, and/or do not reflect PNPS's NRC-regulated cable inspection program and prior representative electrical vault sampling. These proposed requirements for stormwater monitoring appear to be premised on the notion that cables can be submerged to an extent, degree and frequency that results in breaking of wire coatings, allowing stormwater to come into contact with wires. In fact, this is incorrect because PNPS's electrical vault cabling is subject to an NRC-regulated program that ensures cables are not degrading.[411] The effectiveness of the NRC-regulated program is demonstrated by the lack of non-naturally occurring pollutants in representative sampling of stormwater from electrical vaults.[412] For these reasons, and those provided below, Entergy requests that certain stormwater effluent limitations and sampling be removed from the final Permit.

### A. Background

#### 1. Description Of PNPS's Electrical Vaults

The twenty-five (25) electric vaults located at PNPS have been there since the facility was initially constructed. They are single-component, concrete systems with iron lids, and therefore designed to be protective of cabling and watertight.[413] Given their configuration, groundwater intrusion from and into the bottom of the vaults would not be expected, and has not been observed in the past. By way of confirmation of this, iron staining is visible at the top and along the sides of slide 11 referenced in footnote 413, showing the intrusion of stormwater via the lids and lid margin into the vaults. Nine (9), or over 1/3, of the vaults are equipped with automatic dewatering pumps.[414]

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[409] *Id.* ¶¶ 49-67.

[410] *Id.* ¶¶ 68-70.

[411] *See infra*, Part VIII.A.3.

[412] *See infra*, Part VIII.A.4.

[413] *See* Goodwin Procter, Discussion Regarding PNPS Manholes, p.11 (May 13, 2015) (presented to EPA on May 13, 2015 and provided to DEP on July 20, 2016) (provided herewith) (providing photograph of one of PNPS's electrical vaults).

[414] *See* Correspondence from Elise N. Zoli, Goodwin Procter, LLP to George Papadopoulos, EPA (June 30, 2015).

### 2. History Of Communications With EPA On Electrical Vaults

Within the last two years, Entergy has responded to EPA's questions on stormwater discharges from PNPS's electrical vaults. In February 2015, Entergy provided EPA with a letter clarifying the historic record and current framework for managing stormwater discharges at the site.[415] Most recently, in response to EPA's March 24, 2015 Section 308 information request, Entergy provided EPA with: (1) detailed information on its NRC-regulated program for monitoring electrical vaults, and (2) water quality sampling results from representative electrical vaults.[416] Together, these submissions have established that PNPS's stormwater vaults are appropriately monitored and that effluent discharges from these vaults do not cause or contribute to a violation of water quality standards or otherwise violate applicable discharge limits.

### 3. NRC Effectively Regulates Electrical Vault Cabling

NRC directly regulates PNPS's electrical vault cabling in a manner designed to ensure that this equipment is maintained in a condition that ensures functionality, including for nuclear safety purposes. To do so, vault cabling submergence is not authorized, but rather effectively managed under NRC regulation, and PNPS's NRC-mandated protocols. Specifically, 10 C.F.R §§ 50.65 and 50.49, and associated NRC directives, require affirmative written maintenance and monitoring procedures to protect against conditions that could result in degradation.

In 2007, NRC issued a generic letter requesting industry-wide review of cabling management and monitoring to avoid conditions that compromise functionality of those systems (*e.g.*, avoiding various failures, such as arcing and shorting equated to submergence).[417] In 2010, NRC issued an information letter setting industry-wide expectations for how the fleet will manage and monitor cables pursuant to NRC regulations, including its expectation that licensees, including PNPS, will:

- Perform a site-wide review of existing cabling sufficient to identify conditions that could reasonably contribute to cabling degradation, chiefly submergence;
- Take prompt corrective action to correct any such conditions, including through the removal of water via installation of sump pumps;
- Test cables to verify that degradation has not occurred; and
- Establish a monitoring program sufficient to ensure against recurrence, despite corrective action, of identified conditions and to identify new conditions.[418]

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[415] *See* Correspondence from Elise N. Zoli, Goodwin Procter, LLP to George Papadopoulos, EPA (Feb. 11, 2015).

[416] *See* Correspondence from Ken Moraff, EPA to David E. Noyes, Entergy, 3 (Mar. 24, 2015); Correspondence from Ken Moraff, EPA to David E. Noyes, Entergy (June 9, 2015); Correspondence from Elise N. Zoli, Goodwin Procter, LLP to George Papadopoulos, EPA (June 30, 2015).

[417] *See* NRC, Generic Letter 2007-01 (Feb. 7, 2007) (requesting information on "inspection, testing and monitoring programs to detect the degradation of inaccessible or underground power cables").

[418] *See* NRC, Information Notice 2010-26 (Dec. 2, 2010).

Compliance with NRC mandates is verified through annual NRC inspections of representative cabling installations, which have resulted in no adverse findings.[419] For these reasons, no submergence, and no submergence-related pollutants, are reasonably expected. This is known to EPA, because (as described below) EPA directed PNPS to perform representative sampling, which identified no relevant pollutants.

### 4. Recent EPA-Requested Sampling Shows No Exceedances

In its March 24, 2015 Section 308 Information Request, EPA requested the following information from Entergy in order to obtain a "representative" characterization of stormwater discharged from electrical vaults:

- "collect one sample of water from at least (7) seven different electrical vaults on the [PNPS] property and have it analyzed for [twenty-six (26)] parameters" at a specified Minimum Level of Detection ("MLD"); and
- "provide a map showing the general location of all electrical vaults that can accumulate stormwater, specifying which specific electrical vaults were sampled as well as the location of the four (4) existing NPDES-permitted stormwater outfalls, designated serial numbers 004, 005, 006, and 007."[420]

To ensure representative sampling, the seven vaults sampled, which represent just under 30% of the twenty-five vaults on the property, were to "vary in their contents, size and location [and] …be among the deepest and among those that have the greatest amount of electrical wiring and associated equipment."[421] The twenty-six parameters selected for monitoring were based on a subset of the monitoring requirements for EPA's remediation general permit that EPA determined could potentially be present at PNPS.[422]

From June 9 to 12, 2015, water samples were collected from seven electrical vaults at PNPS, specifically CP-1, CP-4, MH-2, MH-4, MH-5, MH-L and MH-Q, including a field duplicate from MH-Q.[423] In the calendar week prior to testing approximately 0.9 inches of rain fell in Plymouth, Massachusetts, which was specifically retained after the storm event to facilitate submergence testing that ordinarily would not be authorized, *e.g.*, MH-Q was immediately pumped after sampling.

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[419] *See, e.g.*, NRC, Pilgrim Nuclear Power Station - Integrated Inspection Report (2012); NRC, Pilgrim Nuclear Power Station - Integrated Inspection Report (2013); NRC, Pilgrim Nuclear Power Station - Integrated Inspection Report (2014); NRC, Pilgrim Nuclear Power Station - Integrated Inspection Report (2015). The integrated inspection reports are available at http://adamswebsearch.nrc.gov/webSearch2/view?AccessionNumber=ML152 24A489.

[420] *See* Correspondence from Ken Moraff, EPA to David E. Noyes, Entergy, 3 (Mar. 24, 2015); Correspondence from Ken Moraff, EPA to David E. Noyes, Entergy (June 9, 2015).

[421] Correspondence from Ken Moraff, EPA to David E. Noyes, Entergy, 3 (Mar. 24, 2015).

[422] *See* Correspondence from Ken Moraff, EPA to David E. Noyes, Entergy, 3 (Mar. 24, 2015); Correspondence from Ken Moraff, EPA to David E. Noyes, Entergy (June 9, 2015).

[423] *See* ERM, *Summary of Manhole Sampling Activities* (June 30, 2015) ("ERM Report").

The sampling and analytical results demonstrate that these vaults contain only naturally occurring contaminants. Specifically, for all samples taken, only three (3) of the twenty-six (26) parameters, all metals unrelated to wire insulation – iron, zinc and copper − were detected without qualification at or above the Minimum Level of Detection ("ML").[424] Iron, zinc and copper are naturally occurring metals that are known to occur in Massachusetts's soils at the following natural background concentrations: iron − 20,000 mg/kg; zinc −100 mg/kg; and copper − 40 mg/kg.[425] The concentrations detected in PNPS's electrical vaults are far below these natural background concentrations. The detection of iron and zinc in all samples collected further indicates that these detections likely are a result of natural background concentrations. Accordingly, the presence of iron, zinc and copper in the electrical vault samples is consistent with the collection of stormwater ubiquitous in manholes.

The remaining twenty-three (23) parameters appropriately should be considered to be absent from the samples because they were observed below the method detection limit ("MDL") and/or ML, and therefore, as EPA acknowledges, are unreliable and not true detections.[426]

### B. Certain Of The Draft Permit's Effluent Limitations And Sampling Requirements For Electrical Vault Are Unsupported

#### 1. Part I.C.3 Monitoring And Reporting Requirements

Part I.C.3 of the Draft Permit requires monitoring and reporting of, *inter alia*, phenol, PCBs, phthalates, cadmium and lead from five electrical vaults on the PNPS site.[427] PNPS's representative electrical vault sampling results for phenol, PCBs, cadmium and lead were below

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[424] In addition to the iron, zinc and copper, sampling detected total phenols in the MH-2 sample above the ML; however, that detection was qualified because the sample fell outside acceptable matrix spike/matrix spike duplicate (MS/MSD) recovery limits, which is an element of the laboratory quality control program. If the matrix spike recovery does not fall within the method acceptance criteria, it indicates the sample matrix is interfering with the analysis. Matrix interference typically is associated with complications caused by constituents in the sample itself. For this reason, the detection of total phenol in MH-2 above the ML should not be considered an accurate detection. *See* ERM Report at 2.

[425] Massachusetts Department of Environmental Protection, Technical Update: Background levels of Polycyclic Aromatic Hydrocarbons and Metals in Soil (May 23, 2002), *available at*: http://www.mass.gov/eea/docs/dep/cleanup/laws/backtu.pdf.

[426] An MDL is the "the minimum concentration of a substance that can be measured and reported with 99% confidence that the analyte concentration is greater than zero." 40 C.F.R. Part 136 Appendix B. EPA has determined the MDL for various analytical tests and reported them in the Massachusetts Remediation General Permit, Permit No. MAG910000, Appendix VI. An ML "is the lowest level at which the analytical system gives a recognizable signal and acceptable calibration point for the analyte. The ML represents the lowest concentration at which an analyte can be measured with a known level of confidence." Correspondence from Ken Moraff, EPA to David E. Noyes, Entergy (June 9, 2015); *see also* 40 C.F.R. Part 136 Appendix B; Remediation General Permit under the National Pollutant Discharge Elimination System (NPDES) for Discharges in Massachusetts, Massachusetts General Permit, Permit No. MAG910000, Appendix VI at 7, notes (Aug. 26, 2010). EPA's Section 308 information request specified the ML to be used for each of the twenty-six (26) parameters. *See* Correspondence from Ken Moraff, EPA to David E. Noyes, Entergy (June 9, 2015) (setting ML for each testing parameter).

[427] Draft Permit, Part I.C.3, at 22-23.

the ML and in most instances the MDL.[428] For this reason, these results do not and cannot support monitoring and reporting requirements for these pollutants.[429] Further, phenols, phthalates, PCBs, and cadmium are not expected to occur at the PNPS site because of prohibitions on submergence of cabling. Finally, the permit writer has provided no explanation for selecting these pollutants for increased monitoring making the selection arbitrary and capricious. Entergy, therefore, requests that Part I.C.3 be revised to remove monitoring and reporting of total phenol, PCBs, total phthalates, total cadmium and total lead.

#### 2. Stormwater Pollution Prevention Plan ("SWPPP") Ongoing Monitoring

Part I.H.5 of the Draft Permit requires that "[a]ll areas with industrial materials or activities exposed to stormwater and all structural controls used to comply with effluent limits in this permit, [] be inspected, at least once per month, **including all electrical vaults that are required to be routinely pumped out to a stormwater outfall**," and that samples "shall be collected within the first sixty (60) minutes of discharge from a storm event" and examined for "color, odor, clarity, floating solids, settled solids, suspended solids, foam, oil sheen, and other obvious indicators of pollution."[430] The monthly sampling of electrical vaults in the SWPPP are unnecessary in light of stormwater sampling required in Parts I.C.1 through I.C.3 of the Draft Permit. Parts I.C.1 and I.C.2 of the permit require monthly sampling from stormwater outfalls during a storm event for flow rate, TSS, oil and grease and pH.[431] Part I.C.3 requires quarterly sampling of electrical vaults that EPA "consider[s] representative of the discharges"[432] from electrical vaults, and further mandates that samples be "representative of water that has collected . . . and discharged to a permitted outfall."[433] EPA has provided no basis for requiring additional sampling of stormwater in the SWPPP.

Further, monthly monitoring within the first sixty (60) minutes of a storm event is impractical and potentially dangerous, given site conditions and personnel requirements. There are 25 electrical vaults at the PNPS facility and inspection of all of them within the first (60) minutes of a storm event is impractical. Collecting samples from all 25 would present serious feasibility challenges. Entering these vaults during a storm event also is potentially dangerous, because it is difficult to access the confined space during storms. Entergy previously communicated these same concerns with respect to sampling stormwater outfalls, and EPA acknowledged them by altering the stormwater effluent monitoring requirements in Parts I.C.1 and I.C.2 of the Draft Permit.[434]

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[428] *See* ERM Report at Table 2.

[429] *See supra*, Part VIII.A.4.

[430] Draft Permit, Part I.H.5, at 35.

[431] *See id.*, Part I.C.1 and I.C.2, at 18-21.

[432] Fact Sheet at 30.

[433] Draft Permit, Part I.C.3, at 23 n.2.

[434] *See* Fact Sheet at 29 ("The permittee has noted that some required stormwater sampling over the last few years was not conducted due to the difficulty in accessing stormwater outfalls . . . . Therefore, the draft permit allows for

Finally, based on Entergy's prior extensive submissions to EPA,[435] the 60-minute stormwater inspection and sampling requirement is unnecessary and unsupported. As the Fact Sheet acknowledges, PNPS already undertakes NRC-regulated regular inspections of electrical vaults which ensure that cables are not degrading such that they would contaminate stormwater.[436] The Fact Sheet and Draft Permit provide no explanation for why this inspection regime, already in place, is supposedly inadequate. Indeed, sampling results from electrical vaults confirmed the absence of non-naturally occurring pollutants at detectable levels (*i.e.*, above the ML and/or MDL).[437] In light of these quantitative results and the NRC-regulated inspection program, EPA has provided no basis for requiring monthly qualitative sampling for "color, odor, clarity, floating solids, settled solids, suspended solids, foam, oil sheen, or other indicators of pollution."[438]

For all of these reasons, Entergy requests that the requirement to inspect and sample all electrical vaults within sixty (60) minutes of a storm event be removed from the permit.

### 3. Cumulative Additional Sampling Of Stormwater Vaults Is Unsupported And Unnecessary

Part I.J of the Draft Permit requires that PNPS "shall conduct a one-time sampling for all of the electrical vaults which were not sampled pursuant to EPA's March 24, 2015 CWA Section 308(a) letter."[439] The Draft Permit, in other words, requires PNPS to conduct sampling for the vaults that EPA staff indicated just last year need not be sampled, and requires the results of that sampling be submitted within 180 days of the effective permit date, for the same 26 pollutant parameters previously sampled.

In the Fact Sheet, EPA states that "a characterization of water collected in all of the vaults is warranted because these vaults are located throughout the property and the initial sampling showed the presence of several pollutants."[440] The explanation in the Fact Sheet is not supported. First, EPA has already determined that the prior sampling was representative of all 25 electrical vaults. As EPA explains in the Fact Sheet, the five electrical vaults selected, for quarterly monitoring are "considered representative of the discharges from the twenty five (25) electrical vaults."[441] Four (4) of these five (5) vaults were previously sampled for all 26 parameters.[442]

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sampling to be conducted in a manhole hydraulically connected to a particular stormwater outfall, *if feasible and in particular if more easily accessible than the actual outfall during a storm event*." (emphasis added)).

[435] *See supra*, Part VIII.A.2.

[436] *See supra*, Part VIII.A.3.

[437] *See supra*, Part VIII.A.4.

[438] Draft Permit, Part I.H.5, at 36.

[439] *See id.*, Part I.J, at 37.

[440] Fact Sheet at 31.

[441] *Id.* at 30.

[442] *Compare* Draft Permit, Part I.C.3, at 22 *with* ERM Report, Table 1.

Second, as explained above, with the exception of naturally occurring zinc, iron and copper, pollutants were not observed above the ML and/or MDL in the sampled electrical vaults, which mean that those observations are not accurate or meaningful.[443] For this reason, EPA is incorrect when it states that the "initial sampling showed the presence of several pollutants."[444] In sum, the requirement to sample every electrical vault is inadequately supported, indeed contradicted, by the Fact Sheet's own discussion of the sampling results and instead has the aura of punitive action.

For these reasons, Entergy requests that Part I.J of the Draft Permit be removed from the final Permit.

### C. There Is No Basis For Requiring Whole Effluent Toxicity Testing Given The Limits Of EPA's And DEP's Regulatory Authority With Respect To The Relevant Effluents And The Small Concentrations Of Contaminants Involved

Part I.C.4 of the Draft Permit and Attachment A thereto proposes requiring PNPS to undertake "whole effluent toxicity" ("WET") testing, twice each year, in accordance with specified testing protocols, with respect to two small aquatic species, the Inland Silverside and the Mysid Shrimp.[445] According to the Fact Sheet, the purpose of requiring WET testing is "to assess the effects of the combination of pollutants" found in PNPS's discharges via internal Outfalls 011 and 014, which comprise various process waters and other sources, including service water systems and demineralizer reject water, both NRC-regulated discharges.[446] Adding to the confusion, the identified pollutants of interest for purposes of the WET testing, as proposed in the Draft Permit, include ammonia, organic carbon, cadmium, lead, copper, zinc, and nickel.[447] The Fact Sheet does not state, nor are we aware, of any conceivable basis for believing that these substances would be added to the process water streams that comprise the discharges via Outfalls 011 and 014. Some of these substances (*i.e.*, copper and zinc) appear to have been included in the proposed WET testing protocol only by virtue of the fact that they were detected in certain of the electrical vaults that were sampled.[448] As discussed above, however, the concentrations detected in these were all below naturally occurring background levels, so there is no apparent basis for supposing that toxic concentrations of these materials occur, alone or in combination.[449] The remaining pollutants were not even detected in the electrical vault sampling data, and we again know of no basis for believing that either would be added to the process waters associated with Outfalls 011 and 014 in any biologically significant amounts, and the Fact Sheet identifies

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[443] *See supra*, Part VIII.A.4.

[444] Fact Sheet at 31.

[445] *See* Draft Permit, Part I.C.4, at 25-27 & Attach. A.

[446] *See* Fact Sheet at 44.

[447] *See* Draft Permit, Part I.C.4, at 25.

[448] *See supra*, Section VIII.A.4 (electric vault sampling detected presence zinc and copper consistent with background levels, while other pollutants were below minimum level of detection and therefore could not be confirmed as being present at all).

[449] *See supra*, Section VIII.A.4.

none but instead confesses that EPA and DEP have only "limited data" as to the composition of the waste streams in question.[450] The Draft Permit's provisions for WET testing should therefore be deleted from the final Permit as being factually unsupported.

### D. Non-Substantive Corrections Related To Stormwater Discharge Requirements.

Entergy also requests that the following non-substantive inconsistencies in Part I.C.3 of Draft Permit be corrected in the final Permit:

- The "Discharge Limitation" column should remove sub-columns "Average Monthly" and "Maximum Daily" to reflect the fact that monitoring is only to be conducted quarterly.[451]

- In footnote 2, the first sentence should be removed because it conflicts with footnote 1. Footnote 2 appropriately recognizes that "[s]ampling may be conducted in wet or dry weather and does not need to be at a time when the vault contents are being discharged," while footnote 1 would require the sampling to occur during a discharge.[452]

If Part I.J of the Draft Permit is not removed from the final Permit, then Entergy requests that Part I.J of the final Permit be corrected to reflect that seven (7) as opposed to six (6) electrical vaults were previously sampled.[453]

## IX. Authorization For The Discharge Of Untreated Sea Foam Suppression Water Should Not Be Eliminated.

As the Fact Sheet reflects, the Draft Permit has removed a prior authorization for the discharge of untreated sea foam suppression water from Outfall 008.[454] EPA bases the removal on statements made by Entergy employees that sea foam suppression had not been necessary during the current permit term and was not anticipated in the future.

While sea foam suppression may not be anticipated, however, the facility still must have the option of using sea foam suppression, if necessary. Excessive sea foam can blow onto electrical equipment at the facility leading to dangerous conditions, including arcing of electrical equipment – an occurrence that has been known to happen at PNPS historically.[455] For this

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[450] *See* Fact Sheet at 43.

[451] *See* Draft Permit, Part I.C.3, at 22.

[452] *See id.*, Part I.C.3, at 23 n.1.

[453] *See id.*, Part I.J, at 37.

[454] *See* Fact Sheet at 33.

[455] *See, e.g.*, NRC, *Information Notice 93-95: Storm-Related Loss of Offsite Power Events Due to Salt Buildup on Switchyard Insulators* (Dec. 13, 1995), *available at:* http://www.nrc.gov/reading-rm/doc-collections/gen-comm/info-notices/1993/in93095.html (hereinafter "NRC Information Notice") ("Since 1982, the Boston Edison Company Pilgrim station has also experienced several loss of offsite power events when *heavy ocean storms*

reason, Entergy respectfully requests that the untreated sea foam suppression discharge authorization remain in the final NPDES permit.

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deposited salt on the 345 kV switchyard causing the insulators to arc to ground.") (emphasis added); Enercon Services, Inc., *Enercon Response to Tetra Tech's Indian Point Closed-Cycle Cooling System Retrofit Evaluation Report,* prepared for Entergy Nuclear Indian Point 2, LLC, and Entergy Nuclear Indian Point 3, LLC (Dec. 2013), p. 28-29 ("Periodic salt deposition *during storm events has* caused electrical arcing at several plants," including PNPS), Figure 7-1 (providing picture of arcing) (excerpt enclosed) (emphasis added); NRC & EPRI, *EP RI/NRCRES Fire PRA Methodology for Nuclear Power Facilities,* Final Report, NUREG/CR-6850 (Sept. 2005) (examining fires caused by, *inter alia*, arcing).

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**UNITED STATES ENVIRONMENTAL PROTECTION AGENCY**
**NEW ENGLAND - REGION I**
**5 POST OFFICE SQUARE, SUITE 100 (OEP06-1)**
**BOSTON, MASSACHUSETTS 02109-3912**

# FACT SHEET

DRAFT NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM (NPDES) PERMIT TO DISCHARGE TO WATERS OF THE UNITED STATES PURSUANT TO THE CLEAN WATER ACT (CWA)

NPDES PERMIT NUMBER: **MA0003557**

PUBLIC NOTICE START AND END DATES: May 18, 2016 - July 18, 2016

NAME AND MAILING ADDRESS OF APPLICANT:

**Entergy Nuclear Generation Company**
**Entergy Nuclear Operations, Inc.**
**Pilgrim Nuclear Power Station**
**600 Rocky Hill Road**
**Plymouth, MA 02360**

NAME AND ADDRESS OF FACILITY WHERE DISCHARGE OCCURS:

**Pilgrim Nuclear Power Station**
**600 Rocky Hill Road**
**Plymouth, MA 02360**

RECEIVING WATER(S): **Cape Cod Bay**

RECEIVING WATER CLASSIFICATION(S): **Class SA**

SIC CODE: **4911 (Electric Services)**

NOTE: ENTERGY'S COMMENTS REFLECT FACTUAL EDITS ONLY AND DO NOT INCLUDE EPA'S STATEMENT OF THE LEGAL CONTEXT OR REGULATORY RATIONALE, WHICH ENTERGY HAS ADDRESSED IN ITS COMMENTS.

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## 1.0 Proposed Action, Type of Facility, and Discharge Location

Entergy Nuclear Generation Company (and Entergy Nuclear Operations, Inc. (collectively, Entergy), the permittee, owns and operatespermittees, respectively own and operate Pilgrim Nuclear Power Station (PNPS or the Station) in Plymouth, MA. PNPS is a 670711 gross megawatt (MW) electric, 685 net MW electric generating station adjacent toon the western shore of Cape Cod Bay in Plymouth, MA. The facility discharges wastewater from a combination of once-through cooling water, traveling screen washwaterwash water, treated process wastewaters, miscellaneous low volume wastewaters, and storm water.

The PNPS site was purchased in 1967 for the main purpose of constructing PNPS. Commercial operation of the stationStation began in December of 1972 by Boston Edison Company and this permit was subsequently, with the site transferred to Entergy with a change of ownership in 1999. The PNPS facility occupies approximately 140site consists of 1,674 acres and utilizes one-through cooling water from Cape Cod Bay for its condenser. Entergy also owns an additional 1500, with a portion of fewer than 100 acres adjacent to the plant site that has beenoccupied by the major on-site constructed features (*i.e.*, nuclear-related structures and equipment) and more than 1,500 acres . placed in a forest management trust. PNPS is located on the western shore of Cape Cod Bay and occupiesthe property occupying approximately one (1) mile of continuous shoreline frontage. The site can be accessed by land or from Cape Cod Bay. See Figures 1 and 2 for local and regional site locus maps.

The major constructed features of the PNPS site areinclude the reactor and turbine buildings, the off-gas retention building, the radwaste building, the emergency diesel generator building, the intake structure and main discharge canal, the switchyard, the main stack, various administration buildings, and the former recreational facilities. Refer to Figure 3 for the site layout including the intake embayment, discharge channel, and permitted outfalls.

PNPS has one boiling water reactor unit and a steam-driven turbine generator system. The PNPS fuel is low-enriched uranium dioxide with maximum enrichment of 4.6 percent by weight uranium-235 and fuel burn-up levels of 48,000 megawatt-days per metric ton uranium. The primary containment for the reactor is a pressure suppression system, which includes a drywell, pressure suppression chamber, vent system, isolation valves, containment cooling system, and other service equipment. The containment is designed to withstand an internal pressure of 62 pounds per square inch (PSI) above atmospheric pressure and to act as a radioactive materials barrier. A secondary containment completely encloses both the primary containment and fuel storage areas and acts as a radioactive material barrier as well.

PNPS consists of one boiling water reactor unit, supported by a steam-driven turbine generator system. The unit was originally licensed for an output of 1,998 MW thermal. In 2003, PNPS underwent a Thermal Power Optimization, which increased the thermal rating to the current 2,028 MW thermal. As noted above, PNPS is a 711 gross megawatt (MW) electric, 685 net MW electric, steam-electric, base load generating Station.

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A quantitative description of the discharge in terms of significant effluent parameters based upon historical discharge data is shown on Attachment A. The data are shown for what is referred to in this fact sheet as the monitoring period, which covers the period of January 2008 through March 2016, the most recent eight years out of PNPS's nearly 50 years of monitoring.

On April ~~29th~~29, 1991, the U.S. Environmental Protection Agency (EPA) and the Massachusetts Department of Environmental Protection (MassDEP) issued ~~PNPS (then owned by Boston Edison Company) a~~the most recent renewed NPDES permit (Current Permit) under the federal Clean Water Act (CWA) and the Massachusetts Clean Waters Act, respectively, to PNPS to govern the facility's withdrawal of water from Cape Cod Bay for cooling ~~uses~~ and its ~~discharges~~discharge of that cooling water, and limited additional regulated pollutants to Cape Cod Bay ~~as part of a variety of wastewater streams. These~~. While PNPS is operating, these wastewater streams consist of condenser non-contact cooling water [circulating water (CW) system] (Outfall 001), thermal backwash for bio-fouling control (Outfall 002), intake screen wash water (Outfalls 003 and 012), plant service cooling water [service water (SW) system, also referred to as Salt Service Water (SSW) system] (Outfall 010), and neutralizing sump waste commingled with demineralizer reject water, station heating water, and SW (Outfalls 011 and 014). Additionally, two outfalls discharge stormwater (Outfalls 004 and 007), one outfall discharges stormwater commingled with fire water storage tank discharge (Outfall 006), and one outfall discharges stormwater commingled with most of the flows from Outfall 011 (Outfall 005). See Figure 4 for the water flow diagram.

Under normal operating conditions ~~when electricity is being generated~~, continuous discharges at the facility include flows from Outfalls 001[1] and 010. All other discharges, from Outfalls 002, 003, 004, 005, 006, 007, 011, 012, and 014 are intermittent.

Table 1 - Outfall Summary

| Outfall Serial Number | Description of Discharge |
|---|---|
| 001 | Once-through non-contact cooling water - chlorinated |
| 002 | Thermal and non-thermal backwash water |
| 003 | Screenwash water (traveling screens) to intake embayment - dechlorinated |
| 004, 006, 007 | Storm water from yard drains~~, including electrical vault water~~ |
| 005 | Storm water from yard drains, including ~~electrical vault water,~~ demineralizer reject water |
| 010 | Service water (SW) for turbine building closed cycle cooling water (TBCCW) and reactor building closed cycle cooling (RBCCW) systems-chlorinated |

[1] CW flow to the discharge canal [001] is usually continuous, except for condenser backwashes (including thermal backwashes [002]), and when both CW pumps are shut off during refueling outages.

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Table 1 - Outfall Summary

| Outfall Serial Number | Description of Discharge |
|---|---|
| 011 | Internal outfall - ~~Various~~various wastewaters from station heating and service water systems and demineralizer reject water |
| 012 | Screenwash water to discharge canal ~~-~~– dechlorinated |
| 014 (new outfall) | Discharges from waste neutralization sump including TBCCW and RBCCW systems, standby liquid control (SLC) system |

The facility also discharges from two outfalls which are not included in the current NPDES permit~~:~~.  The first is a radwaste system discharge, which is currently sampled for boron, nitrates, and radioactivity~~ and~~.  The second is a small miscellaneous stormwater discharge, which ~~only~~ discharges under extreme storm ~~conditions~~events and has not discharged in the last 5 years.  The radwaste system discharge ~~shall be in accordance with~~is under the sole jurisdiction of the U.S. Nuclear Regulatory Commission (USNRC)~~ operational requirements~~ at 10 C.F.R. Part 20 and USNRC technical specifications set forth in the facility's operating license, DPR-35.  It is nonjurisdictional with EPA and MassDEP.  The miscellaneous stormwater discharge that was reported by the permittee during the permit term is acknowledged~~ and~~, authorized by this permit and designated Outfall 013.

Additives at the facility consist of sodium hypochlorite [chlorination of Outfall 001 (CW system) and 010 (SW system)], sodium thiosulfate [dechlorination of screenwash water for Outfalls 003 and 012)], sodium nitrite and tolyltriazole (corrosion inhibitors present in periodic discharges through Outfalls 011 and 014), and sodium pentaborate (added to produce boronated water).  No biocides other than chlorine, in the form of sodium hypochlorite solution, are used at the facility. Use of any other biocide ~~shall~~must be approved by EPA and DEP, as described on Page 3, footnote 5 of the permit.

The ~~current permit (1991~~Current Permit~~)~~ was issued and effective on April 29, 1991, was modified on August 30th, 1994, and ~~expired~~was set to expire on April 29, 1996, absent timely application for renewal that in fact occurred.  On September 19th, 1995, Boston Edison, the permittee at the time, submitted a timely and complete permit renewal application.  Since the permit renewal application was deemed timely and complete by EPA, the permit was administratively continued pursuant to 40 C.F.R. § 122.6.  In a letter dated July 7, 1999, the permittee requested transfer of ownership from Boston Edison Company to Entergy.  Entergy submitted a permit reapplication update on December 1, 1999.

Additionally, Entergy has submitted additional information in Response to Requests for Information under Section 308(a) of the CWA from EPA dated September 10, 1999, June 9, 2000, October 25, 2004 (which was supplemented by an additional request on July 31, 2007), August 18, 2014~~,~~, (updating prior information), and June 30, 2015 (for electrical vault water sampling).

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~~Certain operational changes at PNPS have been~~Permit authorities granted ~~approval~~certain minor authorizations at PNPS since the last permit issuance, including the following:

- A letter from EPA dated June 30, 1995, approved the use of Tolyltriazole, a corrosion inhibitor, in various Pilgrim Station systems [station heating systems, and reactor building and turbine building closed cooling-water systems (RBCCW and TBCCW), which discharge through Outfall 011].
- EPA approved, subject to annual review, removal of the PNPS discharge canal fish barrier net on November 23, 1994.
- Two daily, manual grab samples of the service water (SW) System continuous chlorination for total residual oxidants (chlorine) were approved by EPA in lieu of continuous chlorination monitoring on August 26, 1998.
- On October 1, 1998~~ (AR #74),~~, EPA approved the discharge of demineralizer reject water to Outfall 005.

On October 13, 2015, ~~citing poor market conditions, reduced revenues and increased operational costs, ~~Entergy announced that it ~~would~~intends to shut PNPS down, essentially terminating electricity generation at the facility~~, no later than~~ and targeting a shutdown date of June 1, 2019.[2] The exact timing of that shutdown in 2019 depends on a variety of factors, including further discussions with the New England Independent System Operator ("NE-ISO"), as well as fuel design and loading, spent fuel pool and operational considerations. Entergy's decision to close Pilgrim was based on numerous factors, including the Commonwealth's decisions to subsidize oil storage at natural gas facilities and hydropower utilities in Canada. These conditions rendered continued station operations uneconomical. In a press release of April 14, 2016, Entergy announced that it would be refueling the Pilgrim facility in 2017 to continue providing electricity ~~and will be ceasing operations on May 31,~~into 2019.[3] On December 18, 2015, the Independent System Operator of New England (ISO-NE) accepted Entergy's Non-Price Retirement request for the facility.[4] Because Entergy has advised EPA that some discharges and water withdrawals will continue after the cessation of electricity generation, the draft permit reflects post-shutdown operations and discharges as appropriate. However, since the permittee cannot fully anticipate all changes in permitted flows that will take place post-shutdown, this permit may be modified post-shutdown if warranted.

[2] Press Release, Entergy, Entergy to Close Pilgrim Nuclear Power Station in Massachusetts No Later than June 1, 2019 (Oct. 13, 2015), AR#515.
[3] *Id.*
[4] Letter from Stephen J. Rourke, Vice President, ISO-NE, to Marc Plotkin, Vice President, Entergy Nuclear Power Marketing (Dec. 18, 2015), (AR# 514*) available at* *http://www.iso-ne.com/staticassets/documents/2015/12/entergy_537.pdf*.

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## 2.0 DESCRIPTION OF PROCESSES AND DISCHARGES

### 2.1 Nuclear Steam Supply System ~~Operation~~Operations Relevant to the Permit

The Boiling Water Reactor (BWR) that is employed by PNPS is designed to: produce electrical energy through conversion, via a turbine driven generator, of ~~a portion of~~ thermal energy contained in the steam supplied from the reactor; condense the turbine exhaust steam into water; and return the water to the reactor as heated feedwater with a major portion of the gaseous, dissolved, and particulate impurities removed. The major components of the power generation system are: turbine generator, main condenser, condensate pumps, condensate demineralizers, reactor feed pumps, feedwater heaters, and condensate storage system. ~~The~~A portion of the heat rejected to the main condenser (the waste heat inherent in any thermodynamic cycle) is ~~removed by~~transferred to the circulating water (CW) system.

The saturated steam produced by the reactor is passed through the high pressure turbine where the steam is expanded and then exhausted through moisture separators. Moisture is removed in the moisture separators and the steam is then passed through the low pressure turbines where the steam is again expanded. From the low pressure turbines, the steam is exhausted into the condenser where the steam is condensed and de-aerated, ~~and then returned to the cycle as condensate~~*i.e.*, constitutes water.

### 2.2 Cooling Water Intake Structure (CWIS)

Cape Cod Bay ~~is~~was selected to be and remains the source of cooling water and service water for PNPS. The facility uses a once-through cooling system in which seawater is withdrawn from the bay via an embayment formed by two breakwaters, and is discharged into a ~~900-ft-long~~ discharge canal located immediately adjacent to the intake embayment. (See Figure 3) ~~The~~On a maximum design basis, the CWIS provides up to 311,000 gpm, or 448 MGD, of condenser cooling water via two (2) circulating water (CW) pumps, and ~~can provide~~, also on a maximum design flow basis, provides up to 13,500 gpm, or 19.4 MGD, of cooling water to the service water system via five (5) service water (SW) pumps. The intake structure also supplies flow, as demanded, to the Fire Protection System Pumps. PNPS obtains its potable and reactor makeup water from the Town of Plymouth's municipal water system~~.~~, not from Cape Cod Bay. See Figure 5 for a plan view and cross sectional views of PNPS' CWIS.

The intake structure consists of ~~wing walls,~~ a skimmer wall that functions as a submerged baffle, slanted vertical bar racks ~~that~~designed to reduce impingement and capture large debris, vertical traveling screens to ~~prevent~~reduce impingement mortality and potentially entrainment, fish-return sluiceways~~, condenser cooling~~ to return impinged fish to Cape Cod Bay, circulating water pumps, and service water pumps. (See Figure 6 for the cooling water process flow diagram) The intake structure also includes two wing walls ~~are~~ constructed of concrete, ~~and~~that guide flow into four separate intake bays. Each wing wall extends from the ~~face~~seaward-most components of the intake structure at ~~a~~an approximate 45-degree angle, one to a distance of 130 ft to the northwest and the other one to a distance of 63 feet to the northeast. The entrance of the intake

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structures measures approximately 62 feet wide at the stop log guide, and extends to the floor of the intake structure at 24 feet below mean sea level (MSL). The skimmer wall at the front of the intake ~~removes floating debris, with the bottom of the wall extending~~extends to 12 feet below MSL. Fish are able to transit the skimmer wall, and escape ~~the system~~impingement, by way of approximately 6 to 12 10-inch circular openings (fish ports) that are located ~~in the skimmer walls~~ at each end of the ~~intake structure~~skimmer wall. According to the applicant, divers have visually verified that the escape openings are effective. Bar racks behind the skimmer wall ~~intercept large debris. The racks~~ are constructed of 3-inch by 3/8-inch rectangular bars, with a 3-inch opening between each bar. ~~Divers remove debris~~PNPS's maintenance crew and ~~large, impinged organisms from~~divers address debris on the skimmer wall and bar racks, periodically and as necessary.

Under ~~normal~~typical operation, seawater is heated in the condenser up to approximately ~~27 to~~ 30°F above the monitored intake temperature on a daily basis, with the permit limit being 32°F for such operations. With the cooling water flow being relatively constant at 311,000 gpm throughout the year, the discharge temperature is almost entirely a function of the intake water temperature~~.~~ and station power level (*i.e.*, actual electricity generated), as well as station operating conditions, such as condenser conditions, and ambient temperatures. The purpose of the main condenser is to serve as a heat sink (*i.e.*, a mechanism for heat removal) for the turbine exhaust steam, the turbine bypass steam, and for other related flows. The PNPS main condenser is a twin shell, horizontal titanium tube, seawater cooled unit and is located in the Turbine Building below the main turbine's low-pressure sections. The location of the condenser below the main turbine is indicative of its function, whereby the cooling water of the CW system condenses the steam exhausted from the turbine, which is then returned to the reactor as feedwater. The arrangement of CW piping allows backwashing of the condenser by section to remove possible debris accumulated on the inlet tube sheets. See Figure 6 for a schematic of the cooling process flow.

From the condenser, water flows through a buried concrete conveyance to the discharge canal. This discharge is designated as Outfall 001. The conveyance consists of a 13 foot by 17 foot reinforced concrete box culvert that runs for about 235 feet, followed by a 10.5 foot diameter concrete pipe that runs for about 250 feet. Upon exiting the concrete pipe, discharged water enters a 900 foot long trapezoidal discharge canal separated from the intake embayment by a breakwater. The discharge from the SW system also discharges through this canal. See Figure 3 for a schematic of the intake embayment and discharge channel.

The discharge canal was created by two ~~breakwaters~~jetties that are oriented perpendicular to the shoreline, one of which is shared with the intake embayment. The channel sides are sloped at a 2:1 horizontal-to-vertical ratio. The bottom is 30 foot wide at an elevation of 0 ft MLW, or 4.8 ft below MSL. The channel bottom remains at this elevation until it converges with the shore, which has a slope of approximately 4:1 at the channel mouth. The discharge canal is extended over the beach to mean low water (MLW) by rock-fill jetties. The jetties are of rubble mound construction and are protected by heavy capstone. The jetties have a nominal elevation of +16 MLW sloping down to a height of 4 ft at MLW~~.~~ under extreme tidal conditions. The elevation of

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the bed of the discharge canal is below 0 ft MLW. The discharge canal jetties ~~also~~ serve to promote rapid mixing in Cape Cod Bay for heat dissipation and to protect the CWIS and discharge structures from wave action. At low tide, the water in the discharge canal is several feet higher than sea level, and the discharge is rapid and turbulent, estimated at 8.1 feet per second (fps). At high tide, the velocity is estimated at 1.4 fps, because the cross sectional area of flow in the channel is greater. Discharge of the heated water creates a thermal plume in the nearshore area of PNPS.

Outfalls 001 [condenser cooling water (CW system)], 002 (thermal backwash), and 010 [plant service cooling water (SW system)] are "once-through" discharge points. The source water for these outfalls is Cape Cod Bay. ~~Outfalls~~Outfall 003 ~~and 012~~ (intake screen wash) ~~and 011 and 014 (waste neutralization sump) use~~ uses Cape Cod Bay water ~~and/or~~, with emergency use of City of Plymouth municipal (drinking) water. Outfall 011 (waste neutralization sump) uses City of Plymouth municipal (drinking) water. Outfalls 004, 005, 006, 007, and 013 are designated storm water outfalls. In addition to stormwater, Outfall 005 also intermittently discharges a portion of the flows from Outfall 011, with the remainder being discharged through Outfall 014. In addition to stormwater, Outfall 006 discharges fire water storage tank water (City of Plymouth municipal water) during maintenance.

### 2.3 Cooling and Auxiliary Water Systems

Located in the seawater pump wells of the CWIS, two vertical, mixed-flow, wet-type pumps ~~provide a continuous~~ supply ~~to~~ the CW system. Each 1450-horsepower pump has a capacity of 155,500 gallons per minute (gpm). The water is pumped from the intake structure to the ~~condenser~~condensers via two buried concrete pipes, each measuring 7.5 feet in diameter. Measurements taken at the breakwaters during mid-tide level with both pumps running indicate that the average intake velocity is 0.05 fps. At the intake, before the screens, the velocity ~~is~~has been calculated as about 1 fps during all tidal conditions. Through the traveling screens, the velocity at mean low water has been estimated by a worst-case calculation to be 1.57 fps. The velocity is approximately 0.15 fps near the east fish-return sluiceway, which is located in the intake embayment just east of the intake structure.

Located in the central wet well of the intake structure are five service water pumps that supply the SW system~~.~~, which fulfils a nuclear safety function. Generally, four pumps run simultaneously, while one is kept on standby. Each pump has a capacity of ~~2500~~2,700 gpm, providing a combined capacity at normal, four-pump operation of approximately 10,~~000~~800 gpm. The service water system, which serves a nuclear safety function, is continuously chlorinated in order to control nuisance biological organisms, such as mollusks, barnacles, algae and other organisms, in the service water system. Diffusers located downstream of the racks deliver a 12-percent sodium hypochlorite and seawater mixture to each intake bay. The mixture is used to ensure the total residual chlorine ~~discharge~~ concentration at the discharge point does not exceed a maximum daily concentration of 1.0 part per million (ppm~~) and~~), as well as an average monthly concentration of 0.5 ppm, in ~~the service water discharge and~~addition to the 0.1 ppm maximum daily and average monthly concentration ~~in~~during chlorination of the condenser cooling water.

Chlorination of the CW system also takes place, on a periodic basis, and typically occurs during spring, summer, and fall, when the circulating water system is chlorinated two hours per day (one hour for each pump). Sodium hypochlorite is also added inboard of the trash or bar ~~rack~~racks to control fouling.

### 2.4 Traveling Screens

Prior to water flowing through either the cooling water pumps or the service water pumps, water passes through one of four (4), ten (10) foot wide traveling screens. The screens work to prevent small ~~debris and small~~ aquatic organisms from being impinged and potentially entrained into the cooling water or service water systems. Each screen is constructed of 53 segments with ¼-inch by ½-inch stainless steel wire mesh. Each segment has a stainless steel lip that is used to lift ~~debris and organisms~~fish and direct them into a fish-return sluiceway. Thus, the screen system has been optimized for fish protection purposes.

The traveling screens are not rotated continuously but are operated, on average, 3 to 4 times each day, depending on the scenarios listed below. The screens normally operate at 5 fps, but can be operated at up to 20 fps during storm events ~~that could cause~~leading to extreme debris loading. The screens ~~operate~~have operated under the following circumstances or conditions:

- When there ~~is~~has been an indication that fish are being impinged at ~~a rate exceeding 20 fish per hour, at which time~~excessive rates, the traveling screens are turned continuously until the impingement rate drops below 20 fish per hour for two consecutive sampling events.
- During impingement sampling that is required by the ~~permit's~~Current Permit's marine life monitoring program, screen wash is scheduled for eight hours prior to each of the three weekly sampling events. Each impingement sampling event is conducted for a minimum of 30 minutes, three (3) times per week.
- When the difference in water level on each side of the screen reaches a specified threshold at an alarm set point. The threshold is typically set at six (6) inches. This level difference signifies that too much debris has collected on the screen. Level differences are rare and usually the result of a storm event.
- During hypo-chlorination, which occurs each day for two hours when the main cooling water system is chlorinated inboard of the trash rack to control fouling.
- Whenever water temperatures are less than 30 degrees Fahrenheit (F).
- At a minimum, once per each 12-hour shift, usually at the beginning and end of each shift, and usually lasting for a few hours.

The screens are washed when they are in operation, using a dual level spray wash. Service water is used as the source for the spray wash. Sodium thiosulfate is added to the wash water to remove chlorine and protect organisms returned to ~~the intake embayment or the discharge canal.~~Cape Cod Bay. The screens are washed from the side that faces the approaching flow at the splash housing, which is located about 46 feet above the bottom of the intake structure. Low pressure spray, rated at about ~~20~~15 pounds per square inch (psi), removes light fouling and

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organisms from the screen. Subsequently, a high pressure spray, at about ~~100~~140 psi, is applied to remove heavy fouling. The low and high pressure spray nozzles are about 18 to 24 inches apart. ~~The screen rotation rate is kept slow during high impingement events.~~

~~Impinged~~After 1979, when the East sluiceway was constructed, impinged fish ordinarily are washed into ~~a~~the seamless concrete fish-return east of the fish return sluiceway and ~~usually~~ returned to the intake embayment approximately 300 feet east of the intake structure. The ~~original wet~~ West sluiceway~~, newly designated in this permit as Outfall 012,~~ was installed in 1972 and was connected to the discharge canal. ~~In 1979, the east sluiceway was installed and connected to the intake embayment.~~ This East sluiceway discharge is designated as Outfall 003, and the West sluiceway discharge is designated as Outfall 012. During storms, some of the wash water may be discharged via the original sluiceway to the discharge canal through Outfall 012.

See Figure 7 for a schematic showing the two (2) fish return locations associated with these outfalls. An interchangeable baffle plate is utilized to divert the flow to one sluiceway or the other from the screenhouse. ~~The baffle plate directs organisms and debris; however, some water flows over this structure and into the alternate sluiceway. The east~~The East sluiceway (Outfall 003) was designed to maintain a minimum 6-inch depth and a water velocity of less than 8 fps, is covered with galvanized wire screen, and has no sharp turns. The discharge point of the ~~east~~East sluiceway is at the mean low water (MLW) level. On ~~occasion~~rare occasions, the end of the ~~east~~East sluiceway has been seen above the water level~~, causing any organisms present to experience a "free fall" scenario.~~. The ~~west~~West sluiceway discharge is above the MLW level in the discharge canal.

The travelling screen and fish return system is currently optimized for fish protection purposes.

### 2.5 Thermal Backwash

Three to five times each year during normal operations, the plant's output is reduced to about 50 percent of its maximum capacity, and a thermal backwash is conducted to control biological fouling. The backwash procedure involves heating non-chlorinated seawater from the condensers up to about 105 °F and then pumping this water to flow back through the traveling screens and out to the intake embayment. The treatment is maintained for up to one (1) hour at each intake bay separately. Scheduling of the thermal backwash treatments is coordinated with the highest ~~tide~~tides to achieve maximum coverage, preventing mussels from growing in the upper elevations of the intake structure. There are also occasional ~~non-thermal~~"regular" backwashes conducted as necessary, which ~~do not~~ use ~~heated~~ water~~. This discharge~~ that is heated to less than 105°F. These twin discharges are designated as Outfall 002 and the monitoring requirements are described below in Section 6.2. See Figure 8 for a schematic of the thermal backwash configuration.

### 2.6 Liquid Radioactive Waste Processing Systems and Effluent Controls

~~The liquid radioactive waste system collects, treats, stores, and/or disposes of all radioactive liquid wastes. Liquid waste is collected in sumps and drain tanks at various locations throughout~~

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~~the plant and is then transferred to the appropriate receiving tank for processing. The liquid radioactive waste (radwaste) control system is designed to segregate and then process liquid radioactive waste from various sources separately. The liquid radioactive waste is classified, collected, and processed as either clean (liquids having low concentrations of radioactive impurities and high conductivities), or miscellaneous radwastes (liquids having a high detergent or contaminant level, but with a low radioactivity concentration).~~

~~Clean liquid radioactive waste is collected from the equipment drain sumps located onsite. The liquid wastes are then transferred to the clean waste receiver tank for processing. The clean waste receiver tank also receives resin transfer water and ultrasonic resin cleaner flush water. Flatbed filters and/or radwaste filter demineralizers are used to treat the clean liquid radioactive waste prior to its collection in the treated water holding tanks. Liquid waste within the holding tanks is sampled and analyzed and usually returned to the condensate storage tanks or the main condenser hot well for reuse within the facility. If the analysis of the clean liquid waste indicated high waste with abnormally high contaminants or high radioactivity, the clean liquid waste may be reprocessed. Clean liquid waste with abnormally high conductivity may be reprocessed in the chemical waste system or evaluated for controlled release into the circulating water discharge canal through the liquid radioactive waste header.~~

~~Chemical liquid radioactive wastes are collected from the facility's floor drain sumps. Collected liquid wastes are primarily from minor equipment leaks, tank overflows, equipment drains, and floor drainage. The liquid wastes are automatically transferred to the chemical waste receiver tanks when the sump is filled to a preset level. After decay and storage, the chemical liquid wastes are evaluated for discharge or reprocessing. Miscellaneous liquid radioactive wastes are collected from floor drains within the turbine washdown area, personnel decontamination areas, fuel cask decontamination area, reactor head washdown area, truck decontamination area, machine shop wastes, and retube building decontamination area. Miscellaneous liquid radioactive wastes primarily consist of water collected from equipment washdown and decontamination solution wastes, radiochemistry laboratory solution wastes, miscellaneous water waste, and personnel decontamination waste. The wastes are sampled and analyzed for radioactivity to evaluate them for controlled release or for transfer to the chemical waste receiver tank for reprocessing.~~

~~If the liquid radioactive waste meets~~Radioisotopes that meet the facility's Offsite Dose Calculation Manual (ODCM) criteria for controlled release~~, it~~ can be discharged on a controlled basis into the circulating water discharge canal through the liquid radioactive waste discharge header. ~~As the liquid waste passes through the~~This discharge ~~header, the radioactivity level~~is under USNRC's sole jurisdiction, is continuously monitored~~. The discharge~~, and is automatically terminated if the activity ~~exceeds~~would exceed preset levels. The facility's ODCM is used in accordance with the facility's USNRC operating license.

~~Drainage of liquid radioactive wastes from the Turbine and Reactor Building closed-cycle cooling water systems (TBCCW & RBCCW) as a result of plant outages are discharged through Outfall 011, as described in detail below.~~

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## 3.0 RECEIVING WATER DESCRIPTION

PNPS is located on the ~~northwest~~western shore of Cape Cod Bay in the Town of Plymouth, MA, as shown in Figure 2. Cape Cod Bay is a circular embayment of the Atlantic Ocean off the coast of eastern Massachusetts. All surface water discharges from PNPS discharge to Cape Cod Bay, which is designated as Class SA High Quality Waters by the MassDEP under the Commonwealth of Massachusetts Surface Water Quality Standards (SWQS). *See* 314 CMR 4.06(4~~).~~) & Figure 24.[5]

Class SA waters are described in the SWQS (314 CMR 4.05(4)(a)) as:

> These waters are designated as an excellent habitat for fish, other aquatic life and wildlife, including for their reproduction, migration, growth and other critical functions, and for primary and secondary contact recreation. In certain waters, excellent habitat for fish, other aquatic life and wildlife may include, but is not limited to, seagrass. Where designated in the tables to 314 CMR 4.00 for shellfishing, these waters shall be suitable for shellfish harvesting without depuration (Approved and Conditionally Approved Shellfish Areas). These waters shall have excellent aesthetic value.

The Massachusetts Division of Marine Fisheries (DMF) has identified portions of Cape Cod Bay ~~in the vicinity of the PNPS discharge~~ as approved for shellfishing. ~~The only exception~~DMF authorizations are subject to the United States Coast Guard's established exclusionary zone for PNPS, within which public access is ~~the shoreline area bordering~~proscribed. Surrounding the PNPS facility and extending to the edge of this designated ~~area~~exclusionary zone (CCB41.1), in which ~~shellfishing~~public access is prohibited.

## 4.0 LIMITATIONS AND CONDITIONS

The effluent limitations and all other requirements described herein may be found in the draft permit. The basis for the limits and other permit requirements are described below. The Discharge Monitoring Report (DMR) data for the period of January 2008 through December 2014 were reviewed as part of developing the Draft Permit~~.~~, and no subsequent DMRs to date would alter those analyses. This time period is referred to in this Fact Sheet as the "monitoring period." This DMR data is summarized in Attachment A and includes data for process and cooling water from Outfalls 001, 002, 003, 010 and 011. The limited monitoring data from the stormwater outfalls is discussed below in Section 6.4.

[5] http://www.mass.gov/eea/docs/dep/service/regulations/314cmr04.pdf

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## 5.0 PERMIT BASIS: STATUTORY AND REGULATORY AUTHORITY

### 5.1 General Requirements

The Clean Water Act (CWA) prohibits the discharge of pollutants ~~to~~from a point source to the surface waters of the United States without authorization from a National Pollutant Discharge Elimination System (NPDES) permit, unless such a discharge is otherwise authorized by the statute. The NPDES permit is the mechanism used to implement technology-based and water quality-based effluent limitations and other requirements, including monitoring and reporting, ~~at the facility-specific level.~~for individual point-source discharges. This draft NPDES permit was developed in accordance with various statutory and regulatory requirements established in or pursuant to the CWA and any applicable State regulations. The regulations governing the EPA NPDES permit program are generally found at 40 C.F.R. Parts 122, 124, 125, and 136.

EPA bases NPDES permit limits on applicable technology-based and water quality-based requirements. Subpart A of 40 C.F.R. Part 125 establishes criteria and standards for the imposition of technology-based treatment requirements in permits under Section 301(b) of the CWA, including the application of EPA-promulgated effluent limitations and case-by-case determinations of effluent limitations under Section 402(a)(1) of the CWA. *See* 40 C.F.R. § 125.3. The development of water quality-based standards is governed by a variety of legal requirements, including CWA §§ 301(b)(1)(C), 303, 401 and 510, as well as 40 C.F.R. § 122.44(d) and Part 131. Permit limits must, at a minimum, satisfy federal technology standards, but also must satisfy any more stringent water quality-based requirements that may apply. Put differently, between technology-based and water quality-based requirements, whichever is more stringent governs the permit. In addition, when setting permit limits, EPA must consider the requirements in the existing permit in light of the CWA's "anti-backsliding" requirements, which generally bar a reissued permit from relaxing limits as compared to the limits in an earlier permit, unless a specific anti-backsliding exception applies. *See* 33 U.S.C. § 1342(*o*); 40 C.F.R. § 122.44(*l*).

### 5.2 Technology-Based Requirements

#### 5.2.1 General

Technology-based treatment requirements represent the minimum level of control that must be imposed under Sections 301(b) and 402 of the CWA (see also 40 C.F.R. Part 125, Subpart A). Technology-based limits are set to reflect the pollutant removal capability of particular treatment technologies that satisfy various narrative treatment technology standards set forth in the CWA. These standards, in essence, define different levels of treatment capability. Specifically, pollutant discharges must be limited to a degree that corresponds with the best practicable control technology currently available (BPT) for certain conventional pollutants, the best conventional control technology (BCT) for other conventional pollutants, and the best available technology economically achievable (BAT) for toxic and non-conventional pollutants. *See* 33 U.S.C. §§ 1311(b)(1)(A), (b)(2)(A), (E), (F); 40 C.F.R. § 125.3(a). For "new sources" of pollutant discharges, *see* 40 C.F.R. §§ 122.2 (definition of "new source"); 122.29(a), discharges of pollutants must be limited to a degree corresponding to the "best available demonstrated control technology" (BADT), 33 U.S.C. §§ 1316(a), (b).

In general, the statute requires that facilities like PNPS comply with technology-based effluent limitations as expeditiously as practicable, but in no case later than March 31, 1989. *See* 40 C.F.R. §125.3(a)(2). Since the statutory deadline for meeting applicable technology-based effluent limits has passed, NPDES permits must require immediate compliance with any such limits included in the permit. When appropriate, however, schedules by which a permittee will attain compliance with new permit limits may be developed and issued in an administrative compliance order under CWA § 309(a) or some other mechanism.

When EPA has promulgated national effluent limitation guidelines (ELGs) applying the statute's narrative technology standards (such as the BAT standard) to pollutant discharges from a particular industrial category, then those ELGs provide the basis for any technology-based effluent limits included in NPDES permits issued to individual facilities within that industrial category. 33 U.S.C. §§ 1342(a)(1)(A~~), (b~~); *see also* 40 C.F.R. §§ 122.43(a) and (b), 122.44(a)(1), 125.3. In the absence of a categorical ELG, however, EPA develops technology-based effluent limits by applying the narrative technology standards on a case-by-case, Best Professional Judgment (BPJ) basis. 33 U.S.C. § 1342(a)(1)(B); *see also* 40 C.F.R. §§ 122.43(a), 122.44(a)(1), 125.3(c). When developing technology-based effluent limitations, EPA considers the terms of the particular technology standard in question, as specified in the statute and regulations, *id.*, along with a variety of factors enumerated in the statute and regulations for each specific technology standard. 33 U.S.C. § 1314(b); *see also* 40 C.F.R. § 125.3(d). In developing ELGs, EPA's analysis is conducted for an entire industrial category or sub-category. In the absence of an ELG, EPA develops technology-based limits on a BPJ basis for a particular permit by conducting the analysis on a site-specific basis. As one court has explained:

> [i]n what EPA characterizes as a "mini-guideline" process, the permit writer, after full consideration of the factors set forth in section 304(b), 33 U.S.C. § 1314(b), (which are the same factors used in establishing effluent guidelines), establishes the permit conditions "necessary to carry out the provisions of [the CWA]." § 1342(a)(1). These conditions include the appropriate ... BAT effluent limitations for the particular point source. ... [T]he resultant BPJ limitations are as correct and as statutorily supported as permit limits based upon an effluent limitations guideline.

*NRDC v. EPA*, 859 F.2d 156, 199 (D.C. Cir. 1988).

#### 5.2.2 ELGs for the Steam Electric Power Generating Point Source Category

EPA promulgated ELGs for the Steam Electric Power Generating Point Source Category (the Steam Electric ELGs) in 1982. See 40 C.F.R. Part 423. The provisions of this part are applicable to discharges resulting from the operation of a generating unit by an establishment primarily engaged in the generation of electricity for distribution and sale which results primarily

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from a process utilizing fossil-type fuel (coal, oil, or gas) or nuclear fuel in conjunction with a thermal cycle employing the steam water system as the thermodynamic medium. *See* 40 C.F.R. § 423.10. Since the operations at PNPS prior to the anticipated cessation of electric-generating activities ("shutdown") fall within those defined in this industrial category, they are covered by these ELGs, although PNPS's post-shutdown activities will not fall within those defined in this industrial category and hence will not covered. Revised ELGs for the Steam Electric Category were proposed on June 7, 2013 and the Final Rule for these ELGs was published on November 3, 2015 and became effective on January 4, 2016. *See* 80 Fed. Reg. 67,838 (Nov. 3, 2015). EPA has applied the revised ELGs in the draft permit conditions applicable to the pre-shutdown period. The Steam Electric ELGs set BPT standards for certain pollutants contained in low volume wastes, fly ash and bottom ash transport water, metal cleaning wastes, cooling water, and cooling tower blowdown. In addition, the ELGs set BAT standards for certain pollutants in cooling water, cooling tower blowdown, and chemical metal cleaning wastes. When an applicable categorical standard has not been developed, or is inapplicable (as is the case with respect to the post-shutdown period at PNPS), technology-based limits would instead be developed on a BPJ, case-by-case basis. *See* 40 C.F.R. § 125.3(c)(3).

The revised Steam Electric ELGs that apply to this facility are similar to the previous ELGs and include the following effluent limits based on BPT or BAT:

a. for low volume waste sources:
  (1) 100.0 mg/L as a maximum and 30.0 mg/L as a 30-day average for Total Suspended Solids (TSS), and
  (2) 20 mg/L as a maximum and 15 mg/L as a 30-day average for oil and grease (O&G);
b. for all discharges, except once-through cooling water: 6.0-9.0 SU for pH;
c. for all discharges: no discharge of polychlorinated biphenyl compounds (PCBs);
d. for once-through cooling water: 0.2 mg/L as a maximum for total residual chlorine (or total residual oxidants for intake water containing bromides); and
e. for cooling tower blowdown: 0.5 mg/L as a maximum and 0.2 mg/L as an average for free available chlorine.

The Steam Electric ELGs, however, establish categorical effluent limitations under the various technology standards for only some of the pollutants discharged by facilities in this industry. The Steam Electric ELGs do not include effluent limitations on the discharge of heat. In the absence of technology-based effluent guidelines, the permit writer is authorized under Section 402(a)(1)(B) of the CWA to establish effluent limitations on a case-by-case basis using Best Professional Judgment (BPJ). Therefore, any technology-based thermal discharge limits would be based on a BPJ application of the BAT technology standard, which is applicable to non-conventional pollutants such as heat. As discussed further below, however, the permit's thermal discharges limits may, instead, be based on water quality-based requirements or a thermal discharge variance under CWA § 316(a)). 33 U.S.C. § 1326(a).

In addition to the Steam Electric ELGs, Sector O of the 2015 Multi-Sector General Permit (MSGP) (Steam Electric Generating Facilities) contains Stormwater Pollution Prevention Plan

(SWPPP) components, along with a benchmark monitoring concentration of 1.0 mg/L total iron. *See* 2015 MSGP, Part 8.O.7. Since PNPS ~~is~~, prior to shutdown, will be engaged in the activities covered by this sector, EPA has included technology-based permit conditions for stormwater discharges from these MSGP provisions in the SWPPP requirements of the draft permit in Section 9.0 below.

### 5.3 Water Quality-Based Requirements

Water quality-based limitations are required in NPDES permits when EPA and ~~the State~~a state determine that effluent limits more stringent than technology-based limits are necessary to maintain or achieve state or federal water quality standards (WQS). CWA § 301(b)(1)(C), 33 U.S.C. § 1311(b)(1)(C). State WQS consist of three parts: (a) designated uses for a water body or a segment of a water body; (b) numeric and/or narrative water quality criteria sufficient to protect the assigned designated use(s); and (c) antidegradation requirements to ensure that once a use is attained it will not be degraded. The Massachusetts Surface Water Quality Standards (MA SWQS), found at 314 CMR 4.00, include these elements. These standards also include requirements for the regulation and control of toxic constituents and require that EPA criteria, established pursuant to Section 304(a) of the CWA, shall apply for pollutants not otherwise listed in the MA SWQS, unless MassDEP has established a site-specific criterion. NPDES permit limits must be set to assure that these ~~state WQS~~MA SWQS requirements will be satisfied in the waters receiving the permitted discharge.

When using chemical-specific numeric criteria to develop permit limits, both the acute and chronic aquatic-life criteria, expressed in terms of maximum allowable in-stream pollutant concentration, are used. Acute aquatic-life criteria are considered applicable to daily time periods (maximum daily limit) and chronic aquatic-life criteria are considered applicable to monthly time periods (average monthly limit). Chemical-specific limits may be set under 40 C.F.R. § 122.44(d)(1) and are implemented under 40 C.F.R. § 122.45(d).

~~A facility's design flow is used when deriving~~Where sufficient information and assurances are available, structural flows may be used to derive constituent limits for daily, monthly or weekly time periods, as appropriate. Also, the dilution provided by the receiving water is factored into this process where appropriate. Narrative criteria from ~~the state's water quality standards~~MA SWQS may apply to require limits on the toxicity in discharges where (a) a specific pollutant can be identified as causing or contributing to the toxicity but the state has no numeric standard, or (b) the toxicity cannot be traced to a specific pollutant.

Water quality-based effluent limitations may be established based on a calculated dilution factor derived from the available dilution in the particular receiving water at the point of discharge. In coastal and marine waters, Massachusetts SWQS require the State to "establish the extreme hydrologic conditions at which aquatic life criteria must be applied on a case-by-case basis. In all cases, existing uses shall be protected and the selection shall not interfere with the attainment of designated uses." 314 CMR 4.03(3)(c).

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As stated above, NPDES permits must contain effluent limits more stringent than technology-based limits when necessary to maintain or achieve state WQS. The permit must address any pollutant or pollutant parameter (conventional, non-conventional, toxic and whole effluent toxicity) that is or may be discharged at a level that will cause, have "reasonable potential" to cause, or contribute to an excursion above any WQS. 40 C.F.R. §122.44(d)(1). An excursion occurs if the projected or actual in-stream concentration exceeds the applicable criterion or a narrative criterion or designated use is not satisfied. In determining reasonable potential, EPA considers a number of factors, including (a) existing controls on point and non-point sources of pollution; (b) pollutant concentration and variability in the effluent and receiving water as determined from the permit application, monthly DMRs, and State and Federal Water Quality Reports; (c) sensitivity of the species to toxicity testing; (d) known water quality impacts of processes on wastewater; and, where appropriate, (e) dilution of the effluent in the receiving water.

### 5.4 Section 316(a) of the Clean Water Act

Heat is defined as a pollutant under Section 502(6) of the CWA. 33 U.S.C. § 1362(6). As with other pollutants, discharges of heat (or "thermal discharges") must, in general, satisfy both technology-based standards (specifically, the BAT standard) and any more stringent water quality-based requirements that may apply. With regard to water quality requirements, state WQS typically include numeric temperature criteria, and may also include narrative criteria and designated uses that apply to particular water body classifications and could necessitate restrictions on thermal discharges.

Beyond technology-based and water quality-based requirements, CWA § 316(a), 33 U.S.C. § 1326(a), authorizes the permitting authority to grant a variance under which thermal discharge limits less stringent than technology-based and/or water quality-based requirements may be authorized if the biological criteria of Section 316(a) are satisfied. Furthermore, the Massachusetts SWQS provide that:

> alternative effluent limitations established in connection with a variance for a thermal discharge issued under [CWA § 316(a)] and 314 CMR 3.00 are in compliance with 314 CMR 4.00. As required by [CWA § 316(a)] and 314 CMR 3.00, for permit and variance renewal, the applicant must demonstrate that alternative effluent limitations continue to comply with the variance standard for thermal discharges.

314 CMR 4.05(4)(a)(2)(c) (for Class SA waters). Therefore, thermal discharge limits set pursuant to a variance under CWA § 316(a) are deemed by the state to satisfy Massachusetts SWQS.

To qualify for a variance under CWA § 316(a), a permit applicant must demonstrate to the permitting agency's satisfaction that thermal discharge limits based on technology and water quality standards would be more stringent than necessary to assure the protection and propagation of a balanced, indigenous population (BIP) of shellfish, fish and wildlife in and on

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the body of water into which the discharge is made. 33 U.S.C. § 1326(a); 40 C.F.R. §§ 125.70, 125.73(a). The applicant must also show that its requested alternative thermal discharge limits will assure the protection and propagation of the BIP, considering the cumulative impact of its thermal discharge together with all other significant impacts on the species affected. 40 C.F.R. §§ 125.73(a), (c)(1)(i). If satisfied that the applicant has made such a demonstration, then the permitting authority may impose thermal discharge limits that, taking into account the interaction of the thermal discharge with other pollutants, will assure the protection and propagation of the BIP. 33 U.S.C. § 1326(a); 40 C.F.R. §§ 125.70, 125.73(a) and (c)(1)(i).

While a new facility obviously must make a prospective demonstration that its desired future thermal discharges will assure the protection and propagation of the BIP, a facility with an existing thermal discharge can perform either a prospective or a retrospective demonstration in support of its request for a § 316(a) variance. More specifically, "existing dischargers may base their demonstration upon the absence of prior appreciable harm in lieu of predictive studies." 40 C.F.R. § 125.73(c)(1). Alternatively, even if there has been prior appreciable harm, the applicant may base its variance request on a demonstration that "the desired alternative effluent limitations (or appropriate modifications thereof) will nevertheless assure the protection and propagation of a balanced, indigenous community of shellfish, fish and wildlife in an on the body of water into which the discharge is made." *Id.* § 125.73 (c)(1)(ii).

As stated above, if the demonstration is satisfactory to the permitting authority, then it may issue a permit with alternative, variance-based thermal discharge limits. If the demonstration fails to support the requested variance-based thermal discharge limits, however, then the permitting authority shall deny the variance request. In that case, the permitting authority shall either impose limits based on the otherwise applicable technology-based and water quality-based requirements or, in its discretion, impose different variance-based thermal discharge limits that are justified by the permit record. *In re Dominion Energy Brayton Point, LLC*, 12 E.A.D. 490, 500 & n.13, 534 n.68, 552 n.97 (EAB 2006). As part of its March 2000 section 308 letter submittal to EPA, Entergy included material that was considered a demonstration in support of extending the previously granted 316(a) variance from the 1991 permit. (AR #81, 384, and 393) See Section 7 below for a discussion of the thermal limits and the 316(a) variance and Fact Sheet Attachments B and C, which support these limits and the continuation of the variance.

### 5.5 Requirements for Cooling Water Intake Structures under CWA § 316(b)

PNPS withdraws water from Cape Cod Bay through one cooling water intake structure (CWIS); this water is used both for cooling at the main condenser and supported systems for producing

electricity and for cooling safety-related equipment, including facility shut-down systems. The withdrawal of seawater through PNPS' CWIS is subject to the requirements of CWA § 316(b). 33 U.S.C. § 1326(b). Section 316(b) mandates that any standard set for a point source under CWA §§ 301 or 306 must "require that the location, design, construction, and capacity of cooling water intake structures reflect the best technology available for minimizing adverse environmental impact." This is referred to as the Best Technology Available (BTA) standard and it is discussed in more detail in Section 8.0, below and in Attachment D.

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**5.6 Anti-backsliding**

~~A~~Ordinarily, a permit may not be renewed, reissued or modified with less stringent limitations or conditions than those contained in the previous permit unless in compliance with the anti-backsliding requirements of the CWA. *See* 33 U.S.C. § 1342(*o*); 40 C.F.R. § 122.44(*l*). EPA's anti-backsliding provisions prohibit the relaxation of permit limits, standards, and conditions except under certain circumstances. Effluent limits based on BPJ, water quality, and state certification requirements must also meet the anti-backsliding provisions found at Section 402(*o*) and 303(d)(4) of the CWA. The draft permit does not contain permit limits or conditions that are less stringent than the existing permit. Therefore, the anti-backsliding provisions are met.

**5.7 Antidegradation**

Federal regulations found at 40 C.F.R. § 131.12 require states to develop and adopt a statewide antidegradation policy that maintains and protects existing instream water uses and the level of water quality necessary to protect the existing uses, and maintains and protects the quality of the waters that exceed levels necessary to support propagation of fish, shellfish, and wildlife and to support recreation in and on the water. The Massachusetts Antidegradation Regulations, found at 314 CMR 4.04, apply to any new or increased activity that would lower water quality or affect existing or designated uses, including increased loadings to a waterbody from an existing activity. All existing instream uses and the level of water quality necessary to protect the existing uses of the receiving waters shall be maintained and protected.

There are no new or increased discharges being proposed with this permit reissuance. Therefore, EPA believes that the MassDEP is not required to conduct an antidegradation review regarding this permit reissuance.

**5.8 State Certification**

Under Section 401(a)(1) of the CWA, 33 U.S.C. § 1341(a)(1), EPA is required to obtain certification from the state in which the discharge is located that the provisions of the new permit will comply with all state water quality standards and other applicable requirements of state law, in accordance with Section 301(b)(1)(C) of the CWA. 33 U.S.C. § 1311(b)(1)(C); *see also* 33 U.S.C. § 1341(d). EPA permits typically include any conditions~~ required in the state's certification as being~~ necessary to ensure compliance with state water quality standards or other applicable requirements of state law. See 33 U.S.C. § 1341(d); 40 C.F.R. § 124.55(a)(2). Regulations governing state certification are set out at 40 C.F.R. §§ 124.53 and 124.55. As such, Section 401 requirements ordinarily are met. Nonetheless, EPA requires express certification which MassDEP has provided. EPA regulations pertaining to permit limits based upon water quality standards and state requirements are contained in 40 C.F.R. § 122.44(d).

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## 6.0 Explanation of Permit's Effluent Limitations

In Sections 5.2 and 5.3 above, EPA explained in general terms the technology-based and water quality-based requirements of the CWA. In this Section, EPA explains how it has applied these requirements in developing the draft NPDES permit for PNPS. As a whole, the draft permit's conditions are based on a combination of technology-based and water quality-based requirements, as well as a CWA §316(a) variance for thermal discharges.

The discussion below, and the draft permit itself, address PNPS's many outfalls as well as its many different types of pollutant discharges and its withdrawals of Cape Cod Bay water for cooling and other uses. Monitoring requirements are also addressed, as are individual permit changes requested by PNPS.

### 6.1 Outfall 001

The circulating water (CW) system discharges condenser non-contact cooling water through Outfall 001. The CW system withdraws ~~salt~~ water from Cape Cod Bay, which is chlorinated with sodium hypochlorite on an intermittent basis ~~(~~typically during spring, summer, and fall, up to 2 hours/day~~)~~, one hour for each CW pump, before entering the cooling system. Chlorine is the only biocide approved for use at PNPS; no other biocide ~~shall be~~is used without prior EPA approval. The permittee ~~currently~~periodically adds sawdust to the CW system to find and seal condenser leaks as necessary.

Sampling for Outfall 001 is conducted in the discharge canal, below the footbridge, downstream from where the flow from Outfall 001 commingles with flows from Outfalls 003, 004, 005, 010, 011, and 014. Since the majority of water in the discharge canal (greater than 95% under most conditions) consists of flow from Outfall 001, this sampling point is believed to be representative of the Outfall 001 discharge. The permittee believes that the structural changes that would be necessary to sample Outfall 001 (installation of a sample pump in the outfall) prior to commingling with other flows would be significant in relation to the benefits achieved, since the majority flow volume in the discharge canal consists of cooling water flow. It is also uncertain that major modifications would not be required.

Due to the ~~announced~~planned shutdown of the PNPS as discussed in Section 1.0 above, which is expected to occur ~~no later than~~by June 1, 2019, this permit has developed two sets of conditions for Outfalls 001 and 010, to reflect the significant reduction in intake and effluent flows which will occur after ~~the~~ shutdown. The effluent limits pages of the draft permit are separated into three (3) specific sections. The first, Part I.A, lists the effluent limits that apply up through the date of the expected termination of ~~electricity~~electric generation (shutdown), while Part I.B applies from the date of shutdown and through expiration, and Part I.C applies to certain outfalls prior to and after shutdown, such as those for stormwater.

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#### 6.1.1 Flow

The current permit includes an effluent limitation at Outfall 001 for monthly average flow of 447 MGD and daily maximum flow of 510 MGD. The monthly average flow limit reflects the design intake flow at PNPS of the 2 CW pumps and is based on pump capacity curves. Review of DMR data (January 2008 through December 2014) reveals that these flow limitations have not been exceeded on any occasion. The monthly average flow rate has ranged from 217.7 - 446.4 MGD and daily maximum flow has been recorded consistently at ~~446.4~~155,500 gpm per pump, or 447.8 MGD. The daily maximum limit of 510 MGD is not ~~achievable by the facility based on the design capacity of the CW pumps~~customarily achieved. Therefore, the monthly average flow limit for Outfall 001 has been maintained at 447 MGD and the daily maximum flow limit has been reduced to ~~447~~448 MGD, to reflect ~~the maximum design~~actual operations. This reduction represents a 12% flow ~~of the~~reduction in authorized intake and discharges.

In its permit reapplication, the permittee requested removal of the effluent limitations for flow. However, volumetric flow rate is analogous to capacity in terms of the criteria for best technology available (BTA) in § 316(b) of the CWA. Volumetric flow rate is a significant parameter in § 316(b) demonstration studies as well as in determining heat loadings to the receiving water. Heat is considered to be a nonconventional pollutant. Accordingly, EPA will retain the effluent limitations on circulating cooling water flow rate for Outfall 001 in the draft permit as described above.

After shutdown, the permittee will need to operate one of the 2 CW pumps occasionally to ~~support~~provide dilution water for the liquid radiological waste disposal system, which will continue to be used after shutdown ~~operations.~~and fire-protection water on an emergency, backup basis. CW will not be used for cooling purposes subsequent to shutdown. The permittee believes that this intake would generally be used for a few hours at a time ~~and for not more than 5% of the time.~~, e.g., Entergy anticipates that it may need to operate the pump for up to 48 hours to achieve NRC-mandated dilution levels for liquid radiological waste under some circumstances. (Joe Egan - email of 10/28/15~~)~~). Therefore, the flow limits for Outfall 001 post-shutdown, as shown in Part I.B.1 of the permit, have been reduced to a monthly average of ~~11.2~~16 MGD with a daily maximum of 224 MGD. The monthly average flow represents one CW pump being used for up to ~~5%~~48-hours during a 28-day month (in recognition of the ~~time,~~fact that shorter months allow fewer days over which to average dilution water flows), whereas the 224 MGD represents the ~~cooling~~ water withdrawal rate of the pump.

#### 6.1.2 pH

The current permit requires that the pH shall not vary by more than 0.5 standard units from that of the intake water. However, there were no specific monitoring requirements established for pH in the current permit.

The Steam Electric Power Generating Point Source Category (40 C.F.R. Part 423) requires that the pH of all discharges, except for those of once through cooling water, shall be in the range of 6.0 - 9.0 SU. The Massachusetts SWQS (314 CMR 4.05(4)(a)(3)) require that for Class SA

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waters, the pH of the receiving water shall be in the range of 6.5 through 8.5 standard units and not more than 0.2 standard units outside of the natural background range.

To be consistent with the State WQS, the draft permit limits pH to the range of 6.5 to 8.5 standard units and not more than 0.2 standard units outside of the natural background range. The draft permit requires weekly monitoring of the discharge.

### 6.1.3 Total Residual Oxidants (TRO)

The current permit restricts biocide use at the facility to chlorine only. The current permit also requires that the chlorination cycle for the circulating cooling water systems shall not exceed two (2) hours in any one day for one cooling water point source unless the discharger demonstrates to the EPA and the State that discharge for more than two hours is required for macroinvertebrate control. In the current permit, the TRO concentration was limited to 0.1 mg/l as a monthly average and daily maximum in the discharge to Cape Cod Bay. Since the intake water contains bromides (i.e., saline water), the sampling parameter is expressed as TRO instead of total residual chlorine (TRC), in accordance with the Steam Electric Power Generating Point Source Category effluent guidelines (see 40 C.F.R. § 423.11).

The Steam Electric ELGs at 40 C.F.R. § 423.13 require that for any plant with a total rated electric generating capacity of 25 megawatts or greater, the quantity of pollutants discharged in once through cooling water from each discharge point shall not exceed 0.2 mg/L of total residual chlorine (TRC) as a maximum. The term total residual chlorine (or total residual oxidants for intake water with bromides) means the value obtained using the amperometric method for total residual chlorine described in 40 C.F.R. Part 136. Additionally, 40 C.F.R. § 423.13(b)(2) states that "total residual chlorine may not be discharged from any single generating unit for more than two hours per day unless the discharger demonstrates to the permitting authority that discharge for more than two hours is required for macroinvertebrate control. Simultaneous multi-unit chlorination is permitted." ~~As discussed above, however, the current permit imposes more stringent TRO limits - 0.1 mg/L as both a monthly average and daily maximum.~~ Review of DMR data reveals ~~that this daily maximum TRO limit has been exceeded on 3 occasions during the monitoring period, with~~ a maximum concentration of 0.19 mg/L TRO. ~~However, the~~The monthly average limit ~~has not been exceeded on any occasion, ranging~~ranges between 0 and 0.07 mg/l.

Consistent with 40 C.F.R. Part 423, the draft permit maintains the two (2) hour daily maximum dosing requirement noted above.

In this draft permit, EPA must consider the applicable water quality criteria in setting TRO limits for this outfall. For the purposes of this permit, all TRO discharges are believed to be predominantly comprised of TRC~~,~~; therefore, the limits based on the TRC criteria will be expressed as TRO limits. TRO limits would typically be calculated by multiplying the water quality criteria by the dilution available to the discharge. ~~To EPA's knowledge, there has not been any prior hydrodynamic modeling conducted that would provide an estimate of dilution for the discharge from the discharge canal. The fact sheet to the 1991 permit notes in the section~~

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~~discussing the boron limits:~~ in the waterbody. Here, the chronic and acute, marine water quality criteria for TRC are 7.5 ug/l and 13 ug/l, respectively. In order to assure that the current permit's TRO limit of 0.1 mg/L for Outfall 001 is maintained, therefore, a dilution factor of no less than 7.7 must be shown. Prior to shutdown, given a CW design flow of 447 MGD (or approximately 831 cfs), approximately 6,398.7 cfs of dilution water would be required to achieve a dilution factor 7.7. The surface area of the Bay is 1300 $km^2$, a bottom area of about 1600 $km^2$ and an average depth of 30 m.[6] Thus, the dilution factor is readily satisfied, i.e., by more than an order of magnitude.

~~"The boron discharge is further diluted by the passive entrainment of the jet from the cooling water canal into Cape Cod Bay. Nominally such shoreline discharges entrain about 5 times the jet flow rate in the receiving water."~~

~~The source of this statement could not be found and it is not clear if this is the dilution that would be available to pollutants in the discharge canal once they are discharged to Cape Cod Bay. The chronic and acute, marine water quality criteria for TRC are 7.5 ug/l and 13 ug/l, respectively.~~

Therefore, this draft permit ~~establishes~~retains the current TRO ~~limits~~limit of ~~7.5 and 13 ug~~0.1 mg/l, as both a monthly average and daily maximum, ~~respectively. EPA will consider any comments during the public comment period regarding the applicability of any particular dilution that should be used to calculate a less stringent TRO limit~~ with respect to pre-shutdown operations for Outfall 001.

Post-shutdown, the permittee will be prohibited from chlorinating the water that is withdrawn with the CW pump to support shutdown operations. Therefore, the permit has included a prohibition on the chlorination of this intake water in Part I.B.1 and has removed the TRO monitoring requirement and limits for this outfall post-shutdown.

Post-shutdown, the only source of TRO, aside from that naturally occurring in sea water, will be the chlorinated water from the SW system at Outfall 010. The 1991 permit limited TRO at Outfall 010, prior to commingling with any other discharge, at a monthly average of 0.5 mg/l and a daily maximum of 1.0 mg/l. For the 1991 permit, the permittee demonstrated that, with these limits set at Outfall 010, the concentration of TRO after mixing in the discharge canal with the flows from Outfall 001 would be below the limit of 0.10 mg/l set at Outfall 001. ~~However,~~

While the condenser cooling water flow on which this demonstration for TRO limits was based, will be terminated, with the exception of flows from one of the two CW pumps ~~which may be operated up to 5% of the time. As described in Section 6.6.5 below, criteria based limits for TRO have been established at Outfall 010 post-shutdown.~~on only an intermittent basis that will not exceed 16 MGD per month on average, EPA believes that it can be assured that the current permit's TRO limit of 0.10 mg/L set at Outfall 001 despite the reduced discharge volume via the SW pumps, provided that, instead of continuous chlorination, the chlorination regime for service

[6] AEI Report at vi.

water is limited to up to 2 hours per day. As set forth above, a dilution factor of 7.7 is needed to ensure that a TRO limit of 0.1 mg/L is maintained. On a maximum daily basis, assuming the operation of up to five SW pumps with a total combined design flow of 13,500 gpm (or 30 cfs), a dilution factor of 7.7 will be achieved and maintained if there is at least 231 cfs of dilution flow. On an average monthly basis, assuming the operation of up to four SW pumps with a total combined design flow of 10,800 gpm (or approximately 24.1 cfs), a dilution factor of 7.7 will be achieved and maintain if there is at least 186 cfs of dilution flow. Based on the discussion above, EPA believes that these dilution flows are reasonably assured.

In setting these limitations, however, EPA remains cognizant that more frequent chlorination of the service water system than up to 2 hours per day may be necessary in order to comply with NRC-mandated nuclear safety mandates, and therefore may be undertaken as needed consistent with NRC's exclusive authority over such activities. Thus, as described in Section 6.6.5 below, the current permit's for TRO limitations of 0.1 mg/L have been retained at Outfall 010 post-shutdown, because those limitations are more stringent than any limit that would be derived based on Massachusetts's acute water-quality standard for chlorine in marine water and the dilution provided by the receiving water.

### 6.1.4 Temperature & Temperature Rise

The current permit requires a daily maximum effluent limitation for temperature of 102°F, monitored continuously. The current permit also requires that the temperature rise, or delta T, not exceed 32°F. These temperature limits were based on the CWA § 316(a) variance that was granted in the current permit. Review of DMR data reveals that the daily maximum effluent temperature has ranged from 69 - 101.6 °F and the effluent limit has not been exceeded on any occasion during the monitoring period. The DMR data also reveal that the maximum rise in temperature was 31.6°F on two occasions and that the temperature rise limit has not been exceeded during the monitoring period.

The draft permit includes a maximum daily temperature limit of 102°F and maximum daily rise in temperature (delta T) limit of 32°F. These temperature limits and the associated § 316(a) variance are explained in detail in Section 7.0, below, and in Attachments B and C. The permittee requests that "Sample Type" for thermal parameters be changed to "Resistance Temperature Detector" (RTD), which is a type of electronic temperature monitoring device. This type of device is acceptable for temperature monitoring and the sample type of "recorder" on the permit limits page is an appropriate description for this device.

Post-shutdown, since the water withdrawn with the CW pump will no longer be used for condenser cooling, but to ~~support other operations, the draft permit limits the effluent temperature to a maximum daily limit of 85°F and a monthly average of 80°F, which are the temperature limits consistent with the MA SQWS for Class SA waters. *See* 314 CMR 4.05(4)(a)(2)(a). The permittee has estimated the delta T of this effluent will be up to 3°F above the intake temperature, presumably due to fact that even after the shutdown~~provide dilution flow, there will ~~be some ongoing equipment cooling discharges~~no longer be any thermal component to this discharge. Therefore, EPA has deleted the thermal limitation and monitoring requirements

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associated with the SSW system. (Joe Egan email of 10/28/15, AR#519). Although not specified in the emaildilution water discharge from Outfall 001 subsequent to shutdown. As discussed below in Section 6.6.6, however, it is assumed that this delta T is associated with the remaining cooling water flows within the SW system post-shutdown. Therefore, it isstill necessary to establish temperature limits for Outfall 010, which will be the sole continuous remaining thermal discharge in the discharge canal post-shutdown Although the MA SWQS generally limit any delta T to 1.5 °F, they also provide that temperature effluent limitations established pursuant to a § 316(a) variance "are in compliance with" MA SWQS. *Id.* Since the EPA concludes in Section 7.3 below that a continued § 316(a) variance for temperature allowing a delta T of 32°F during normal (pre-shutdown) operations will assure the protection and propagation of a balanced, indigenous population (BIP) of shellfish, fish and wildlife in and on the body of water into which the discharge is made, EPA concludes that a delta T of 3°F will likewise assure the protection and propagation of the BIP after shutdown, since the majority of the thermal component of the condenser cooling discharge will have been eliminated. Accordingly, the draft permit includes a maximum delta T of 3°F post-shutdown..

### 6.1.5 Oil and Grease

The current permit does not include O&G limits or monitoring at Outfall 001, and EPA is not aware of any existing O&G data for Outfall 001. Nor do theThe Steam Electric ELGs do not establish O&G limits for the discharge from Outfall 001 (*i.e.*, once-through cooling water). See) Prior to shutdown, see 40 C.F.R. Part 423, . The current permit does, however, include O&G limits for Outfalls 004 and 005, as discussed below in Section 6.4, and the draft permit proposes new technology-based limits for O&G at Outfalls 010, 011, and 014 based on the Steam Electric ELGs, as discussed below in Sections 6.6 and 6.7. All of these discharges commingle with the discharge from Outfall 001 prior to sampling for Outfall 001, which is conducted, as noted earlier, below the footbridge over the discharge canal. In order to ascertain O&G levels in the combined flows in the discharge canal, the draft permit establishes a monitoring requirement for O&G at Outfall 001, which will apply during both pre- and post-shutdown operations. The draft permit specifies a test method to be used to analyze for O&G and the minimum level (ML) of detection for this method of 5 mg/l.

### 6.1.6 Addition of biodegradable material

Due to occasional condenser leaks, the current permit provided that the addition of "a reasonable quantity of biodegradable and non-toxic material may be used to the extent necessary to find and/or seal the leak." The current permit further required the permittee to report the duration and estimated amounts of such material used.

The facility currently uses wood flour (sawdust) to find and/or seal condenser leaks and the draft permit includes a condition allowing the use of sawdust to seal condenser leaks to the extent necessary. The permittee shall report the type and approximate amount of material used on the DMR cover letter. The permittee shall be limited to using only sawdust or similar wood-based products for this purpose. If the permittee determines that another substance is required for this purpose, it shall request and receive approval from EPA prior to using such substance.

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### 6.2 Outfall 002

Thermal backwashes are necessary to control biological growth (biofouling) in the intake structures. Outfall 002 consists of thermal backwash water, which is heated water taken from the CW system. Outfall 002 flows back through the intake structure to the intake channel (also called the intake embayment). Chlorination is not conducted during backwashes, which cannot be performed at full power. The CW system (condenser) backwashes occur 4-5 times per year and consists of a pair of backwashes (one for each CW pump bay), lasting approximately 60 minutes for each bay; during 45 minutes of which the permittee raises the reactor power level so that the water temperature reaches at least 105°F. The permittee also conducts regular backwashes on an as-needed basis, *e.g.*,

#### 6.2.1 Flow

The current permit includes a daily maximum flow limit of 255 MGD, specified as "estimated when in use." This flow is based on the capacity of one of the CW pumps (155,500 gpm). The permittee backwashes one intake bay at a time, for a duration of about one hour each. The current permit also requires that the discharge shall not be more frequent than three hours a day twice a week for those periods when required to operate the plant most efficiently. The draft permit continues to limit thermal backwashes to once per week and for a maximum of three (3) hours for both intake bays. Although the typical backwash for each intake bay is completed within one (1) hour, under certain conditions, this time would need to be increased, so the three (3) hour maximum for the backwashing of both intake bays allows for such conditions.

The current permit notes that in addition to the thermal backwashes performed 4-5 times per year, non-thermal backwashes are performed 3-4 times per year. Although the current permit does not require monitoring of non-thermal backwashes, the draft permit requires monitoring of all backwashes through Outfall 002, whether they are thermal or non-thermal.

In a September 4, 2014 email from Joe Egan of PNPS to George Papadopoulos of EPA, the permittee proposed to reduce the maximum daily flow limit to 28 MGD, as opposed to the prior limit of 255 MGD, which was based on the flow rate of one circulating water pump. The draft permit includes a maximum daily flow limit of 28 MGD, as requested by the permittee. This permit limit is equivalent to the use of one CW pump (at 155,500 gpm) for a maximum of 3 hours per day.

Post-shutdown, the permittee has noted that it will no longer conduct thermal backwashes, but may need to conduct non-thermal backwashes. (Joe Egan - phone call of 12/21/15). Therefore, as shown in Part I.B.3 of the permit, there continue to be limits on the frequency and flows of such backwashes, as well as a limited pH range. This Part also prohibits the use of thermal backwashes after shutdown.

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6.2.2 pH

The current permit requires that the pH of the discharge shall not vary by more than 0.5 standard units from that of the intake water.

The Steam Electric Power ELGs (40 C.F.R. Part 423) requires that the pH of all discharges, except for those of once through cooling water, shall be in the range of 6.0 - 9.0 SU. The Massachusetts SWQS (314 CMR 4.05(4)(a)(3)), however, require that, for Class SA waters, the pH of the receiving water shall be in the range of 6.5 through 8.5 standard units and not more than 0.2 standard units outside of the natural background range. The draft permit limits pH to the range of 6.5 to 8.5 standard units and not more than 0.2 standard units outside of the natural background range to be consistent with the State WQS.

6.2.3 Total Residual Oxidants (TRO)

The CW system is typically chlorinated 2 hours per day; however, during thermal backwash chlorination of the CW system is not conducted. The draft permit requires monitoring of TRO once during each backwash to ensure the discharge does not contain any detectable TRO, as there may be some residual TRO in the cooling water system. Post-shutdown, since the intake water from the CW pump will no longer be chlorinated, there will not be expected to be any TRC contributing to TRO in the discharge. Therefore, there will no longer be any monitoring required for TRO post-shutdown.

6.2.4 Temperature

The current permit requires a daily maximum temperature limit of 120°F, measured continuously during each thermal backwash procedure. During the monitoring period, this limit has not been exceeded, with a high temperature of 114.9°F. In a September 4, 2014 email from Joe Egan of PNPS to George Papadopoulos of EPA, the permittee proposed to reduce the daily maximum temperature limit for Outfall 002 from 120°F to 115°F. The draft permit includes the more stringent maximum discharge temperature of 115°F, as requested by the permittee. Since this temperature is higher than that allowed by the MA SWQS, a variance from the MA SWQS has been granted as discussed in Section 7.3 below.

The permittee requests that "Sample Type" for thermal parameters be changed to "Resistance Temperature Detector" (RTD). As noted in Section 6.1.4. above, this type of sample is acceptable for temperature, therefore the draft permit shall require a "recorder" sample type, which is the generic term used for electronic device monitoring.

Post-shutdown, since the permittee is prohibited from conducting thermal backwashes and no heat will be added to the water for non-thermal backwashes, the effluent temperature limit has been eliminated.

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### 6.3 Outfalls 003 and 012

The source of the screen wash water (Outfall 003) is service water (SW) which has been dechlorinated, and possibly fire water in emergency conditions, which is not dechlorinated. Under normal operating conditions, the majority of this screen wash water is discharged to Outfall 003 to the intake embayment via a sluiceway added in 1980, but some also discharges to the discharge canal. During storm conditions, the majority of screen wash water is discharged to the discharge canal, mainly to prevent re-impingement of seaweed. The outfall to the discharge canal, which was previously not identified as a separate outfall, has been designated as Outfall 012 in the draft permit. (See Figure 7, also noted earlier in Section 2.4)

The current permit allows sampling at a representative point of the screen wash water flow. The draft permit specifies that screen wash water be sampled from the fish return sluiceway at Outfall 003, since this is where the majority of this flow is discharged. The draft permit also requires that the permittee document when routing of screen wash water to the discharge canal (Outfall 012) occurs along with the reason for such occurrence.

The permittee has requested that dechlorination be discontinued when screen wash water is discharged to Outfall 012. The permittee reasoned that during storm conditions when both circulating (seawater) pumps are in operation, dechlorination of screen wash water sent to the discharge canal via Outfall 012 could be discontinued due to increased discharge canal dilution, assuring that residual oxidants released to Cape Cod Bay are within permit limits. However, EPA does not agree, as it is expected that chlorinated screen wash water would be detrimental to the organisms washed from the screen that may survive during transit back to the receiving water. Although the mix of fragile vs. non-fragile species varies over time, there are periods when more non-fragile species are washed off the screens and survive the return to the receiving water. Therefore, the draft permit requires that all screen wash water be dechlorinated prior to use, with the exception of fire water that is used under emergency conditions.

Post-shutdown, the permittee believes that Outfall 012 will be the default flow path for the traveling screen washwaters. (Joe Egan email of 10/28/15). Therefore, Part I.B.4 of the permit allows this water to only be discharged to Outfall 012, including sampling from the fish return sluiceway at Outfall 012, with the same conditions as during normal operations as described below.

#### 6.3.1 Flow

The current permit (as modified) requires both a monthly average and daily maximum flow limitation of 4.1 MGD for Outfall 003. In the 1992 permit modification, the permitted flow for Outfall 003 was raised to 4.1 MGD to account for the possible amount of 0.9 MGD of screen wash water that would come from potable Station Fire water. This water shall be used only under emergency conditions when traveling screen operation is impeded by the accumulation of algae or other biological material and when approved by the NRC.

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Review of DMR data reveals that these limits have not been exceeded on any occasion, as neither monthly average nor daily maximum flow has exceeded 4.1 MGD. This flow limit of 4.1 MGD is based on the capacity of the booster pumps on 2 of the 5 service water bay pumps (1,100 gpm each for 24 hours per day, or 3.2 MGD) as well as 0.9 MGD for emergency fire water (at 500 gpm), which equals 4.1 MGD. The draft permit continues this flow limitation.

In its 1999 letter (Administrative Record (AR) #81), the permittee requested that flow be a monitor only parameter for this outfall, noting that this flow is intermittent. Although the total daily flow of 4.1 MGD may not be exceeded, this flow rate may be experienced if the permittee uses the fire water for screen wash water. Therefore, this limit has been maintained in the draft permit.

6.3.2 pH

The current permit requires that the pH of this discharge shall not vary more than 0.5 s.u. from the intake.

The Steam Electric Power ELGs (40 C.F.R. Part 423) require that the pH of all discharges, except once through cooling water, shall be in the range of 6.0 - 9.0 SU. The Massachusetts Water Quality Standards (WQS) (314 CMR 4.05(4)(a)(3)) require that for Class SA waters, the pH of the receiving water shall be in the range of 6.5 through 8.5 standard units and not more than 0.2 standard units outside of the natural background range. The draft permit limits pH to a range of 6.5 to 8.5 standard units and not more than 0.2 standard units outside of the natural background range to be consistent with the State WQS.

6.3.3 Total Residual Oxidants (TRO)

The current permit, as modified, requires that the screen wash water, with the exception of Station Fire water, shall be dechlorinated when in use and that the wash water shall contain no detectable TRO. The current permit does not, however, require that the permittee monitor TRO. To ensure that the screen wash water does not contain detectable levels of TRO, the draft permit requires monitoring of TRO once per month.

6.3.4 Temperature

The current permit requires that the temperature of the discharge shall at no time exceed the temperature of the intake water used for this discharge. The permittee has requested removal of this condition, since the process of screen washing does not add heat to the wash water. By removing the condition entirely, however, the draft permit would be less stringent than the current permit, which would not be consistent with anti-backsliding requirements at CWA § 402(o), 33 U.S.C. § 1342(o), and 40 C.F.R. § 122.44(*l*)(1). Part I.A.3.a. of the draft permit requires that the water used for screenwashing shall not have been used for any cooling purpose at the facility.

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### 6.4 Stormwater Outfalls (004, 005, 006, 007, and 013)

Outfalls 004, 005, 006, and 007 discharge untreated stormwater. In addition to stormwater, Outfall 005 also discharges a portion of the flows from Outfall 011 (and rarely, emergency discharge from the heating boiler blowdown via a floor drain), and Outfall 006 discharges water from fire water storage tanks (municipal water). Outfalls 004 and 005 discharge to the discharge canal and Outfalls 006 and 007 discharge to the intake embayment. As described in Section 6.7 below, the permittee is rerouting a portion of the Outfall 011 flows directly to the discharge canal at times, thereby bypassing Outfall 005 as its connection point to the discharge canal.

The 1991 permit required monitoring of these four (4) outfalls twice per year and during significant storm events, a term which was not defined in the 1991 permit. The last few years of DMR indicate very limited sampling from these outfalls.

During the 1995 permit renewal application process, a miscellaneous storm drain located at the boat launch area between storm drain outfalls 006 and 007 was identified. It drains a small portion of the facility which is similar in characteristics to the drainage areas for Outfalls 004, 005, 006, and 007, consisting mainly of roadways and other impervious surfaces. Since that notification, the permittee has installed additional security fencing and a concrete wall around portions of the perimeter of the property, including the point beyond where this storm drain discharge occurs through a conduit. The permittee reported that, at this point, the stormwater infiltrates in sandy soil prior to the intake embayment. The permittee also noted that sampling of stormwater through this storm drain is not feasible, due to its location between two security fences. (email from Joe Egan to George Papadopoulos of 2/10/16, AR#516). The permittee believes that this miscellaneous storm drain does not discharge directly to the intake embayment and that, even prior to the installation of the fencing and concrete wall, this outfall was only expected to discharge to the intake embayment in the event of extreme weather conditions. The draft permit recognizes and authorizes the outfall of this storm drain, designating it as Outfall 013, but establishes no monitoring requirements for this location, since the outfall is inaccessible, is not expected to discharge directly to Cape Cod Bay except under extreme storm events, and drains a relatively small area similar in character to the drainage area for Outfall 006.

The draft permit requires monthly sampling for the four stormwater outfalls. Sampling requirements have been more clearly defined in the footnotes of Part I.C.1 of the draft permit. The permittee has stated that some of its stormwater outfalls are difficult to access for monitoring purposes and that it is often unclear whether a particular storm event triggers the current monitoring requirement. (email from Joe Egan to George Papadopoulos of 8/8/14, AR# 517). Therefore, the draft permit allows for sampling of these outfalls to be conducted at the first accessible upstream manhole hydraulically connected to each stormwater outfall, if the discharge outfall at end-of-pipe is not accessible. Due to the limited stormwater sampling conducted pursuant to the current permit, the draft permit has increased the monitoring frequency for these outfalls from two per year to monthly and has provided a definition of storm events that trigger sampling requirements and a description of when stormwater sampling during such events must occur, so as to assure that more storms are eligible to be sampled.

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EPA reviewed the 2015 Multi-Sector General Permit's (MSGP) provisions for "Industrial Sector O, Steam Electric Generating Facilities" to determine whether there are any applicable monitoring requirements or other conditions for these stormwater discharges. The only applicable condition is a benchmark monitoring concentration of 1.0 mg/l for total iron. *See* MSGP, Part 8.O.7, *available at* http://go.usa.gov/cEMaQ. In the MSGP, pollutant benchmark concentrations are applicable to certain sectors or subsectors. Benchmark monitoring data are primarily used to determine the overall effectiveness of the control measures (BMPs) and to assist facilities in determining when additional corrective action(s) may be necessary to comply with the conditions of the MSGP. *See* MSGP, Part 6.2.1.

During the permit term, PNPS informed the Region that stormwater discharged from these outfalls includes stormwater that has accumulated in various electrical vaults on the property and that is periodically pumped out to the closest stormwater outfall in order to assure proper working condition of electrical cables and associated equipment in the vaults. The permittee indicated that the NRC requires the inspection of these vaults on a regular basis to assure that electrical equipment and wires are not submerged in water for extended periods of time. *See* United States Nuclear Regulatory Comm'n, *NRC Information Notice 2010-26: Submerged Electrical Cables* (Dec. 2, 2010). Consequently, facility personnel must routinely inspect these vaults, especially after storm events. PNPS identifies 25 electrical vaults on the property where it performs such pumping, nine (9) of which are outfitted with automated pumps, which are activated when waters reach a pre-determined level.

In order to assess the constituents of the water in these vaults, EPA sent PNPS a CWA Section 308 letter on March 24, 2015 requiring water sampling from seven (7) of the electrical vaults on the property for a variety of pollutants that could possibly be found. The results of this sampling, which were submitted with a letter of June 30, 2015 by PNPS, found that the sampled pollutants were either often not detected ~~or detected at low levels. TSS was detected in two (2) of the vaults at 4.4 and 4.8 mg/l. Cyanide was detected in one vault at an estimated concentration of 5.3 ug/l. Total phenols and phthalates were detected in four (4) vaults and polychlorinated biphenyls (PCBs) were detected in one vault.~~, detected at low levels, or observed below the minimum level ("ML") and/or method detection limit ("MDL"). An MDL is the "the minimum concentration of a substance that can be measured and reported with 99% confidence that the analyte concentration is greater than zero." *See* 40 C.F.R. Part 136 Appendix B. EPA has determined the MDL for various analytical tests and reported them in the Massachusetts Remediation General Permit, Permit No. MAG910000, Appendix VI. An ML "is the lowest level at which the analytical system gives a recognizable signal and acceptable calibration point for the analyte. The ML represents the lowest concentration at which an analyte can be measured with a known level of confidence." *See* Correspondence from Ken Moraff, EPA to David E. Noyes, Entergy (June 9, 2015). TSS was observed in two (2) of the vaults at 4.4 and 4.8 mg/l, which is below the ML. Cyanide was observed in one vault below the ML. Total phenols were observed without qualification above the MDL but below the ML in three vaults. Total phthalates were observed without qualification in three (3) vaults at levels below the ML. Polychlorinated biphenyls (PCBs) were observed in one vault below the ML. Among the metals sampling, antimony, iron, copper, zinc, lead, nickel, cadmium, and hexavalent chromium were

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~~detected~~observed in 1 or more vaults~~.~~, typically at levels below the ML and/or MDL, with the exception of iron, copper and zinc. When comparing these results to the marine water quality criteria, it was found that ~~the lead samples exceeded the chronic criterion of 8.1 ug/l on five (5) occasions,~~ the chronic and acute criteria for copper of 3.1 ug/l and 4.8 ug/l, respectively, were exceeded three (3) times each, and the chronic and acute criteria for zinc of 81 ug/l and 90 ug/l, respectively, were also exceeded three (3) times each.

~~Based on the results of this sampling, the draft permit establishes regular monitoring requirements to assess the need for effluent limitations.~~ Although some of the parameter values were above water quality criteria levels, this does not take into account the dilution that would be present when these discharges mix with the cooling water flows and other stormwater flows as they get discharged to Cape Cod Bay.

Based on the results of this sampling, the draft permit establishes regular monitoring requirements to assess the need for effluent limitations. In the draft permit, quarterly monitoring is required for water that has collected in five (5) separate electrical vaults, which are spread throughout the property and considered representative of the discharges from the twenty five (25) electrical vaults. Since each of these 5 vaults discharge to a nearby, permitted stormwater outfall, they have been designated as internal outfalls and numbered 004A, 005A, 005B, 007A and 007B, reflecting the stormwater outfall to which they are discharged. This sampling is required quarterly and does not need to be conducted during wet weather, since the addition of the water from the vaults can occur in wet or dry conditions. The parameters to be sampled include TSS, ~~total phenols, total PCBs, total phthalates, total cadmium~~, total copper, total iron~~, total lead~~, total zinc, and pH. This parameter listing reflects those that were detected in at least one (1) of the vaults at levels above the ML.

~~In addition, the draft permit establishes a one-time sampling requirement for all of the electrical vaults which were not sampled for the March 2015 Section 308(a) letter. These samples shall be analyzed for the same parameters which were required by that letter and listed in Permit Attachment C. EPA believes that a characterization of water collected in all of the vaults is warranted because these vaults are located throughout the property and the initial sampling showed the presence of several pollutants.~~

### 6.4.1 Flow

The current permit does not require reporting of flow from Outfalls 004, 005, 006, and 007. On its permit reapplication, the permittee reported the following flows through these storm water outfalls based on a gallons per minute (GPM) peak runoff rate for a ten (10) year storm of 1.5 inches per hour for one (1) hour: Outfall 004 = 2,379 GPM, Outfall 005 = 1,212 GPM, Outfall 006 = 812 GPM, and Outfall 007 = 5,819 GPM.

Although the 1991 permit listed flow as a parameter, it did not specify any monitoring frequency or limits for flow. The draft permit requires the permittee to estimate stormwater discharges from all outfalls associated with the storm events which are sampled.

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The draft permit requires the permittee to estimate the discharge through Outfall 005 without the contribution of flow from Outfall 011, which is monitored separately. As noted in Section 6.7 below, the permittee has redirected Outfall 011 flows directly to the discharge canal. The draft permit also requires the permittee to estimate the flow from Outfall 006 without the contribution of flow from the fire water storage tanks. For a month when there is flow from the fire water storage tanks to Outfall 006, the permittee shall estimate this flow and report it in an attachment to the DMR.

6.4.2 Total Suspended Solids (TSS)

Massachusetts WQS at 314 CMR 4.05(4)(a)(5) require that waters "shall be free from floating, suspended and settleable solids in concentrations or combinations that would impair any use assigned to this class, that would cause aesthetically objectionable conditions, or that would impair the benthic biota or degrade the chemical composition of the bottom." The current permit includes monthly average and daily maximum TSS limits of 30 mg/l and 100 mg/l, respectively, at Outfalls 004, 005, 006, and 007, measured twice per year. These limits were based on BPJ. Review of DMR data reveals that these limits have been exceeded on a few occasions.

Due to the lack of recent stormwater sampling data, EPA looked back to the period from 1998 to 2007, when more frequent stormwater sampling and analysis was conducted. At Outfall 004, the reported TSS concentration for this period ranged from 0.8 - 10.7 mg/l. At Outfall 005, the TSS concentration ranged from 1.0 - 133.3 mg/l; the monthly average concentration was exceeded on four occasions and the daily maximum concentration was exceeded once. At Outfall 006, the TSS concentration ranged from 0.8 - 30.4 mg/l; the monthly average concentration was exceeded on one occasion. At Outfall 007, the TSS concentration ranged from 1.3 - 100.3 mg/l, with three exceedances of the monthly average limit and one exceedance of the daily maximum limit.

To ensure that the narrative WQS for solids is maintained, the draft permit includes the TSS limits of 30 mg/l monthly average and 100 mg/l daily maximum from the current permit. Inclusion of these numeric, water quality-based limits is also consistent with anti-backsliding provisions of 40 C.F.R. § 122.44(l)(1). Due to the exceedences measured under the current permit and the lack of sampling data over roughly the last 10 years, the sampling frequency has been increased to quarterly, to more accurately characterize the discharges through these outfalls. Samples shall be taken during the first flush of wet weather, defined as during the first hour of the start a storm event greater than 0.1 inches in magnitude that occurs at least 24 hours from the previously measurable (greater than 0.1inch rain fall) storm event. If this is not feasible, then sampling shall be conducted as soon as possible after the first hour and the permittee shall provide a brief explanation of why a first flush sample was not taken. The permittee has noted that some required stormwater sampling over the last few years was not conducted due to the difficulty in accessing stormwater outfalls (email from Joe Egan to George P of 8/8/14). Therefore, the draft permit allows for sampling to be conducted in a manhole hydraulically connected to a particular stormwater outfall, if feasible and in particular if more easily accessible than the actual outfall during a storm event.

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6.4.3 Oil and Grease (O&G)

The current permit includes a daily maximum O&G limitation of 15 mg/l, measured twice per year, at Outfalls 004, 005, 006, and 007.

Massachusetts WQS at 314 CMR 4.05(4)(a)(7) provide that SA waters "shall be free from oil and grease and petrochemicals," which EPA and MassDEP interpret as requiring no detection of oil and grease in SA waters. DMR data indicate, however, that O&G has ranged from non-detect (ND) - 6.5 mg/l at Outfall 004, from ND - 10.0 mg/l at Outfall 005, from ND - 5.3 mg/l at Outfall 006, and from ND - 13.0 mg/l at Outfall 007 during the monitoring period. All four of these stormwater outfalls discharge directly to SA waters of Cape Cod Bay and prior monitoring data reveal that O&G is or may be discharged at levels that will cause, have the reasonable potential to cause, or contribute to an excursion above the water quality standard, which, as noted above, provides that SA waters "shall be free from oil and grease and petrochemicals." Therefore, the draft permit establishes a daily maximum O&G limitation of non-detect for Outfalls 004, 005, 006 and 007. The draft permit specifies a test method that shall be used to analyze for O&G, and the minimum level (ML) of detection for this method of 5 mg/l will be the level at which compliance with this limit is determined. Essentially, to be in compliance with this limit, samples must be non-detect for O&G using the test method specified in the draft permit. In addition, the draft permit has established an O&G monitoring requirement at Outfall 001 which is monitored below the foot bridge over the discharge canal, to assure that O&G is not detected at the point of discharge to Cape Cod Bay. These conditions will ensure that WQS in the receiving water are satisfied.

Samples must be taken during the first flush of wet weather, as defined above and in the permit. In addition to the numeric maximum daily limits for O&G, the Storm Water Pollution Prevention Plan (SWPPP) includes best management practices (BMPs) to address potential contributions of O&G (see discussion in Section 9, below). In its SWPPP, the permittee must describe measures it will take to assure that any sources of oil and grease in all areas contributing to these outfalls are identified and minimized.

6.4.4 pH

The current permit requires that the pH shall not be less than 6.0 standard units nor greater than 8.5 standard units or not more than 0.2 standard units outside the naturally occurring range. This permit requirement did not require monitoring and reporting of the effluent pH, therefore no pH data is available. The current permit limit range is slightly less stringent than the Massachusetts WQS, 314 CMR 4.05(4)(a)(3), which require that for Class SA waters, the pH of the receiving water shall be in the range of 6.5 through 8.5 standard units and not more than 0.2 standard units outside of the natural background range.

The draft permit limits pH to a range of 6.0 to 8.5 standard units (SU) and not more than 0.2 SU outside of the natural background range for Outfalls 004, 005, 006, and 007. Although the lower end of the pH range is below that of the MA WQS limit of 6.5 s.u., the dilution available to these discharges is such that the range of 6.5 to 8.5 s.u. is expected to be met instream. Inclusion of

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these limits is consistent with anti-backsliding provisions at 40 C.F.R. 122.44(*l*)(1). Samples shall be taken during the first flush of wet weather, as defined above and in the permit.

### 6.5 Outfall 008

The modification to the current permit, which was effective in August of 1994, authorized the discharge of untreated sea foam suppression water from Outfall 008. Entergy informed EPA that sea foam suppression water was not used during the current permit period and ~~will~~that its use is not ~~be used~~anticipated in the future. (PNPS Trip Report, 1/24/2013, AR# 518). The permittee has subsequently explained, however, that allowance for use of sea foam suppression must still be maintained in recognition of the potential risk that excessive sea foam may blow onto electrical equipment at the facility, resulting in dangerous conditions and loss of off-site power events, as has occurred historically at the facility several times since 1982. Accordingly, discharge of sea foam suppression water and use of Outfall 008 ~~is not~~will remain authorized ~~by the draft permit~~.

### 6.6 Outfall 010

Outfall 010 discharges plant service non-contact cooling water [Salt Service Water (SSW) System] which undergoes continuous chlorination with sodium hypochlorite. Water for the SSW system is withdrawn from Cape Cod Bay through the CWIS. Service water is the ultimate heat sink for critical nuclear cooling systems within the plant, including the turbine building closed-cycle cooling water (TBCCW) system and the reactor building closed-cycle cooling water (RBCCW) system. Both the SSW and RBCCW systems are safety related and are subject to U.S. NRC regulatory requirements. The discharge through Outfall 010 is classified as a low volume waste source pursuant to 40 C.F.R. § 423.11.

Outfall 010 is sampled downstream of the heat exchangers, via grab sample valves. Outfall 010, discharges into the discharge canal and combines with once-through cooling water from the main condensers (Outfall 001). The SSW system is not chlorinated during refueling outages because the CW pumps are shut down and there is not adequate dilution to allow continuous release of effluent water with detectable residual chlorine from the SSW system into Cape Cod Bay.

#### 6.6.1 Flow

The current permit includes a monthly average flow limitation of 19.4 MGD, which may be estimated from pump capacity curves and approximate time of discharge. Review of DMR data reveals that the flow limitation has not been exceeded on any occasion, with the highest recorded flow of 14.5 MGD during the monitoring period. This flow limitation is based on 5 pumps operating at 2,700 gpm each, discharging continuously (24 hours/day). However, the permittee typically operates a maximum of 4 of the 5 pumps at a time under most conditions. ~~The~~Prior to shutdown, the draft permit includes a monthly average flow limitation of 19.4 MGD and a daily maximum flow of 19.4 MGD, reflecting the actual capacity of the 5 SSW pumps.

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The current permit requires that the discharge through Outfall 010 be sampled "at the heat exchanger before this stream mixes with any other stream going to the discharge." According to the permittee, the current sampling location is via grab sample valves downstream of the heat exchangers but prior to being discharged to the discharge canal where it mixes with other flows. The draft permit requires that samples be taken at a representative location of the discharge exiting from the heat exchangers and prior to mixing with any other flows.

After shutdown, the flow limits for Outfall 010 shown in Part I.B.2 of the permit reflect the ~~reduced use of intake water~~potential need for the use of up to four pumps for the SSW~~.~~ during certain months, and allow for the use of up to all five SSW pumps during a 24-hour period, in recognition that the use of all five pumps may still be potentially necessary under certain conditions. These limits, which will take effect ~~no later than~~upon cessation of electric-generating operations (presently anticipated June 1, 2019~~,~~), will be a monthly average limit of ~~7.8~~15.6 MGD and a daily maximum limit ~~15.6~~19.4 MGD. The ~~monthly average limit is based on the permittee's expected use of up to~~ permittee believes that fewer pumps may potentially be adequate for post-shutdown activities at PNPS, and that the permittee may use as few as up to two (2) SSW pumps for the majority of time post-shutdown ~~for safety and reliability purposes. The daily maximum limit of 15.6 MGD represents the capacity for 4 of the 5 SSW pumps, which may be needed under some scenarios.~~, although conservatism is still warranted in recognition of the fact that the post-shutdown period will represent a new operational dynamic for the facility. (Joe Egan phone call of 12/21/15) EPA will evaluate the permittee's post-shutdown use of the SSW after one (1) year following shutdown to assess whether further modification of the SSW flow limitations is warranted.

6.6.2 Total Suspended Solids (TSS)

The current permit does not include TSS requirements for this outfall. The discharge through Outfall 010, however, is classified as a low volume waste source pursuant to the ELGs, meaning that the technology-based limits for TSS in the ELGs are applicable to this discharge~~.~~ during the pre-shutdown period. Therefore, the draft permit has established the technology-based numeric limits for low volume waste in the ELGs at Outfall 010, including a daily maximum TSS concentration of 100 mg/l and a monthly average TSS concentration of 30 mg/l.

6.6.3 Oil and Grease (O&G)

The current permit does not include O&G requirements for this outfall. As stated above, since this discharge is classified as a low volume waste source pursuant to the ELGs, technology-based limits for O&G in the ELGs are applicable to this discharge~~.~~ during the pre-shutdown period. The draft permit applies the limits in the ELGs for low volume waste, including a daily maximum O&G concentration of 20 mg/l and a monthly average O&G concentration of 15 mg/l. As noted in Section 6.1.5 above, the draft permit also establishes a monitoring requirement for O&G at Outfall 001 for pre and post-shutdown conditions to provide data to enable the agencies to assess whether there are detectable levels of O&G at a point after which the discharges from all of the outfalls to the discharge canal have combined.

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#### 6.6.4 pH

The current permit does not include monitoring requirements for pH. The Steam Electric ELGs require that the pH of all discharges, except once through cooling water, shall be within the range of 6.0 - 9.0 SU. The Massachusetts Water Quality Standards (WQS) [314 CMR 4.05(4)(a)(3)] require that for Class SA waters, the pH of the receiving water shall be in the range of 6.5 through 8.5 standard units and not more than 0.2 standard units outside of the natural background range. The draft permit includes a technology-based numeric pH range of 6.0 to 9.0 standard units consistent with the Steam Electric ELG. This range is less stringent than the range required for discharges to Class SA waters of 6.5 to 8.5 s.u. However, as discussed in Section 6.1.2 above, the draft permit requires that the discharge at Outfall 001, which is sampled at a point after commingling with Outfall 010, among others, has the pH range required for Class SA waters, that is, 6.5 to 8.5 s.u.

#### 6.6.5 Total Residual Oxidants (TRO)

The current permit allows use of continuous chlorination of SW system cooling water for macroinvertebrate control. The ELGs prohibit chlorination for more than two hours per day unless the permittee can demonstrate that such discharge is required for macroinvertebrate control. PNPS had previously demonstrated that macroinvertebrate fouling occurs in the SSW System and that continuous chlorination of the SSW system is required to be in conformance with the U.S. NRC Generic Letter 89-13. As detailed in the fact sheet of the 1991 permit, the permittee demonstrated that, with a daily maximum TRO concentration of 1.0 mg/l for the SSW system, the maximum TRO concentration after the SSW mixes with the condenser cooling water would be 0.04 mg/l at the end of the discharge canal. For these reasons, the draft permit authorizes continuous chlorination of the SSW system during the pre-shutdown period.

The current permit requires a monthly average and daily maximum TRO limitation of 0.5 mg/L and 1.0 mg/L, respectively, monitored continuously and prior to mixing with the condenser cooling water discharge through Outfall 001, or any other flows. The permittee has determined these levels are necessary for adequate macroinvertebrate control in its cooling equipment. The current permit also allows the permittee to submit manual grab samples taken four times per day in lieu of the continuous monitoring data if the continuous TRO monitoring equipment should become inoperative.

Review of DMR data reveals that daily maximum TRO, in the form of TRC, has been exceeded on five (5) occasions, with a highest recorded daily maximum TRO concentration of 2.4 mg/L. The monthly average TRO effluent limitation has not been exceeded on any occasion. The draft permit continues to require a monthly average TRO limit of 0.50 mg/l and a daily maximum limit of 1.0 mg/l at Outfall 010 until the shutdown occurs.

Post-shutdown, the condenser cooling water flow on which the original demonstration for these TRO limits was based will be terminated, with the exception of flows from one of the two CW pumps which may be operated for up to ~~5% of the time~~48 hours each month. The draft permit will set WQB limits for total residual oxidants (TRO) of up to 0.1 mg/L, as both a daily

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maximum and average monthly limit, based on ~~WQC~~it having been demonstrated that these limits are more stringent than any limit that would be derived based on Massachusetts’s WQS for total residual chlorine (TRC) in marine waters and the dilution provided by the receiving water, as explained in Section 6.1.3 above. The chronic and acute, marine water quality criteria for TRC are 7.5 ug/l and 13 ug/l, respectively. ~~End-of-pipe TRC limits would typically be calculated by multiplying the water quality criteria by the dilution available to the discharge. To EPA’s knowledge, there has not been any prior hydrodynamic modeling conducted that would provide an estimate of dilution for the discharge from the discharge canal.~~ In addition, ~~the permittee may choose to demonstrate to~~ EPA and ~~the~~ MassDEP recognize that discharge of TRC levels above ~~criteria are~~these limits may be required for macroinvertebrate control post-shutdown ~~and shall include any dilution estimates based on an acceptable dilution model of Cape Cod Bay in the vicinity of the discharge. EPA and MassDEP would consider whether to establish less stringent limits for TRO based on review of any such demonstration~~in order to comply with NRC-mandated safety requirements, and will be undertaken consistent with those requirements if necessary.

6.6.6 Temperature

The current permit did not establish any temperature limits for Outfall 010. Effluent temperature and delta T limits that were established for Outfall 001, which comprised more than 95% of the flow in the discharge canal, the rest being the continuous flow from Outfall 010 in addition to other flows which were intermittent. As noted earlier, the condenser cooling water flow will terminate from the shutdown and beyond, with only one CW pump that ~~must~~will be operated for non-cooling dilution water purposes for up to ~~5% of the time to support decommissioning activities~~48 hours each month. (See Joe Egan email of 10/28/15, AR#519) Therefore, it is necessary to establish temperature limits for Outfall 010, which will be the sole continuous remaining thermal discharge in the discharge canal post-shutdown. Although some of the flows through the SW system are cooling water, the permittee believes that a delta T of no greater than 3°F would be expected. (See Joe Egan email of 10/28/15, AR #519). The draft permit has established a daily maximum effluent temperature ~~limits at a maximum daily~~ limit of ~~85~~102°F and a ~~monthly average of 80°F, which are the temperature limits consistent with the MA SQWS for Class SA waters. *See* 314 CMR 4.05(4)(a)(2)(a). In addition, there has been~~ delta T limit of a maximum daily of ~~3°F,~~32°F, consistent with the current thermal discharge limits that are applicable to the pre-shutdown use of the CW system as discussed in Section 6.1.4 above. Since the EPA concludes in Section 7.3 below that a continued § 316(a) variance for temperature allowing a delta T of 32°F during normal (pre-shutdown) operations will assure the protection and propagation of a balanced, indigenous population (BIP) of shellfish, fish and wildlife in and on the body of water into which the discharge is made, EPA concludes that the maintenance of the same limitations with respect to the SSW during the post-shutdown period will likewise satisfy the § 316(a) variance standard and consequently also Massachusetts SWQS for Class SA waters. *See* 314 CMR 4.05(4)(a)(2)(c).

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### 6.7 Outfall 011 and new Outfall 014

Outfall 011 is an internal outfall which is sampled prior to commingling with any flow at Outfall 005, a storm drain, which ultimately is routed to the discharge canal. Discharges through Outfall 011 are intermittent, batch discharges directly from the "waste neutralizing sump" or from other source(s). Water released from Outfall 011 may be radiologically contaminated, in which case it would be coming from the waste neutralizing sump. Otherwise, it would originate from what is characterized as a "clean" system (e.g., demineralized water, service water, or station heating water).

The station heating system utilizes demineralized water that is discharged during heating system outages, which occur 1-2 times per year. Tolyltriazole and sodium nitrite are added as corrosion inhibitors to the TBCCW, RBCCW, and station heating systems.

The discharge from the demineralizer system consists of reject water, which is purified city water which does not meet the requirements of the condenser makeup water. This water is pumped from the demineralizer to the demineralizer storage tank, which is used as makeup water for several plant systems (condensate/feedwater, closed cooling water, station cooling water, station heating system, etc.) as dictated by inventory requirements.

Discharges from the waste neutralizing sump consist of drainage from heat exchanger process water [turbine building closed-cycle cooling water (TBCCW) system and the reactor building closed-cycle cooling water (RBCCW) system], station heating system water, drainage from the floor drains in the boiler room (station heating water), various sumps throughout the building (service water system chlorinated salt water), and reject water from the emergency standby liquid control system. This reject water is from the demineralizer, with sodium pentaborate added and which does not meet the plant's technical specifications.

Due to detected levels of tritium in groundwater samples in the vicinity of Outfall 005, the permittee conducted an investigation to determine its source and concluded that water from the waste neutralizing sump that was being discharged through the storm drain at Outfall 005 was the likely source of this tritium. The permittee believes that the storm drain associated with Outfall 005 is not watertight and leaks water from the Outfall 011 discharges. In order to avoid groundwater contamination from this discharge through this storm drain, the permittee has rerouted the flow from the waste neutralizing sump only, directly to the discharge canal with a hose, thereby bypassing the storm drain associated with Outfall 005 (See Figure 4). Since this is a discrete outfall to the discharge canal, it has been designated in this permit as a new Outfall, #014. The other discharges from Outfall 011, including demineralized water, service water, and station heating water will not need to bypass the storm drain and will continue to be discharged through the storm drain at Outfall 005. (12/17/15 email from J. Egan to G. Papadopoulos)

The low level radioactive effluent associated with Outfalls 011 and 014 shall continue to meet all the Nuclear Regulatory Commission (NRC) requirements as specified in 10 C.F.R. Part 20. These limits are detailed in the PNPS Technical Specifications which define facility operational conditions. EPA and the NRC, in the past, have signed a Memorandum of Understanding

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(MOU) which specifies that EPA will be responsible for the water quality aspects of the discharge in concert with the State, and the NRC will be responsible for the levels of radioactivity in the discharge. Thus, the draft permit addresses only the chemical aspects of water quality and does not regulate radioactive materials encompassed within the Atomic Energy Act's definitions of source, byproduct, or special nuclear materials. *See Train v. Colorado Public Interest Research Group*, 426 U.S. 1, 25 (1976) (holding that "the 'pollutants' subject to regulation under the [CWA] do not include source, byproduct, and special nuclear material."). All NRC radioactive discharge requirements will continue to be in effect, as required, in 10 C.F.R. Part 20 and plant technical specifications.

The current permit (at Part I.A.1.n) allows discharge of sodium nitrite (corrosion inhibitor) from the closed loop cooling water systems and heating systems through Outfall 011 and new outfall 014. In its letter to EPA dated May 22, 1995, the permittee requested that Tolyltriazole (a corrosion inhibitor) be added to the station heating, RBCCW, and TBCCW systems. These flows discharge through Outfalls 011 and 014 only during scheduled plant outages.

The discharges through Outfalls 011 and 014 are classified as low volume waste sources pursuant to the Steam Electric ELGs at 40 C.F.R. §423.11. As noted above, Outfall 011 is an internal outfall, because the point of discharge to the receiving water is at Outfall 005. Applying limits at Outfall 011 is consistent with 40 C.F.R. § 122.45(h), which allows for such limits when the wastes associated with the internal outfall may be so diluted as to make monitoring at the point of discharge (Outfall 005) impracticable. In this case, certain pollutants expected to be present in the discharge from Outfall 011, including tolyltriazole, sodium nitrite, and boron, could, depending on the storm event, be so diluted by the stormwater discharge from Outfall 005 as to make monitoring at Outfall 005 impracticable. Moreover, the draft permit requires monitoring at Outfall 005 during the first flush of wet weather of triggering storm events, whereas discharges from Outfall 011 are generally independent of storm events.

#### 6.7.1 Flow

The current permit requires monthly average and daily maximum flow limitations of 0.015 MGD and 0.06 MGD, respectively, for Outfall 011. Review of DMR data indicates that these effluent limitations have not been exceeded. The highest monthly average flow recorded was 0.0104 MGD and the highest daily maximum flow recorded was 0.0122 MGD.

The permittee requested removal of the flow limits at Outfall 011, however, the limits have been retained based on anti-backsliding requirements. The discharges through Outfalls 011 and 014 are expected to meet these flow limits, since they have been consistently met in the past under the current permit. Flow is required to be measured at these outfalls prior to combining with any other wastewater or with stormwater that drains to Outfall 005.

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#### 6.7.2 Total Suspended Solids (TSS)

The current permit requires monthly average and daily maximum TSS limitations of 30 mg/l and 100 mg/l, respectively. Review of DMR data from 2008 through 2014 indicates that these effluent limitations have not been exceeded, with a maximum concentration of 26.4 mg/l.

The discharges through Outfalls 011 and 014 include low volume waste sources pursuant to the Steam Electric ELGs 40 C.F.R. § 423.12, which requires effluent limitations for TSS of 100 mg/l as a maximum and 30 mg/l as an average. Therefore, the draft permit includes an average monthly TSS limit of 30 mg/L and a maximum daily TSS limit of 100 mg/L consistent with the ELGs requirement for low volume waste sources. The monitoring frequency at Outfall 011 remains at once per month but Outfall 014 is required to be sampled whenever it discharges because this discharge is expected to occur less frequently than Outfall 011.

#### 6.7.3 Oil & Grease

The current permit does not include oil and grease (O&G) limitations at Outfall 011. However, since this discharge is classified as a low volume waste source, it must meet effluent limitations for O&G of 20 mg/l as a maximum and 15 mg/l as an average, pursuant to 40 C.F.R. § 423.12.

Therefore, the draft permit establishes a maximum daily O&G limit of 20 mg/l and an average monthly limit of 15 mg/l at Outfall 011 (monthly), as well as Outfall 014 (quarterly, when discharging).

#### 6.7.4 pH

The current permit requires that the discharge through Outfall 011 shall not be less than 6.1 standard units nor greater than 8.4 standards units. The current permit did not specify any monitoring frequency or reporting requirements for effluent pH for this outfall, therefore no pH data are available.

The current permit limit is slightly more stringent than the NELG requirement for low volume wastes (40 C.F.R. § 423.12) that require the pH of all discharges, except once through cooling water, shall be within the range of 6.0 - 9.0 SU. The State WQS (314 CMR 4.05(4)(a)(3)) require that for Class SA waters, the pH of the receiving water shall be in the range of 6.5 through 8.5 standard units and not more than 0.2 standard units outside of the natural background range. A water quality-based pH limitation would be more stringent than the technology-based effluent limitation. In this case, however, Outfall 011 is an internal, low volume waste stream that combines with stormwater at Outfall 005 prior to reaching the receiving water through the discharge canal. The only exception is water from the waste neutralization sump, which as noted above, is discharged directly to the discharge canal through new Outfall 014. The draft permit establishes a water quality-based pH limitation at Outfall 001 downstream of where Outfalls 005 and 011 merge and prior to discharging to Cape Cod Bay that will ensure the effluent meets WQS. Therefore, the draft permit maintains the limit for pH ranging from 6.1 to 8.4 at these outfalls. This permit limit range is slightly less stringent than the WQS (but which will be met prior to discharging to the receiving water) but more stringent than the technology-based limits in the Steam Electric ELGs. EPA is carrying forward the pH limit from the current permit consistent with the anti-backsliding regulations at 40 C.F.R. § 122.44(*l*)(1) which require a reissued permit to establish limits at least as stringent as the current permit with limited exceptions, none of which apply to the pH limit in this case.

#### 6.7.5 Sodium nitrite

PNPS uses sodium nitrite as a corrosion inhibitor in its TBCCW, RBCCW, and station heating systems. The current permit (at Part I.A.1.n) limited the discharge of sodium nitrite as it mixed with the Outfall 001 effluent in the discharge channel, to a concentration of 2.0 mg/L, by calculation. These discharges are generally associated with periods of maintenance, modifications, or equipment repair.

The permittee is required to monitor the discharge through Outfalls 011 (monthly) and 014 (quarterly, when discharging) for sodium nitrite and provide the calculated concentration in the discharge canal upon mixing with the cooling water discharges of Outfalls 001 and 010, as described below, to assure that the sodium nitrite limit of 2.0 mg/l is not exceeded. To calculate the estimated concentrations of sodium nitrite in the discharge canal, the permittee shall divide the concentration of this parameter in the Outfall 011 internal discharge by the dilution factor derived by dividing the flow rate of the cooling water flow being used from the combination of CW and SSW pumps that are operating at the time of the batch discharge of these waters by the flow rate of this discharge. These discharges may be made directly to the discharge canal.

EPA's Gold Book (Quality Criteria for Water, 1986: EPA Publication No. 440/5-86-001 dated May 1, 1986) does not establish any marine water quality criteria for sodium nitrite. Rather it notes that... "In oxygenated natural waters systems, nitrite is rapidly oxidized to nitrate." The Gold Book provides no marine organism toxicity data or stream criteria for nitrites, but does indicate that a nitrite nitrogen level at or below 5 mg/L should be protective of most warm water fish. Therefore, the current permit established a maximum daily concentration of 2.0 mg/L nitrite as calculated in the discharge canal, based on the reported rapid reaction of nitrite to nitrate in oxygenated waters and the protective level of 5.0 mg/L for warm water species.

#### 6.7.6 Copper

EPA's National Recommended Water Quality Criteria for Saltwater include a CMC (acute) copper concentration of 4.8 ug/L and a CCC (chronic) copper concentration of 3.1 ug/L. The permit application submitted by the permittee indicated a copper concentration at Outfall 011 of 49.8 ug/L.

As noted, Outfalls 011 and 014 combine with the discharge from Outfall 001 in the discharge canal, where a significant amount of dilution is provided. Dilution provided from the Outfall 001 discharge is approximately 1:1,000 (using the lowest recorded monthly average flow of 65.6 MGD for Outfall 001 and the daily max flow limit at Outfall 011 of 0.06 MGD). Assuming this dilution, the concentration of copper in the discharge from Outfall 011 would be diluted from

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49.8 ug/L to approximately 0.05 ug/L in the discharge canal. Post-shutdown, the worst case condition for low flow would be represented by the operation of one SSW pump. Under this scenario, the dilution available to this flow would be about 65:1, and the corresponding copper concentration would be 0.77 ug/l, assuming the same level of 49.8 ug/l at the internal location.

The estimated concentration at the discharge canal is not expected to approach the level that would cause or contribute to a WQS violation and this is based on one sampling result. Therefore, the draft permit does not require a limit or monitoring specific to copper. However, the draft permit does establish whole effluent toxicity (WET) testing requirements at Outfalls 011 and 014, described below, which includes monitoring for a suite of metals and will provide twice yearly effluent copper data.

### 6.7.7 Tolyltriazole

In a letter to EPA dated May 22, 1995 (AR #164), the permittee requested the authorization to use tolyltriazole (a corrosion inhibitor) as an additive to its station heating, RBCCW, and TBCCW systems. By letter of June 30, 1995 (AR #154), EPA approved the use of tolyltriazole. Flow from Outfall 011 and 014 containing tolyltriazole would typically occur only during scheduled plant outages. Initial conditioning of the cooling systems would require a maximum tolyltriazole concentration of 20 mg/l, after which concentrations would be maintained at 2.0 mg/l. The maximum concentration would be in the neutralization sump. With one SW pump operating, a worst case condition, corresponding to a flow of 2700 gpm (3.88 MGD), the tolyltriazole concentration would be expected to be about 1.48 mg/l in the discharge canal. Below are calculations of estimated tolyltriazole concentration in the discharge canal under two scenarios using the maximum flow rate of 200 gpm out of the neutralization sump:

Dilution with 1 SW pump operating: $\frac{2700 \text{ gpm}}{200 \text{ gpm}} = 13.5$

Dilution with 1 SW pump and 1 CW pump operating: $\frac{155{,}000 \text{ gpm} + 2700 \text{ gpm}}{200 \text{ gpm}} = 790$

Maximum Tolyltriazole concentration after mixing in discharge canal under both scenarios:

20 mg/l tolyltriazole / 13.5 = **1.48 mg/l**        20 mg/l / 790 = **0.025 mg/l**

Therefore, the concentration of tolyltriazole under the worst case condition of one SW pump operating of 1.48 mg/l would be below the acute and chronic toxicity levels of this chemical, which is a 96 hour $LC_{50}$ for rainbow trout of 23.7 mg/l and a 21 day $LC_{50}$ for *Daphnia magna* of 5.8 mg/l. Based on a more typical operating scenario of one SW pump and one CW pump operating, the discharge concentration of tolyltriazole at Outfall 001 would be expected to be about 0.025 mg/l.

The draft permit includes a maximum daily limit of 1.48 mg/l of tolyltriazole at Outfalls 011 and 014. Consideration has been given to the use of multiple chemicals that combine in the effluent from these outfalls, resulting in the establishment of WET testing requirements as described below.

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### 6.7.8 Boron

The standby liquid control (SLC) wastewater which drains to Outfall 014 via the neutralizing sump consists of reject water from the SLC system. This low volume wastewater is characterized as demineralizer water with sodium pentaborate added, containing approximately 8% boron, and is therefore discharged as reject water.

Sodium pentaborate is commonly used and discharged from most nuclear power plants in the United States. The wastewater source is boronated water used in the reactor's main coolant system. Boron in the form of highly soluble boric acid or sodium pentaborate is added to the water surrounding the active fuel elements for neutron moderation. This boronated water and the movable control rods are used to moderate the activity level of the radioactive nuclear fuel and to maintain a constant power output between refueling operations. In practice, the boronated water is steadily reduced in boron content from a maximum concentration of 16,500 mg/l, after refueling, in order to maintain a suitable neutron flux.

According to EPA's Gold Book, boron is an essential element for growth of plants but there is no evidence that it is required by animals. The maximum concentration found in 1,546 samples of river and lake waters from various parts of the United States was 5.0 mg/L; the mean value was 0.1 mg/L (Kopp and Kroner, 1967). Groundwaters could contain substantially higher concentrations in certain locations. The concentration in seawater was reported as 4.5 mg/L in the form of borate (NAS, 1974). Naturally occurring concentrations of boron should have no effects on aquatic life.

According to Ambient Water Quality Guidelines for Boron, 1992, Province of British Columbia, Canada (S.A. Moss, N.K. Nagpal):

> Many jurisdictions have not set boron guidelines for the protection of marine aquatic life. According to the EPA (1988), Guam, the Mariana Islands and Trust Territories have set criteria for the protection of marine aquatic life at 5.0 mg/L. Puerto Rico has set the guideline at 4.8 mg/L for coastal waters for use in propagation, maintenance and preservation of desirable marine species.
>
> Taylor et al. (1985) studied the effects of boron on *Limanda limanda* (Dab) and found a 24h-$LC_{50}$ concentration of 88.3 mg B/L. Thompson et al. (1976) performed static renewal studies using seawater and sodium metaborate on underyearling and alevin coho salmon (*Oncorhynchus kisutch*) (1.8-3.8 g in weight). This study was performed on the west coast of British Columbia. They found the 96h-$LC_{50}$ was 40.0 mg B/L and the 283h-$LC_{50}$ was 12.2 mg/L. Hamilton and Buhl (1990) conducted static acute toxicity tests on coho salmon in brackish water using boric acid to find the 24h-$LC_{50}$ at greater than 1,000 mg B/L and the 96h-$LC_{50}$ at 600 mg B/L. They found similar results when tests on chinook salmon (*O. tshawytscha*) were performed. Studies performed on coho salmon by British Columbia MELP found a 96h-$LC_{50}$ of 122.6 mg/L (MELP, 1996).

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> It was recommended that the maximum concentration of boron for the protection of marine aquatic life should not exceed 1.2 mg B/L. This guideline was based on study by Thompson noted above that found the most sensitive species was coho salmon (*Oncorhynchus kisutch*), with a 283h-$LC_{50}$ of 12.2 mg B/L. A safety factor of 0.1 was used to derive the guideline (1.2 mg/l) in the marine environment.

Marine waters normally contain a natural background concentration of boron of about 4.6 mg/l. The current permit limits the concentration of boron in the discharge to the discharge canal to 1.0 mg/l above the natural background concentration, to be shown by calculation. According to the permittee, sodium pentaborate may be discharged in 20,000 gallon batches at a maximum concentration of 16,500 mg/l calculated as boron. The boron concentration shall not exceed 1.0 mg/l, by calculation, above background in the discharge from the discharge canal, with the assumption that background concentration is 4.6 mg/l. Therefore, the actual effluent limit will be 5.6 mg/l. Sufficient water from a combination of CW and SW pumps must be available during each sodium pentaborate release to ensure adequate dilution prior to discharge. Each release of boron will be reported in the appropriate DMR providing the concentration of boron in the tank before release, and the calculated boron concentration in the discharge canal before mixing with Cape Cod Bay water. In addition, at the time of discharge, the permittee must sample the ambient water and analyze it for boron to confirm that the background levels are approximately 4.6 mg/l.

#### 6.7.9 Whole Effluent Toxicity (WET) Testing

EPA's Technical Support Document for Water Quality-Based Toxics Control, March 1991, EPA/505/2-90-001, recommends using an "integrated strategy" containing both pollutant-specific (chemical) approaches and whole effluent (biological) toxicity approaches to better control toxics in effluent discharges. Pollutant-specific approaches, such as those in EPA's Gold Book (ambient water quality criteria) and state regulations, address individual pollutants, whereas whole effluent toxicity (WET) approaches evaluate, in effect, interactions between pollutants, i.e., the "additive," "antagonistic" and/or "synergistic" effects of combinations of pollutants. In addition, WET analyses can reveal the presence of an unknown toxic pollutant. Region I adopted this "integrated strategy" on July 1, 1991, for use in permit development.

Section 101(a)(3) of the CWA states a nation goal of prohibiting the discharge of toxic pollutants in toxic amounts. The Massachusetts SWQS, in effect, prohibit such discharges, by stating that "all surface waters shall be free from pollutants in concentrations or combinations that are toxic to humans, aquatic life or wildlife." 314 CMR 4.05(5)(e). The NPDES regulations at 40 C.F.R. § 122.44(d)(1)(v) require whole effluent toxicity (WET) limits in a permit when the permitting authority determines that a discharge causes, has the "reasonable potential" to cause, or contributes to an instream excursion above the State's narrative criterion for toxicity.

Sections 402(a)(2) and 308(a) of the CWA authorize EPA to establish toxicity testing requirements and toxicity-based permit limits in NPDES permits. Section 308 specifically states that biological monitoring methods may be required when needed to carry out the objectives of

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the Act. Under certain narrative State water quality standards and Sections 301, 303, and 402 of the CWA, EPA and the States may establish toxicity-based limits to implement the narrative "no toxics in toxic amounts" criterion.

The regulations at 40 C.F.R. § 122.44(d)(ii) state that:

> [w]hen determining whether a discharge causes, has the reasonable potential to cause, or contributes to an in-stream excursion above a narrative or numeric criteria within a State water quality standard, the permitting authority shall use procedures which account for existing controls on point and nonpoint sources of pollution, the variability of the pollutant or pollutant parameter in the effluent, the sensitivity of the species to toxicity testing (when evaluating whole effluent toxicity), and where appropriate, the dilution of the effluent in the receiving water.

~~The complexity of the wastewater~~ EPA has evaluated the effluent limitations applicable to the discharges from various sources associated with Outfalls 011 and 014 ~~is such that~~and determined that, in light of the small volumes of the discharges and small concentrations of pollutants involved, whole effluent toxicity testing is not required to ~~identify, evaluate and~~ address ~~any~~ potential water quality impacts. ~~There~~Further, it is expected that the discharges associated with these outfalls are ~~limited data on the individual chemical characteristics of waste streams discharging to internal Outfalls 011 and 014. These discharges~~ dominated by radiological contaminants that already are ~~likely~~subject to ~~be variable in quality and could potentially contain metals and other pollutants that individually could be toxic~~stringent regulation by NRC to ~~aquatic life. However, it is not possible based on current information to determine whether or not the combination of these pollutants, and their subsequent dilution with other internal streams, would result in toxic effects upon discharge. WET testing is conducted to assess whether an effluent contains a combination of pollutants which produces toxic effects. WET testing and WET limits~~ensure that they are ~~used in conjunction with pollutant specific effluent limits to control the discharge of toxic pollutants.~~

~~EPA has included a WET testing requirement in the Draft Permit for Outfalls 011 and 014, in addition~~not released to the ~~chemical-specific limitations described above, to assess the effects of the combination of pollutants on aquatic life. This approach is consistent with that recommended in *Technical Support Document for Water Quality-based Toxics Control*, March 1991, EPA/505/2-90-001, p. 60. The permittee shall report the results of acute WET tests twice per year using the Mysid shrimp, *Americamysis bahia* and the Inland Silverside *Menidia beryllina*. A 24-hour composite sample is the required "sample type" for WET testing. Pursuant to EPA Region 1 policy and MassDEP's Implementation Policy for the Control of Toxic Pollutants in Surface Waters (February 23, 1990), discharges having a dilution ratio of greater than 100:1 require acute toxicity testing two times per year. With two or more SSW pumps operating, the dilution factor is about 130 for this discharge.~~

~~If the WET tests indicate toxicity, the Regional Administrator and the Commissioner may decide to modify the permit. Any such modifications may include the addition of WET limits and/or~~

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~~additional pollutant limits to adequately protect receiving water quality during the remainder of the permit term. WET test results~~environment under ~~the new permit will be considered "new information not available at the time of permit development." Therefore, the permitting authority would be allowed to use this information as a~~circumstances that pose any reasonable potential ~~basis for modifying the existing permit.~~for environmental harm. *See* ~~40~~10 C.F.R. ~~§ 122.62(a)(2).~~Part 20.

**6.8 Additional Permit Conditions**

6.8.1 Radiological Wastewater ("radwaste") Effluents

The discharge of radiological waste water ("Radwaste Effluents") directly into the discharge canal occurs via a diffuser pipe submerged at the upstream (proximal) end of the canal, adjacent to the discharge structure. It consists of demineralized water contaminated with radioactive species [plant makeup water (contact cooling water)] which is normally recycled within the radwaste processing system. In the event of a discharge, it is sampled, analyzed and pumped to the diffuser pipe in the discharge canal. Radioactive materials that fall within the Atomic Energy Act's definitions of source, byproduct, or special nuclear materials are not subject to regulation under the CWA. *Train v. Colorado Public Interest Research Group*, 426 U.S. 1, 25 (1976); *see also* 40 C.F.R. § 122.2 (defining "pollutant"). Thus, the NRC, not EPA, regulates this discharge, which typically occurs 1-2 times per year, usually during refueling outages.

6.8.2 Groundwater

Recent studies regarding groundwater onsite have indicated low levels of tritium ranging from 1,000-3,100 picocuries/liter (pCi/L). EPA's drinking water standard for tritium is 20,000 pCi/L - the average annual amount assumed to produce a dose of 4 mrem/year. From 2007 to 2013, PNPS worked with the Massachusetts Department of Public Health (DPH) to resolve the issue, citing weekly phone calls and quarterly meetings to determine the source of contamination. The permittee has determined that the storm line draining to Outfall 005 likely is not watertight and is a source of ongoing contamination of the groundwater from the demineralizer waste associated with internal Outfall 011. See discussion for Outfalls 011 and 014 in Section 6.7 above for the remedy that the permittee is proposing to implement.

6.8.3 Gas Bubble Disease

Two occurrences of fish mortality during the spring of 1973 and 1975 prompted a study in 1986 of "gas bubble disease" (see AR#419 and discussion of available literature and PNPS studies in Attachment C to this fact sheet pp. 30-33). As a result, the current permit included a provisions at Parts I.A.2.e and I.A.2.f meant to address fish mortality caused by gas bubble disease. In its supplemental permit application letter of 12/1/99 (AR #81), the permittee has requested that the conditions in the current permit pertaining to the barrier net at the end of the discharge canal (Part I.A.2.e.) and dissolved nitrogen saturation level (Part I.A.2.f.) be deleted from the draft permit, because gas bubble disease has only been documented on two separate occasions in the 1970's. EPA has reviewed the dissolved gas saturation measurements made from 2003 to 2012.

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Although limited, the data indicates that dissolved nitrogen has exceeded 115% (the value representing a critical threshold for adult menhaden; see Clay, et al., 1976) once in June 2005 and once in September 2009, both collected during low tide when contact with the bottom limits the extent of the plume outside of the discharge canal.

Under the current permit, PNPS employed a fish barrier until 1995 to prevent fish from entering the discharge canal. Specifically, the barrier was intended to protect Atlantic menhaden, which are particularly vulnerable to mortality from supersaturation of dissolved nitrogen in the discharge and which experienced the mortality events in the early 1970's. Use of the barrier net was discontinued in 1995 because there had been "no evidence of any significant thermal discharge related incidents for the past several years such as Menhaden being attracted to the thermal plume, collecting outside the net, and/or attempting to gain entry into the canal itself." November 23, 1994 letter from EPA to E.T. Boulette of PNPS (AR #351).

The lack of thermal discharge related mortality events and recent dissolved gas saturation data demonstrate that gas bubble disease is unlikely to occur at the PNPS discharge and the permit conditions specific to these events are no longer necessary. Furthermore, PNPS ~~will~~ is anticipated to cease generating electricity ~~no later than~~by June 1, 2019, at which time the heated discharge from the main condenser will be terminated~~ and the rise in temperature at the discharge from Outfall 001 will be a maximum of 3°F, compared to the current permit limit of 32°F~~. The draft permit does not include permit conditions requiring a barrier net or a maximum average dissolved nitrogen saturation level.

## 7.0 Analysis of Thermal Discharge Limits for Outfall 001

As discussed above, in developing thermal discharge limits for this permit, EPA and MassDEP must consider applicable technology-based requirements, water quality-based requirements, and the applicant's CWA § 316(a) demonstration submitted in support of its request for a § 316(a) variance. Specifically, the permittee requested an extension of its § 316(a) variance in its supplemental application letter (AR #292) that was submitted on October 25, 1995 and with its 316 demonstration report submitted in March of 2000 (AR# 233).

### 7.1 Technology-Based Requirements

Turning first to technology standards, the statute classifies heat as a "nonconventional" pollutant subject to BAT standards. *See* 33 U.S.C. §§ 1311(b)(2)(A) and (F), 1311(g)(4), 1314(a)(4), 1362(6). As noted above, the ELGs for the Steam Electric Power Generating Point Source Category, which are found at 40 C.F.R. Part 423, apply to PNPS, prior to shutdown, because during that period this facility meets the ELG's definition of a steam electric power plant. This definition covers facilities that, among other things, utilize a nuclear fuel in conjunction with a thermal cycle employing the steam water system as the thermodynamic medium. Since the Steam Electric ELGs do not include categorical standards for thermal discharge, the permit writer is authorized under Section 402(a)(1)(B) of the CWA and 40 C.F.R § 125.3 to establish

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technology-based thermal discharge limits by applying the BAT standard on a case-by-case, BPJ basis.

With regard to technologies for reducing thermal discharges, EPA is aware that closed-cycle cooling towers, if available for use at the site, would substantially reduce thermal discharges from a facility like PNPS. Therefore, thermal discharge limits based on this technology would be substantially more stringent than the limits based on the open-cycle cooling system that characterizes PNPS' present operation. EPA has considered closed-cycle cooling in the Assessment of Cooling Water Intake Structure Technologies and Determination of Best Technology Available (Attachment D).

In setting a BAT effluent limit on a BPJ basis, EPA considers the relative capability of available technological alternatives and seeks to identify the best performing technology for reducing pollutant discharges (i.e., for approaching or achieving the national goal of eliminating the discharge of pollutants). In addition, before determining the BAT, EPA also considers the following factors: (1) the age of the equipment and facilities involved; (2) the process employed; (3) the engineering aspects of the application of various control techniques; (4) process changes; (5) the cost of achieving such effluent reduction; and (6) non-water quality environmental impacts (including energy requirements); as well as the appropriate technology for the category or class of point sources of which the applicant is a member based upon all available information; and any unique factors relating to the applicant. 33 U.S.C. § 1314(b)(2)(B); 40 C.F.R. § 125.3(c)(2), (d)(3).

"Open-cycle" (or "once-through") cooling systems typically produce the highest levels of thermal discharges (and water withdrawals), as compared to closed-cycle or partially closed-cycle systems. PNPS currently operates with an open-cycle cooling system and, as a result, the entire volume of the facility's cooling water (and thus the entire amount of waste heat) is discharged to the receiving water. "Closed-cycle" cooling systems reduce thermal discharges (and cooling water withdrawals). In a closed-cycle system, cooling water is used to condense the steam, but rather than discharge the heated water, a cooling system is used to remove most of the waste heat from the cooling water - typically dissipating the heat to the atmosphere through a cooling tower of some type - so that the water can be reused for additional cooling.

Given that PNPS is an existing facility that would require retrofitting to achieve technologically-driven improvements, EPA has looked to the existing steam electric facilities that have achieved the greatest reductions in thermal discharges through technological retrofits. As a general matter, the best performing facilities in terms of reducing thermal discharges at existing open-cycle cooling power plants are those facilities that have converted from open-cycle cooling to closed-cycle cooling using some type of "wet" cooling tower technology. Converting to closed-cycle cooling can reduce heat load to the receiving water by 95% or more. EPA's research has identified a number of facilities that have made this type of technological improvement. *See* Draft Permit Determinations Document for Brayton Point Station NPDES Permit, #MA0003654, at pp. 7-37 to 7-38; Responses to Comments for Brayton Point Station NPDES Permit, at p. IV-115.

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As part of its determination of the BTA for PNPS's CWISs under CWA § 316(b), EPA evaluated alternative cooling system technologies in light of their feasibility and the various factors listed above (e.g., cost, engineering considerations). *See* Attachment D. EPA relies upon and incorporates by reference that analysis here. EPA determined that closed-cycle cooling was not the best technology available for minimizing entrainment at PNPS, both because PNPS's historic and current electric-generating operations over the last have been demonstrated to have had no, or at most only a *de minimis*, impact on the aquatic populations or communities in the vicinity of the station, and also because the permittee has ~~determined~~announced that, ~~no later than~~by June 1, 2019, it ~~will~~intends to cease generating electricity and, therefore, withdrawing and discharging once-through cooling water for the main condenser. EPA concludes in Attachment D that a closed-cycle cooling system could not be installed and operational prior to the planned termination of ~~electricity~~electric generation and the associated once-through cooling water discharges for the main condenser. Even if it could, the cost of doing so would be wholly disproportionate, and unwarranted, in light of the absence of any demonstrated effect of PNPS's historic and current water withdrawals and thermal discharges on the BIP. When PNPS ceases generating electricity, ~~however~~moreover, it will achieve a 96% reduction in flow, which exceeds the flow reductions that could have been achieved by retrofitting the existing system with closed-cycle cooling.

In addition to reducing flow, the elimination of withdrawals to cool the main condenser will achieve a roughly 91% reduction in the maximum delta T of the discharge. By comparison, retrofitting PNPS for closed-cycle cooling would reduce the maximum delta T of the discharge by a similar percentage. As discussed in Attachment D, these reductions in volume and temperature via closed-cycle cooling would come at a significant cost to install a technology that could be obsolete even before it is completed, given the permittee's ~~announcement~~announced intention to cut its withdrawals drastically ~~by~~after June 2019 and to ~~begin decommissioning in preparation for closing~~permanently retire the facility~~ completely~~. Thus, in light of Entergy's decision to close PNPS ~~no later than~~by June 1, 2019, EPA concludes that retrofitting PNPS for closed-cycle cooling would not be the BAT for thermal discharges. EPA considers several other technologies in Attachment D and their impacts on entrainment and impingement, but none of these would appreciably lower the delta T or the absolute temperature of the discharge. (VFDs, for one, would likely raise the temperature of the discharge even further).

For these reasons, EPA has determined that, in light of the ~~impending~~planned closure of the facility, continuing to operate the plant with the existing technology and controls in the near term and then eliminating water withdrawals for the main condenser and reducing cooling water and other miscellaneous water withdrawals ~~on or before~~after June 1, 2019, resulting in a 96% reduction in flow, would be the BAT for the reduction of thermal discharges at the facility. The draft permit includes conditions and requirements consistent with prohibiting the discharge of thermal effluent from the main condenser once the facility ceases generating electricity. In the interim, EPA has concluded that a less stringent set of limits - namely, the thermal discharge limits in the existing permit - would satisfy CWA § 316(a) and support the renewal of PNPS' existing § 316(a) variance.

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### 7.2 Water Quality-Based Requirements

Water quality-based requirements would be based on the Massachusetts SWQS's numeric and narrative temperature criteria, consideration of designated and existing uses, and the State's antidegradation and mixing zone policies. The state's SWQS classify Cape Cod Bay as a Class SA water and, accordingly, prohibit discharges from causing ambient water temperatures to exceed 85°F (29.4°C) or a maximum daily mean of 80°F (26.7°C), and the rise in temperature due to a discharge shall not exceed 1.5°F (0.8°C). *See* 314 CMR 4.05(4)(a)(2)(a). The SWQS further provide that "there shall be no [temperature] change from natural background that would impair any uses assigned to this class including those conditions necessary to protect normal species diversity, successful migration, reproductive functions or growth of aquatic organisms." *Id.* 4.05(4)(a)(2)(b). In addition, 314 CMR 4.05(4)(a)(2)(c) states that "alternative effluent limitations established in connection with a variance for a thermal discharge issued under 33 U.S.C. § 1251 (FWPCA, § 316(a)) and 314 CMR 3.00 are in compliance with 314 CMR 4.00. As required by 33 U.S.C. § 1251 (FWPCA, § 316(a)) and 314 CMR 3.00, for permit and variance renewal, the applicant must demonstrate that alternative effluent limitations continue to comply with the variance standard for thermal discharges."

At the current level of operation, PNPS's thermal discharge cannot always meet the numeric temperature criteria of the MA SWQS throughout the receiving water (see MIT modeling - 2000 316 demonstration, AR#233).

The data and analysis to support these determinations are presented in Attachment C: Assessment of Impacts to Marine Organisms from Thermal Discharge and Thermal Backwash. Although PNPS's thermal discharge would not satisfy the above-discussed temperature criteria of the Massachusetts SWQS, the state's SWQS also provide that thermal effluent limits established pursuant to a CWA § 316(a) variance will satisfy SWQS. Also see the discussion in Section 5.4 of this fact sheet. Thus, as explained below, EPA's decision to grant a thermal discharge variance from technology- and water quality-based standards authorized under CWA § 316(a) variance is deemed to satisfy the SWQS. *See* 314 CMR 4.05(4)(a)(2)(c) (for Class SA waters).

### 7.3 CWA § 316(a) Variance-Based Limits

As described above, discharges of heat must satisfy both technology-based standards and any more stringent water quality-based requirements that may apply. According to CWA §316(a) and 33 USC §1326(a), however, thermal discharge effluent limits in permits may be less stringent than those required by technology-based and water quality-based requirements, if the discharger demonstrates that such limits meeting those requirements would be more stringent than necessary to assure the protection and propagation of a balanced, indigenous population (BIP) of shellfish, fish, and wildlife in and on the water body receiving the thermal discharge. EPA regulations define the term "balanced, indigenous population"—and its synonym, "balanced, indigenous community"—in the following way:

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> . . . a biotic community typically characterized by diversity, the capacity to sustain itself through cyclic seasonal changes, presence of necessary food chain species and by a lack of domination by pollution tolerant species. Such a community may include historically non-native species introduced in connection with a program of wildlife management and species whose presence or abundance results from substantial, irreversible environmental modifications. Normally, however, such a community will not include species whose presence or abundance is attributable to the introduction of pollutants that will be eliminated by compliance by all sources with section 301(b)(2) of the act; and may not include species whose presence or abundance is attributable to alternative effluent limitations imposed to section 316(a).

40 C.F.R. § 125.71(c).

The demonstration "must show that the alternative effluent limitation desired by the discharger, considering the cumulative impact of its thermal discharge together with all other significant impacts on the species affected, will assure the protection and propagation of the BIP." *Id.* § 125.73(a); *see also* 33 U.S.C. § 1326(a).

As part of the permit renewal process, the permittee must reapply for the § 316(a) variance. A permittee can make a case for a variance retrospectively, by showing that monitoring data collected during plant operation show no evidence of appreciable harm to the BIP attributable to the thermal discharge. 40 C.F.R. § 125.73(c). Permittees may also present a prospective analysis. *Id.* This approach generally requires extensive modeling of the thermal plume and is usually undertaken when a facility is requesting a change to its operation and its thermal limits. Regardless of the method chosen, the demonstration must show that the requested variance, "considering the cumulative impact of [the permittee's] thermal discharge together with all other significant impacts on the species affected, will assure the protection and propagation of a [BIP]." *Id.* § 125.73(a). PNPS has opted for a retrospective analysis, with some data collection to confirm prior modeling efforts.

The § 316(a) variance in the current PNPS NPDES permit allows the station to have a maximum daily discharge temperature of 102o F with a delta T (change in temperature from intake to discharge) of 32°F. These discharge limits are required to be met in the discharge canal prior to release into Cape Cod Bay. These limits were proposed based on the consideration of the operational characteristics of the reactor unit. In addition, this draft permit has established an effluent temperature limits for thermal backwashes at Outfall 002 of 115°F as discussed in Section 6.2.4 above, which replaces the 120°F limit in the 1991 permit.

For its evaluation of PNPS's § 316(a) demonstration, EPA considered the suite of available information including 1) PNPS' § 316(a) demonstration materials submitted in March of 2000, specifically Sections 5.3.1 to 5.3.7 - thermal impacts to "representative important species" ("RIS"); 2) 1974 investigations conducted by MIT (Pagenkopf et al.,1974); 3) an investigation by EG&G, in 1995, and (4) information on the assemblage of fish and invertebrate species in the affected area of the Cape Cod Bay and their thermal sensitivities.

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EPA's evaluation of the § 316(a) variance for PNPS is provided in Attachments B and C. EPA and MassDEP considered the temperature effects and tolerances on representative important species (RIS) and other biological data that have been collected and evaluated. EPA concludes that the thermal plume from PNPS is relatively small compared to the receiving water, dissipates rapidly, and is predominantly a surface plume that moves with the tides and the wind. Minor impacts to the macroalgal community have been documented that can be attributed to the thermal plume, but this area is only roughly one acre in size. Thus, from a retrospective analysis, the past forty (40) years of operation of PNPS—during which the thermal component of the discharge has remained the same—have been protective of the balanced indigenous population of fish, shellfish and wildlife, in the context of § 316(a). Based on this information, EPA concludes that no appreciable harm has resulted from the current variance-based thermal limits in the PNPS discharge permit and that the continuation of the variance-based limits will assure the protection and propagation of a balanced, indigenous community of shellfish, fish and wildlife.

Although the thermal backwash temperature limit is higher than the Outfall 001 effluent temperature of 102°F, the thermal backwashes occur less than ten times per year, are for a short duration of typically one to two hours, and occur one intake bay at a time, representing about 50% of the typical condenser cooling water flow. On Page 33 of Fact Sheet Attachment C, MassDEP considered the thermal backwash and its potential effects to aquatic life and concluded that these backwash events are not a cause for appreciable harm to the fish populations in the environs of the intake. Therefore, the continuation of the lower, variance-based thermal limit for the thermal backwash discharges will also assure the protection and propagation of a balanced, indigenous community of shellfish, fish and wildlife.

In Part I.A.1.g of the current permit, there were additional delta T limits which applied over sixty (60) minute periods during steady state and load cycling operations. These delta T limits have been carried over into the draft permit at Part I.A.11 and apply through the date of shutdown of electricity generation.

## 8.0 Section 316(b): Determination of Best Technology Available (BTA) for Cooling Water Intake Structures (CWIS)

With any NPDES permit issuance or reissuance, EPA is required to evaluate or re-evaluate compliance with applicable standards, including the technology standard specified in Section 316(b) of the CWA for cooling water intake structures (CWIS). Section 316(b) requires that:

> [a]ny standard established pursuant to section 301 or section 306 of this Act and applicable to a point source shall require that the location, design, construction, and capacity of cooling water intake structures reflect the best technology available for minimizing adverse environmental impact.

33 U.S.C. § 1326(b). To satisfy § 316(b), the location, design, construction, and capacity of the facility's CWIS(s) must reflect "the best technology available for minimizing adverse environmental impacts" ("BTA"). The operation of CWISs can cause or contribute to a variety

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of adverse environmental effects, such as killing or injuring fish larvae and eggs entrained in the water withdrawn from a water body and sent through the facility's cooling system, or by killing or injuring fish and other organisms by impinging them against the intake structure's screens. CWA § 316(b) applies to facilities with point source discharges authorized by a NPDES permit that also withdraw water from waters of the United States through a CWIS for cooling purposes. CWA § 316(b) applies to this permit due to the operation of a CWIS withdrawing water from Cape Cod Bay and used for cooling at the Pilgrim Nuclear Power Station (PNPS).

On August 15, 2014, EPA published the Final Rule establishing requirements for existing facilities under § 316(b) of the CWA. *See* 79 Fed. Reg. 48,300 (Aug. 15, 2014) ("Final 316(b) Rule for Existing Facilities" or "Final Rule").[7] EPA interprets section 316(b) to require the Agency to establish performance standards that will best minimize impingement and entrainment through the identification of the most innovative and least burdensome tools for achieving regulatory ends. In its regulatory actions, agencies "must take into account benefits and cost, both quantitative and qualitative." The Final Rule's requirements reflect the BTA for minimizing adverse environmental impact, applicable to the location, design, construction, and capacity of cooling water intake structures for existing power generating facilities and existing manufacturing and industrial facilities. The Final Rule applies to all existing power generating facilities and existing manufacturing and industrial facilities that have the design capacity to withdraw more than 2 MGD of cooling water from waters of the United States and use at least twenty-five (25) percent of the water they withdraw exclusively for cooling purposes. The Final Rule, which became effective on October 14, 2014, applies to this permit because PNPS is an existing power generating facility that withdraws more than 2 MGD from waters of the United States and uses at least 25 percent of that withdrawal exclusively for cooling purposes.

In the Final Rule, EPA also sought to address ongoing permitting proceedings like the reissuance of the PNPS NPDES permit. Specifically, EPA recognizes that, in some cases, a facility may already be in the middle of a permit proceeding at the time the new regulations were promulgated. *See* 40 C.F.R. § 125.98(g). The Final Rule makes clear that for an ongoing proceeding, when sufficient information has already been collected, the permitting authority may proceed to a site-specific BTA determination for entrainment and impingement mortality. It is evident that EPA does not intend that the ongoing permit proceeding must backtrack and go through the full information gathering and submission process set out by the Final Rule where sufficient information has been submitted upon which to base a site-specific BTA determination. *See also* 79 Fed. Reg. at 48,358 ("... in the case of permit proceedings begun prior to the effective date of today's rule, and issued prior to July 14, 2018, the Director should proceed. See §§ 125.95(a)(2) and 125.98(g)."). The Final Rule also states that the permitting authority may base its site-specific BTA determination for entrainment on some or all of the factors specified in 40 C.F.R. §§ 125.98(f)(2) and (3).

[7] EPA notes that following its promulgation, multiple petitions challenging the Final 316(b) for Existing Facilities have been filed in federal court. Nonetheless, the rule is in effect as of this writing.

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PNPS was first issued a NPDES permit in 1975 and has been collecting and submitting information to EPA and MassDEP about its CWIS for more than 30 years. Region 1 was working on the permit prior to promulgation of the Final 316(b) Rule for Existing Facilities and had gathered substantial additional information from the permittee as required under its current, administratively-continued permit through the use of information request letters (sent pursuant to CWA § 308(a)) and site visits.

In this case, the Region has determined that the information already submitted by the Facility is sufficient. In its Final Rule, EPA concluded that modified traveling screens are a best technology available for minimizing impingement mortality. The BTA determination for controlling impingement mortality and entrainment at PNPS has been developed on a site-specific basis, consistent with EPA's Final 316(b) Rule for Existing Facilities and under the ongoing permit proceeding provision at 40 C.F.R. § 125.98(g). In evaluating the BTA, EPA considered the number of individual organisms of different ages impinged and entrained by facility intakes, standardized to equivalent numbers of 1-year-old fish. A conversion rate between all life history stages and age 1 was calculated using species-specific survival tables based on life history schedule and age-specific mortality rates. An individual younger than age 1 is a fraction of an age-one equivalent; an individual older than age 1 represents more than one age-one equivalent. EPA found it appropriate to use the A1E measure because an overwhelming majority of eggs, larvae, and juveniles do not survive into adulthood and the A1E calculations adjust for differences in survivorship based on species and age-specific mortality rates.

In addition, EPA has considered any conditions necessary to meet Massachusetts surface water quality standards at 314 CMR 4.00 as they apply to the effects of CWISs on the State's waters. This determination is set forth in Attachment D, *Assessment of Cooling Water Intake Structure (CWIS) Technologies and Determination of Best Available Technology (BTA) under Section 316(b)*, to this fact sheet. ~~The draft permit at Part I.C~~

Flow reduction is commonly used to reduce impingement and entrainment. Unit closures provide clear reductions in flow because such units no longer need cooling water withdrawals. Flow reductions resulting from PNPS's anticipated closure are reasonably included as part of PNPS's impingement mortality and entrainment reductions strategy. The draft permit at Part I.F requires the facility to implement the following changes to the current CWISs to reflect the BTA to minimize the adverse environmental impacts associated with impingement and entrainment:

1. Upon termination of generation of electricity and ~~no later than June 1, 2019 the permittee shall:~~

    ~~a. Operate the traveling screens with a maximum through-screen intake velocity no greater than 0.5 feet per second. Limited exceedances~~solely to the extent of ~~the maximum through-screen velocity are authorized for the purposes~~continued periodic operation of ~~maintaining the CWIS and when~~ the circulating water ~~pumps are required to withdraw water to support decommissioning activities not to exceed five (5) percent of the time on a monthly basis.~~

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b. Monitor the through-screen velocity at the screen at a minimum frequency of daily. Alternatively, the permittee shall calculate through-screen velocity using water flow, depth, and screen open area. For this purpose, the maximum intake velocity shall be calculated during minimum ambient source water surface elevations and periods of maximum head loss across the screens. The average monthly and maximum daily through-screen intake velocity shall be reported each month on the DMR. See Part I.B.1. of the draft permit.

c. Cease coolingsystem as provided herein, the permittee shall cease water withdrawals for the main condenser and reduce total cooling water withdrawals to an average monthly rate of 7.8 MGD. Cooling water withdrawals at the salt service water pumps shall be limited to a maximum daily flow of 15.6 MGD.

d. Withdrawal of seawater using a singlecirculating water system, except that the permittee shall be authorized, for the purpose of providing dilution water consistent with the facility's Off-Site Dose Calculation Manual, to operate one (1) circulating water pump not to exceed five (5) percent of the time on a monthly basis is authorized to support decommissioning activitiesof the permittee's choosing once every rolling twenty-eight (28) day period for up to forty-eight (48) hours, for an average monthly maximum of 16 MGD.

e. Continuously rotate the traveling screens when operating the circulating water pumps.

2. From the effective date of the permit until termination of generation of electricity, no later than June 1, 2019and solely to the extent of continued periodic operation of the circulating water system as provided herein, the permittee shall continuously rotate the traveling screens.operate the traveling screens during circulating water use to the extent necessary or appropriate to mitigate UIEs, as defined above in Part I.D.12, or to reduce debris loading.

33. Upon termination of generation of electricity, service water withdrawals at the salt service water pumps shall be limited to a maximum daily flow of 19.4 MGD and an average monthly flow of 15.6 MGD.

4. Any change in the location, design, or capacity of any CWIS except as expressed in the above requirements must be approved in advance and in writing by the EPA and MassDEP.

EPA has determined on a site-specific, BPJ basis that the requirements in Part I.F of the draft permit will ensure that the facility's CWIS reflects the BTA for this specific facility and will

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minimize entrainment and impingement of all life stages of fish. Attachment B to the draft permit ("Biological Monitoring Plan") requires monitoring impingement and entrainment at the CWIS and in Cape Cod Bay to confirm EPA's evaluation of the likely environmental impact on the aquatic community resulting from the operation of the CWIS through the expected termination of electric generation (which is presently anticipated to occur by June 1, 2019,), at which time the facility will shutdown and water withdrawals through the CWIS will be substantially reduced. Part I.F of the draft permit and the Biological Monitoring Plan also include reduced biological monitoring requirements to ensure that impingement and entrainment are minimized during decommissioning activities.

## 9.0 Storm Water Pollution Prevention Plan (SWPPP)

PNPS stores and handles numerous chemicals on its property which could result in the discharge of pollutants to Cape Cod Bay either directly or indirectly through storm water runoff. Operations include the following activities from which there is, or could be, site runoff: materials handling and storage; chemical handling and storage; fuel handling and storage. To control these and other activities and operations, which could contribute pollutants to waters of the United States, potentially violating the MA SWQS, the Draft Permit requires that the permittee implement and maintain a SWPPP containing best management practices (BMPs) appropriate for this facility See Sections 304(e) and 402(a)(1)(B) of the CWA.

The goal of the SWPPP is to reduce or prevent the discharge of pollutants through the storm water drainage system. The SWPPP requirements in the draft permit are intended to provide a systematic approach by which the permittee shall at all times properly operate and maintain all facilities and systems of treatment and control (and related appurtenances) it uses to achieve compliance with the conditions of the permit. The SWPPP shall be prepared in accordance with good engineering practices and identify potential sources of pollutants which may reasonably be expected to affect the quality of storm water discharges associated with industrial activity at the facility. The SWPPP supports the permit's numerical effluent limitations and is an enforceable element of the permit.

Implementation of the SWPPP involves the following four main steps:

1) Forming a team of qualified facility personnel who will be responsible for developing and updating the SWPPP and assisting the plant manager in its implementation;
2) Assessing potential storm water pollution sources;
3) Selecting and implementing appropriate management practices and controls for these potential pollution sources; and
4) Periodically re-evaluating the SWPPP effectiveness at preventing storm water contamination and complying with the various terms and conditions of the permit.

To minimize preparation time, the permittee's SWPPP may reflect pertinent requirements from other environmental management or pollution control plans, such as, for example, a Spill

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Prevention Control and Countermeasure (SPCC) plan under Section 311 of the CWA and 40 C.F.R. Part 112 or a Corporate Management Practices plan. The permittee may incorporate any part of such a plan into the SWPPP by reference, but any provision from another plan that is being incorporated by reference into the SWPPP must be attached to the SWPPP so that it is immediately available for review and inspection by EPA and MassDEP personnel. Although relevant portions of other environmental plans, as appropriate, can be built into the SWPPP, ultimately however, it is important to note that the SWPPP must be a comprehensive, stand-alone document. Thus, to repeat, any provision from another plan that is being incorporated by reference into the SWPPP must be physically attached to the SWPPP.

A copy of the most recent SWPPP shall be kept at the facility and be available for inspection by EPA and MassDEP. The draft permit requires the permittee to develop and implement a SWPPP no later than one hundred and eighty (180) days after the permit's effective date. The SWPPP supports the permit's numerical effluent limitations and the SWPPP will be equally as enforceable as those numerical limits and other requirements of the permit. See Part I.H. of the draft permit.

The permit requires that the permittee incorporate into its SWPPP all specific pollution control activities and other requirements found in the 2015 Multi-Sector General Permit's (MSGP) provisions for "Industrial Sector O, Steam Electric Generating Facilities." *See* MSGP, Part 8.0.7, *available at* http://go.usa.gov/cEMaQ.

The SWPPP specifically requires the permittee to address the storm water that accumulates in various electrical vaults on the property as explained in Section 6.4 above.

## 10.0 Biological Monitoring Program

The draft permit includes a continuation of some of the biological monitoring, prior to the planned cessation of electric-generating operations at PNPS, which has been conducted by the permittee during this permit term. In the 1991 permit, there was a Marine Ecology Monitoring program that was established as described in Attachment A to the permit. The draft permit includes requirements for impingement and entrainment monitoring, prior to the planned cessation of electric-generating operations at PNPS, as well as periodic fish trawling in the vicinity of the discharge for as long as the facility continues to generate electricity with the associated once-through cooling water withdrawals for the main condenser. The specific methodologies for the biological monitoring requirements are based on the existing methodology employed by PNPS and described in its annual monitoring reports. The Biological Monitoring Plan is included as Attachment B of the draft permit.

## 11.0 Endangered Species Act (ESA)

Section 7(a) of the Endangered Species Act of 1973, as amended (ESA), grants authority to and imposes requirements upon Federal agencies regarding the conservation of endangered and

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threatened species of fish, wildlife, or plants ("listed species"), and the habitat of such species that has been designated as critical ("critical habitat"). The ESA requires Federal agencies, in consultation with and with the assistance of the Secretary of Interior, to insure that any action that they authorize, fund, or carry out, in the United States or upon the high seas, is not likely to jeopardize the continued existence of any listed species or result in the destruction or adverse modification of critical habitat. The United States Fish and Wildlife Service (USFWS) typically administers Section 7 consultations for birds and terrestrial and freshwater aquatic species, while the National Marine Fisheries Service (NMFS) administers Section 7 consultations for marine species and anadromous fish.

As described in this fact sheet, EPA is proposing to reissue the NPDES permit for PNPS authorizing the withdrawal of once-through cooling water and the discharge of process water and storm water through multiple outfalls. PNPS currently operates a single reactor unit with a boiling water reactor and turbine generator. Seawater is withdrawn from Cape Cod Bay through an intake embayment formed by two breakwaters. Seawater, primarily used for condenser cooling water, is pumped from the cooling water intake structure (CWIS) by two circulating water pumps and five salt service water pumps at a maximum volume of 447 MGD. Once-through condenser cooling water (Outfall 001), combined with plant service cooling water (Outfall 010) are discharged to Cape Cod Bay via the discharge canal. In addition, PNPS discharges effluent for thermal backwash, intake screen wash water, neutralizing sump waste commingled with demineralizer reject water, station heating water, and storm water, through various outfalls on an intermittent basis. A more detailed description of each of these waste streams and outfalls is provided in Section 2.0 of this fact sheet. A more detailed description of the receiving water is provided in Section 3.0 of this fact sheet.

NMFS, in consultation with the NRC, completed an assessment of the potential effects of the ongoing operation of PNPS on listed species as part of the renewal of the facility's operating license in 2012. *See* May 17, 2012 letter from Daniel S. Morris (NMFS) to Andrew S. Imboden (NRC) (AR# 465) ("2012 ESA Consultation letter"). In its letter, NMFS concludes that effects of the continued operation of PNPS for the 20-year license renewal term to listed species will be insignificant and discountable, and that the renewal of PNPS' operating license is not likely to adversely affect any listed species under NMFS jurisdiction and will have no effect on right whale critical habitat. In other words, effects would not be meaningfully measured or detected ("insignificant"), or effects would be extremely unlikely to occur ("discountable").[8] ~~NMFS specified~~Thus, NMFS' conclusion was premised on PNPS's continued *status quo* operation throughout the 20-year license renewal period; it was not contingent on the cessation of electric-

[8] According to USFWS and NMFS, a "not likely to adversely affect" conclusion is appropriate when effects on listed species are expected to be discountable, insignificant, or completely beneficial. Beneficial effects are "contemporaneous positive effects without any adverse effects," insignificant effects "relate to the size of the impact and should never reach the scale where takes occurs," and discountable effects are "those extremely unlikely to occur." Glossary of Terms used in Section 7 Consultations in the joint USFWS and NMFS *Endangered Species (Section 7) Consultation Handbook* (March 1998).
~~http://www.fws.gov/endangered/esa-library/pdf/esa_section7_handbook.pdf~~ http://www.fws.gov/endangered/esa-library/pdf/esa_section7_handbook.pdf

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generation in 2019 or in any other year prior to the expiration of the license renewal term. NMFS did specify that re-initiation of this consultation would likely be necessary when EPA reissues a revised NPDES permit for this facility.

On October 13, 2015, Entergy announced that PNPS ~~will~~intends to cease generation of electricity at the facility ~~no later than~~by June 1, 2019. Based on a recent press release, EPA expects that operation of the facility to support ~~electrical~~electric generation will continue until May 31, 2019. Beginning June 1, 2019, EPA expects that seawater withdrawal and effluent discharge will be dramatically altered as a function of entering the decommissioning phase. To the best of its ability based on available information, EPA has taken this into account and has tailored the permit to reflect post-shutdown operations and discharges as appropriate. However, since the permittee cannot fully anticipate all changes in permitted flows that will take place post-shutdown, this permit may be modified post-shutdown if warranted by any new or increased discharges.

The draft permit establishes technology- and water quality-based effluent limitations and conditions designed to ensure the continued protection of designated uses of Cape Cod Bay, including as an excellent habitat for fish, other aquatic life and wildlife, including for their reproduction, migration, growth and other critical functions consistent with the Massachusetts surface water quality standards at 314 CMR 4.05(4)(a). In this section, EPA identifies listed species that may be present in the vicinity of PNPS and evaluates the potential impacts of the action on listed species as authorized under the draft permit. EPA agrees with NMFS' 2012 evaluation of the potential impacts to ESA listed species and the conclusion that continued operation of PNPS for the duration of the 20-year operating license renewal period is not likely to adversely affect any listed species. The conditions of the draft permit are as stringent as or more stringent than the conditions evaluated in the 2012 consultation. In particular, the permit conditions that take effect upon expected termination of ~~electrical~~electric generation at PNPS are substantially more stringent, and will result in fewer effects on listed species, than the conditions assessed during the 2012 consultation. However, based on NMFS' conclusion that continued *status quo* operation under the current permit would have no adverse impacts on listed species, EPA finds that even if PNPS were to not terminate electric generation, such that the more stringent permit conditions did not take effect, PNPS would continue to have no adverse impacts on listed species.

### 11.1 Listed Species in the Vicinity of the Federal Action

As the federal agency charged with authorizing the discharges from this facility, EPA has reviewed available habitat information developed by USFWS and NMFS (collectively, "the Services") to see if one or more of the federal endangered or threatened species of fish, wildlife, or plants may be present within the influence of the discharge. The following federally listed species may potentially inhabit (seasonally) Cape Cod Bay in the area of the facility discharge:

| Common Name | Species Name | Status |
|---|---|---|
| Atlantic Sturgeon | *Acipenser oxyrinchus oxyrinchus* | Threatened |
| North Atlantic Right Whale | *Eubalaena glacialis* | Endangered |

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| Common Name | Species Name | Status |
|---|---|---|
| Humpback Whale | *Megaptera novaeangliae* | Endangered |
| Fin Whale | *Balaenoptera physalus* | Endangered |
| Kemp's Ridley Sea Turtle | *Lepidochelys kempii* | Endangered |
| Leatherback Sea Turtle | *Dermochelys coriacea* | Endangered |
| Loggerhead Sea Turtle | *Caretta caretta* | Threatened |
| Green Sea Turtle | *Chelonia mydas* | Threatened |

*Population of Green Sea Turtle present in action area listed as threatened. Breeding populations in Florida and Mexico's Pacific Coast listed as Endangered.

Atlantic Sturgeon

The Atlantic sturgeon (*Acipenser oxyrinchus oxyrinchus*) is a species of sturgeon distributed along the eastern coast of North America from Hamilton Inlet, Labrador, Canada to Cape Canaveral, Florida, USA. NMFS has delineated U.S. populations of Atlantic sturgeon into five distinct population segments (DPSs): the Gulf of Maine, New York Bight, Chesapeake Bay, Carolina, and South Atlantic DPSs. *See* 77 Fed. Reg. 5880 (Feb. 6, 2012); 77 Fed. Reg. 5914 (Feb. 6, 2012). NMFS has listed the Gulf of Maine DPS of Atlantic sturgeon as a threatened species and extended the prohibitions under section 9(a)(1) of the ESA to this DPS. *See* 78 Fed. Reg. 69,310 (Nov. 19, 2013). The primary factors responsible for the decline of the Gulf of Maine DPS include the destruction, modification, or curtailment of habitat due to poor water quality, dredging and the presence of dams; overutilization due to unintended catch of Atlantic sturgeon in fisheries; lack of regulatory mechanisms for protecting the fish; and other natural or manmade factors including loss of fish through vessel strikes. *See* 77 Fed. Reg. at 5905.

After emigration from the natal estuary, subadults and adults travel within the marine environment, typically in nearshore waters less than 50 meters in depth characterized by gravel and sand substrate, including Massachusetts Bay (Stein *et al.* 2004). According to the *Status Review of Atlantic Sturgeon*, Atlantic Sturgeon Status Review Team Report to National Marine Fisheries Service, Northeast Regional Office (Feb. 23, 2007 p. 61):

> Stein et al. (2004b) examined bycatch of Atlantic sturgeon using the NMFS sea sampling/observer 1989-2000 database. The bycatch study identified that the majority of recaptures occurred in five distinct coastal locations (Massachusetts Bay, Rhode Island, New Jersey, Delaware, and North Carolina) in isobaths ranging from 10 to 50 m, although sampling was not randomly distributed...Fisheries conducted within rivers and estuaries may intercept any life stage, while fisheries conducted in the nearshore and ocean may intercept migrating juveniles and adults.

Based on the Status Review document and the information summarized by NMFS in its 2012 consultation, subadult and adult Atlantic sturgeon may be present in nearshore habitat in Cape Cod Bay. As NMFS provides, the Kennebec and Hudson rivers are the closest rivers to Pilgrim in which Atlantic sturgeon are known to spawn. Given the distance from those rivers to Cape

Cod Bay, early life stages (eggs, larvae, and juvenile) of Atlantic sturgeon are not likely to occur in the action area.

North Atlantic Right Whale

The Northern right whale (*Eubalaena glacialis*) was listed as endangered in 1970 prior to the passage of the ESA. In 2006, the North Atlantic, North Pacific, and southern right whale were listed as three separate endangered species under the ESA based on their unique lineages. *See* 71 Fed. Reg. 77,704 (Dec. 27, 2006); 73 Fed. Reg. 12,024 (Mar. 6, 2008). The North Atlantic right whale primarily occurs in coastal or shelf waters with calving and nursery areas off the Southeastern U.S. and summer feeding grounds extending from New England waters north to the Bay of Fundy and Scotian Shelf (NMFS 2005). The distribution of right whales seems linked to the distribution of their principal zooplankton prey, calanoid copepods (Baumgartner and Mate 2005; Waring et al. 2012). The largest threat to recovery of the population is ship collisions and entanglements. Other threats include habitat degradation, noise, contaminants, and climate and ecosystem change (NMFS 2005).

New England waters include important foraging habitat for right whales and individuals have been sighted off Massachusetts in most months (Watkins and Schevill 1982, Winn et al. 1986, Hamilton and Mayo 1990). Peak occurrence falls between February and May, particularly in Cape Cod and Massachusetts bays (Hamilton and Mayo 1990, Payne et al. 1990). In recent years, however, right whales have been sighted on Jeffreys and Cashes Ledges, Stellwagen Bank, and Jordan Basin during December to February (Khan et al. 2011 and 2012). On multiple days in December 2008, congregations of more than 40 individual right whales were observed in the Jordan Basin area of the Gulf of Maine, leading researchers to believe this may be a wintering ground (NOAA 2008). Calving is known to occur in the winter months in coastal waters off of Georgia and Florida (Kraus et al. 1986). Right whale sightings from May 1997 to the present have been mapped (http://www.nefsc.noaa.gov/psb/surveys/). Since the last consultation in May 2012, there have been multiple sightings of right whales in the action area (particularly spring of 2013 and 2015), including sighting of a mother and calf pair sighted near the northern embayment wall in January 2013 and south of the facility in April 2013. In addition, a large aggregation of North Atlantic right whales spotted in western Cape Cod Bay (near PNPS) in early April of 2013 prompted MassDMF to issue an advisory for vessel operators to proceed with caution when traveling in that area (Attachment C to this fact sheet, p.9).

Humpback whale

The Humpback Whale (*Megaptera novaeangliae*) has been listed as endangered under the ESA since its passage in 1973. Humpback whales inhabit all major ocean basins from the equator to subpolar latitudes. With the exception of the northern Indian Ocean population, they generally follow a predictable migratory pattern in both southern and northern hemispheres, feeding during the summer in the higher near-polar latitudes and migrating to lower latitudes in the winter where calving and breeding take place (Perry et al. 1999). During the summer months, humpback whales foraging in the Gulf of Maine visit Stellwagen Bank and the waters of Massachusetts and Cape Cod bays. Small numbers of individuals may be present in this area, including the waters of Stellwagen Bank, year-round. They feed on small schooling fishes, particularly sand lance and Atlantic herring, targeting fish schools and filtering large amounts of water for their associated prey. Humpback whales may also feed on euphausiids (krill) as well as on capelin (Waring et al. 2010; Stevick et al. 2006). In winter, whales from waters off New England, Canada, Greenland, Iceland, and Norway migrate to mate and calve primarily in the West Indies, where spatial and genetic mixing among these groups occurs (Waring et al. 2014). Acoustic recordings made on Stellwagen Bank National Marine Sanctuary in 2006 and 2008 detected humpback song in almost all months, including throughout the winter (Vu et al. 2012). Changes in humpback whale distribution in the Gulf of Maine have been found to be associated with changes in herring, mackerel, and sand lance abundance associated with local fishing pressures (Stevick et al. 2006; Waring et al. 2014). Shifts in relative finfish species abundance correspond to changes in observed humpback whale movements (Stevick et al. 2006). According NFMS, the majority of humpback whale sightings are in the eastern portion of Cape Cod Bay with few sightings in the action area.

As with other large whales, the major known sources of anthropogenic mortality and injury of humpback whales occur from fishing gear entanglements and ship strikes. Humpback whales, like other baleen whales, may also be adversely affected by habitat degradation, habitat exclusion, acoustic trauma, harassment, or reduction in prey resources resulting from a variety of activities including fisheries operations, vessel traffic, and coastal development.

Fin Whale

The fin whale (*Balaenoptera physalus*) has been listed as endangered under the ESA since its passage in 1973. The fin whale is widely distributed in the North Atlantic and occurs from the Gulf of Mexico and Mediterranean Sea northward to the edges of the Arctic ice pack (NMFS 2010). Off the eastern U.S., fin whales are centered along the 100 m isobaths but with sightings well spread out over shallower and deeper water, including submarine canyons along the shelf break (Kenney and Winn 1987; Hain et al. 1992). Hain et al. (1992) identified Jeffrey's Ledge as a primary feeding area. Fin whales prey on both pelagic crustaceans and schooling fish (NMFS 2010). The overall distribution may be based on prey availability, as this species preys opportunistically on both invertebrates and fish (Watkins et al. 1984).

Like right and humpback whales, fin whales are believed to use North Atlantic waters primarily for feeding, and more southern waters for calving. This species is commonly found from Cape Hatteras northward. During the 1978-1982 aerial surveys, fin whales accounted for 24% of all cetaceans and 46% of all large cetaceans sighted over the continental shelf between Cape Hatteras and Nova Scotia (Waring et al. 2014). Underwater listening systems have also demonstrated that the fin whale is the most acoustically common whale species heard in the North Atlantic (Clark 1995). The single most important area for this species appeared to be from the Great South Channel, along the 50 meter isobath past Cape Cod, over Stellwagen Bank, and past Cape Ann to Jeffreys Ledge (Hain et al. 1992).

The major known sources of anthropogenic mortality and injury of fin whales include entanglement in commercial fishing gear and ship strikes. Pollutants do not appear to be a major direct threat to fin whale populations, although the loss of prey base due to pollution and climate change could potentially impact populations (NMFS 2010).

Sea Turtles

The Loggerhead Sea Turtle (*Caretta caretta*) was listed as endangered through its range on July 28, 1978. Loggerhead turtles inhabit the temperate and tropical regions of the Atlantic, Pacific, and Indian Oceans. Nesting occurs from Texas to Virginia; eggs and hatchlings are not likely to occur in the action area (NMFS and USFWS 2008). Post-hatchling loggerhead enter neritic waters along the continental shelf and before transitioning to the oceanic zone, where juveniles are found particularly around the Azores and Maderia in the North Atlantic (Bolten 2003). Following the oceanic stage, juvenile loggerheads transition to the neritic zone where they are common along the eastern U.S. seaboard in continental shelf waters from Cape Cod Bay, MA to the Gulf of Mexico feeding primarily on benthic invertebrates. Adult, non-nesting loggerheads prefer shallow water habitats and are common in large, open bays (e.g., Florida Bay and Chesapeake Bay) and offshore waters from New York through the Gulf of Mexico (Schroeder et al. 2003). Major threats to loggerhead turtles include commercial fishery bycatch, legal and illegal harvest, habitat degradation (especially of nesting beaches), and predation by native and exotic species (NMFS and USFWS 2008).

The Leatherback Sea Turtle (*Dermochelys coriacea*) has been listed as endangered through its range since the passage of the ESA in 1973. Adult leatherbacks are highly migratory and are believed to be the most pelagic of all sea turtles. There is little information about the habitat requirements and distribution of adult leatherbacks beyond limited knowledge of nesting beaches, including those in the Gulf of Mexico and U.S. Caribbean islands (e.g., the U.S. Virgin Islands and Puerto Rico) (NMFS and USFWS 1992). Eggs and hatchlings are not likely to occur in the action area. Periodic sightings of leatherbacks have occurred in New England waters, particularly around Cape Cod during summer months (NMFS and USFWS 1992). One study tracking the movements of leatherback turtles captured off the coast of Cape Cod indicated that several of the tagged individuals remained near the Northeast U.S. continental shelf (and in Massachusetts Bay) during summer and fall before migrating to tropical or sub-tropical habitat (Dodge et al. 2014).

The Green Sea Turtle (*Chelonia mydas*) was listed as endangered for coastal breeding colonies in Florida and Mexico's Pacific coast and threatened through the rest of its range in 1978. The green turtle occurs in tropical and sub-tropical waters worldwide; in Atlantic waters green turtles are found around the U.S. Virgin Islands, Puerto Rico, and the continental U.S. from Texas to Massachusetts. Primary nesting beaches occur in east central and southeast Florida, and in smaller numbers in Puerto Rico and the U.S. Virgin Islands. Eggs and hatchlings are not likely to occur in the action area. After transitioning from pelagic habitat to shallow, benthic feeding grounds, herbivorous juvenile and adult green turtles forage in pastures of seagrasses and/or algae but can also be found over coral reefs, warm reefs, and rocky bottoms (NMFS and USFWS 1991). Primary threats include degradation of nesting habitat, dredging and coastal development, pollution, seagrass bed degradation, entanglement in commercial fishing gear, and fishery bycatch (NMFS and USFWS 1991).

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The Kemp's Ridley Sea Turtle (*Lepidochelys kempii*) has been listed as endangered through its range since the passage of the ESA in 1973. The species has a relatively limited distribution with nesting beaches primarily located in the western Gulf of Mexico; eggs and hatchlings are not likely to occur in the action area. Once hatchlings emerge, they swim offshore into deeper waters where some juveniles may be transported to the Northwest Atlantic by the Gulf Stream (NMFS et al. 2011). Juveniles in the Northwest Atlantic transition into shallow coastal habitats (including bays and sounds) extending from Florida to New England (Morreale et al. 2007). Both adult and juvenile Kemp's ridley turtle may use New England waters from June through October as seasonal feeding grounds with crabs as its primary prey (NFMS et al. 2011). Migration from coastal foraging areas to overwintering sites is likely triggered by temperature declines. By late fall, most are found south of Chesapeake Bay towards North Carolina (NMFS et al. 2011). Major threats to the recovery of the Kemp's Ridley sea turtle include the degradation of nesting habitat and commercial fishery bycatch (NMFS et al. 2011).

Northern Right Whale Critical Habitat

Critical habitat for right whales was initially designated for most of Cape Cod Bay (CCB), Great South Channel (GSC), and coastal Florida and Georgia (outside of the action area). The habitat features identified in this designation include copepods (prey), and oceanographic conditions created by a combination of temperature and depth that are conducive for foraging, calving and nursing. *See* 59 Fed. Reg. 28,805 (June 3, 1994). In its 2012 ESA Consultation, NMFS determined that, within critical habitat, the thermal plume is no longer detectable and that any pollutants discharged from PNPS would be fully mixed and no longer detectable from background levels. Therefore, there would be no direct effects to critical habitat. See 2012 ESA Consultation letter, 30.

The NMFS has recently replaced the 1994 critical habitat designation for the population of right whales in the North Atlantic. *See* 81 Fed. Reg. 4,838 (Jan. 27, 2016) The critical habitat, which contains physical and biological features of foraging habitat that are essential to the conservation of the North Atlantic right whale, encompasses a large area within the Gulf of Maine and Georges Bank region, including Cape Cod Bay and Massachusetts Bay and deep underwater basins (Wilkinson, Georges, and Jordan Basins). The area incorporates state waters and "includes the large embayments of Cape Cod Bay and Massachusetts Bay but does not include inshore areas, bays, harbors, and inlets." 81 Fed. Reg. 4,862. The newly expanded designated critical habitat does not include the inshore location of PNPS' CWIS and outfalls, due to the absence or rarity of foraging right whales and the likelihood that dense aggregations of preferred prey are not present in these areas, even as NMFS recognizes that there has been an increase in the concentration of right whales in Western Cape Cod Bay in recent years. NMFS received a comment requesting special management considerations of impacts associated with coastally-located industrial electric generators (including PNPS) during the comment period for the proposed critical habitat. NMFS responded that, while some copepods are likely lost to entrainment at PNPS, "the essential feature of dense aggregations of late stage *C. finmarchicus* does not require special management considerations or protection due to entrainment by the

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PNPS..." 81 Fed Reg. 4,855-56. EPA has considered direct and indirect effects to North Atlantic right whales below.

### 11.2 Effect of the Federal Action on Listed Species

Effects of this action on listed species of whales and turtles and their critical habitat primarily include impingement and entrainment of potential prey and effects to habitat, including the discharge of heated effluent. Effects of this action on Atlantic sturgeon include impingement, the discharge of heated effluent, and may also include direct impacts of the discharge of pollutants from PNPS. To date there has been no reported take of Atlantic sturgeon or sea turtles from impingement at PNPS.

#### 11.2.1 Heated Thermal Discharge

EPA characterizes the potential impacts of the heated effluent discharged from PNPS in detail in Attachments B ("Outline of §316(a) Determination Decision Criteria") and C ("MassDEP Assessment of Impacts to Marine Organisms from the Pilgrim Nuclear Thermal Discharge and Thermal Backwash"). Based on this analysis, EPA determined that the temperature limits in the current permit are protective of the balanced, indigenous population and has granted PNPS a variance from technology- and water quality-based temperature limits. Under the draft permit, PNPS may discharge up to 447 MGD of non-contact condenser cooling water heated to a maximum daily temperature of 102°F and a maximum rise in temperature of 32°F from Outfall 001 to Cape Cod Bay. The draft permit also authorizes the discharge of heated backwash water from Outfall 002 to the intake bay and out to the embayment. Thermal backwashes are intermittent.

Attachment C to this Fact Sheet characterizes the thermal plume, which changes throughout the tidal cycle and with ambient temperature. The analysis provided in Attachment C is consistent with the evaluation of the thermal plume in the 2012 ESA Consultation Letter (p. 17). At high tide, the plume is confined to the surface layer (to a depth ranging from 3 to 8 feet below the surface) and spreads from the point of release. Studies on the shape and dimensions of the plume suggest that, under worst case conditions, the area where water temperatures are at least 1°C (1.8°F) above ambient could extend to 3,000 acres, or about 0.8% of the surface area of Cape Cod Bay. In November, when ambient temperatures are cooler, the extent of the plume at temperatures at least 3°C (5.4°F) above ambient is 56 acres; the plume extends to 138 acres in July when ambient temperatures are higher.

At low tide, elevated temperatures are present near the discharge canal and the plume contacts the bottom. The maximum areal extent of the plume at temperatures greater than 1°C (1.8°F) above ambient is 1.2 acres. The maximum linear extent of the 1°C isotherm in contact with the bottom is about 170 m (560 ft) and the bottom area with the maximum recorded rise in temperature (9°C or 16.2°F) was limited to less than 0.13 acres.

EPA concludes that the thermal plume from PNPS is relatively small compared to the receiving water and dissipates rapidly. It is predominantly a surface plume that moves with the tides and the wind. Minor impacts to the macroalgal community have been documented that can be attributed to the thermal plume, but this area is only roughly one acre in size. Thus, from a retrospective analysis, the past forty (40) years of operation of PNPS—during which the thermal component of the discharge has remained the same—has been protective of the balanced indigenous population of fish, shellfish and wildlife, including species listed under the ESA, in the context of § 316(a).

In addition, NMFS, in its 2012 ESA Consultation for the relicensing of PNPS, likewise concluded that, even during the warmest months of the year, the surface and bottom area of the plume is small and that threatened and endangered species of whales are expected to be able to swim around or under the plume throughout the year. As a result, any avoidance of the relatively small plume would not result in the disruption or delay in any essential behaviors that these species may be carrying out in the action area, including foraging, migrating, or resting. *See* 2012 ESA Consultation letter, 18-19. The dimensions of the plume do not extend into designated critical habitat for North Atlantic right whale, therefore, there will be no direct effects to critical habitat. Similarly, threatened and endangered species of sea turtles present in the action area would also be able to avoid the plume by swimming around or under it and the plume will not disrupt or delay any essential behaviors, including foraging, migrating, or resting. NMFS also considered the potential for the risk of cold-stunning of sea turtles, in which turtles attracted by the plume remain in the action area so long that they risk becoming incapacitated when the contact colder ambient temperatures outside the plume. *Id.* at 20. NMFS concluded that the thermal plume is limited sufficiently spatially and temporally that it is extremely unlikely that sea turtles would seek out and use the plume as refuge from falling temperatures such that it would increase vulnerability to cold stunning. *Id.*

NMFS also considered if the thermal plume would be likely to affect Atlantic sturgeon in the action area. At high tide, when the thermal plume is confined to the surface, the normal behavior of Atlantic sturgeon as benthic-oriented fish is likely to limit exposure to the plume and fish that may be near the surface are likely to be able to avoid the relatively small area where ambient temperature are warmest (11.25 acres). At low tide, Atlantic sturgeon are likely to be able to avoid bottom waters with elevated temperatures by swimming around it. NMFS also determined that it is extremely unlikely that Atlantic sturgeon would be exposed to temperatures that could result in mortality (33.7°C or greater) because fish would exhibit avoidance behavior at temperatures of 28°C and would avoid the small area where temperatures are greater than tolerable. NMFS concluded that there would be no avoidance-related effects to Atlantic sturgeon from the thermal plume, and that it is unlikely that the thermal plume would preclude any essential behaviors of Atlantic sturgeon present in the action area, including foraging, migrating, and resting or that the fitness of any individual will be affected. *See* 2012 ESA Consultation letter, 21-22.

Finally, NMFS considered any impacts to listed species as a result of the effect of the thermal plume on the preferred prey species of threatened and endangered species. NMFS concluded that benthic invertebrates, the preferred prey of sea turtles and Atlantic sturgeon, would be displaced from a small area and would likely be able to avoid temperatures that would result in

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injury or mortality. Effects to foraging sea turtles and Atlantic sturgeon would be insignificant and limited to the distribution of prey away from the thermal plume. *See* 2012 ESA Consultation letter, 23. Similarly, prey species for humpback and fin whales, including Atlantic herring, sand lance, Pollock, and mackerel, would be displaced from a small area and would not be injured or killed due to exposure to intolerable temperatures. As a result, effects to foraging humpback and fin whales would be insignificant and limited to the distribution of prey away from the thermal plume. *Id.* Finally, NMFS concluded that copepods, the preferred prey of North Atlantic right whales, would be able to avoid the small area in which temperatures would be intolerable, rather than be injured or killed and, as a result, effects to foraging right whales would be extremely unlikely. *Id.* at 24. Similarly, effects to designated critical habitat for North Atlantic right whales resulting from thermal effects on prey species are also extremely unlikely.

Based on the detailed analysis in the 2012 ESA consultation, NMFS concludes that the thermal plume is not likely to adversely impact threatened and endangered species in the action area. The temperature limits in the draft permit that apply during the period when PNPS will generate electricity are consistent with the conditions evaluated in the 2012 ESA consultation. EPA agrees that, under these conditions, the thermal plume is not likely to adversely impact threatened and endangered species in the action area.

Based on Entergy's ~~proposal to terminate the~~expected termination of electric generation ~~of electricity~~ at PNPS by June 1, 2019, the draft permit ~~requires the permittee to cease~~includes conditions that address the cessation of discharging non-contact cooling water for the main condenser by this date. Elimination of this discharge will effectively eliminate the primary source of heated effluent from the facility. Without the need for condenser cooling water, both the maximum temperature and rise in temperature will be substantially reduced. The draft permit authorizes the discharge of up to 224 MGD (at an average monthly volume of 11.2 MGD) of cooling water to support decommissioning activities at a maximum temperature of 85°F, a monthly average temperature of 80°F, and a maximum rise in temperature of 3°F upon terminating ~~electrical~~electric generation at PNPS. The maximum daily temperature of 85°F and monthly average temperature of 80°F are consistent with the water quality standards for Class SA waters at 314 CMR 4.05(4)(a)(2)(a). Based on the 2012 ESA Consultation and information reviewed and assessed in development of the draft permit, the effects of heated effluent from the continued operation of PNPS at the current temperature on listed species are likely to be insignificant. The substantial reduction in both maximum daily temperature and rise in temperature as a result of terminating ~~electrical~~electric generation will further reduce any potential impacts to listed species from the discharge of heated effluent.

11.2.2 Operation of a Cooling Water Intake Structure

EPA characterizes the potential impacts of entrainment and impingement mortality from PNPS' CWIS in detail in Attachment D, Section 3.0 ("Biological Impact of Cooling Water Intake Structures"). Based on sampling conducted by the facility since 1980, EPA estimates that, on average, PNPS entrains about 2.8 billion eggs and 354 million larvae annually, and impinges about 42,800 fish annually. According to NMFS, because early life stages of listed species are either not present or too large to be entrained, and sub-adult and adults are likely strong enough

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swimmers to avoid becoming impinged, impingement or entrainment of any whales, sea turtles, or Atlantic sturgeon is extremely unlikely to occur. *See* 2012 NMFS ESA Consultation letter, 7-9. In 40 years of biological monitoring, PNPS has not observed the impingement or entrainment of any listed species. Any potential impacts to ESA listed species would be indirect, resulting from the impingement and entrainment of prey species.

In its 2012 ESA consultation with NRC, NMFS assessed the potential impacts of impingement and entrainment of prey on listed species as a result of the continued operation of PNPS~~.~~ for the 20-year license renewal period. At the current levels of cooling water withdrawal and intake velocity, NMFS expects that reductions in prey on listed species as a result of PNPS' CWIS will be insignificant. Specifically, NMFS found that, while entrainment likely results in the loss of some copepods that would otherwise be available as forage for right whales, the reduction would be undetectable from natural variability and any effects to foraging right whales insignificant. *See* 2012 ESA Consultation letter, 12. Similarly, effects to designated critical habitat for North Atlantic right whales resulting from loss of prey are also insignificant. NMFS also expects that the effect of impingement and entrainment losses of Atlantic mackerel, Atlantic herring, and sand lance on foraging whales would be insignificant. *Id.* at 13. Finally, NMFS expects that the effects of the loss of benthic invertebrates as available forage for sea turtles and Atlantic sturgeon would be insignificant. *Id.* at 15. EPA is aware of no new information since 2012 that would alter these conclusions.

Based on Entergy's ~~proposal to terminate the~~expected termination of electric generation ~~of electricity~~ at PNPS by June 1, 2019, the draft permit ~~requires the permittee to cease~~includes conditions that address the cessation of seawater withdrawals for the main condenser by this date. Elimination of seawater withdrawals for ~~electrical~~electric generation will result in an average flow reduction of 96~~% beginning no later than~~%, expected to begin June 1, 2019. By eliminating seawater withdrawals for the main condenser, PNPS will achieve an actual through-screen intake velocity of no more than 0.5 fps. This lower intake velocity would be even more protective by ensuring that listed species are not impinged and by allowing most prey species to avoid impingement. Together, EPA has determined that a 96% reduction in flow and 0.5 fps actual through-screen velocity are the "best technology available" to minimize the adverse environmental impacts from impingement and entrainment. This determination is explained in more detail in Sections 6.0 and 7.0 of Attachment D ("Assessment of Cooling Water Intake Structure Technologies and Determination of Best Technology Available Under CWA § 316(b)").

The draft permit requires a 96% reduction in cooling water withdrawals from Cape Cod Bay and prohibits cooling water withdrawals for the main condenser effective upon ~~terminating electrical~~ the expected termination of electric generation at the plant ~~and no later the June 1, 2019~~. This reduction in cooling water will effectively reduce entrainment by 96%. In addition, the draft permit requires PNPS to, upon the expected termination of electric generation at the plant, achieve a through-screen velocity no greater than 0.5 fps at the traveling screens. Based on the 2012 ESA Consultation and information reviewed and assessed in development of the draft permit, the effects of the continued operation of PNPS at the current levels of seawater

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withdrawal and intake velocity on listed species are likely to be insignificant. The substantial reduction in both cooling water withdrawals and intake velocity as a result of terminating electrical generation will further reduce any potential impacts to listed species from entrainment and impingement.

### 11.3 Finding

It is EPA's opinion that the operation of this facility, ~~as governed by this permit action~~either as currently operating or after the expected termination of electric generation, is not likely to adversely affect the listed species or any of their critical habitat occurring in the vicinity of the receiving water for the reasons discussed in the Attachments B, C, and D and the 2012 ESA Consultation letter and as summarized above.

Based on the analysis of potential impacts presented here, impacts to listed species from the withdrawal and discharge of cooling, process, and storm water at PNPS will be insignificant or discountable. EPA has made the preliminary determination that the renewal of the PNPS permit may affect, but is not likely to adversely affect, any species listed as threatened or endangered by NMFS or any designated critical habitat. This finding is consistent with the conclusion NMFS reached in 2012 during consultation with the NRC for relicensing PNPS. Because the draft permit includes effluent limitations and conditions that are as stringent as or more stringent than the conditions assessed in the 2102 consultation, the effects of the draft permit on threatened and endangered species and critical habitat, as described above, have already been considered and EPA has determined that re-initiation of consultation is not necessary at this time. EPA is seeking concurrence from NMFS regarding this determination through the information presented in this fact sheet.

Re-initiation of consultation will take place: (a) if new information reveals effects of the action that may affect listed species or critical habitat in a manner or to an extent not previously considered in the consultation; (b) if the identified action is subsequently modified in a manner that causes an effect to the listed species or critical habitat that was not considered in the consultation; or (c) if a new species is listed or critical habitat is designated that may be affected by the identified action.

During the public comment period, EPA has provided a copy of the draft permit and fact sheet to both NMFS and USFWS.

## 12.0 Essential Fish Habitat (EFH) Assessment

Pursuant to section 305(b)(2) of the 1996 Amendments, PL 104-297, to the Magnuson-Stevens Fishery Conservation and Management Act, 16 U.S.C. § 1801 et seq. (1998), EPA is required to consult with the National Marine Fisheries Services (NMFS) if EPA's action or proposed actions that it funds, permits, or undertakes, may adversely affect "essential fish habitat," *see also id.* § 1855(b)(2); 50 C.F.R. § 600.920(a)(1), which is defined as "those waters and substrate necessary to fish for spawning, breeding, feeding, or growth to maturity," 16 U.S.C. § 1802 (10).

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"Adverse effect means any impact that reduces quality and/or quantity of EFH." 50 C.F.R. § 600.910(a). Adverse effects may include direct (e.g., contamination or physical disruption), indirect (e.g., loss of prey, reduction in species' fecundity), site-specific, or habitat-wide impacts, including individual, cumulative, or synergistic consequences of actions. *Id.*

EFH is only designated for species for which federal fisheries management plans exist. 16 U.S.C. § 1855(b)(1)(A). EFH designations for New England were approved by the U.S. Department of Commerce on March 3, 1999. The following is a list of the EFH species and applicable life stage(s) for Cape Cod Bay including waters from Plymouth Harbor south to Lookout Point in Plymouth, MA:

| Species | Eggs | Larvae | Juveniles | Adults |
|---|---|---|---|---|
| Atlantic cod (*Gadus morhua*) | X | X | X | X |
| haddock (*Melanogrammus aeglefinus*) | X | X | | |
| pollock (*Pollachius virens*) | | X | X | X |
| whiting (*Merluccius bilinearis*) | X | X | X | X |
| offshore hake (*Merluccius albidus*) | | | | |
| red hake (*Urophycis chuss*) | X | X | X | X |
| white hake (*Urophycis tenuis*) | X | X | X | X |
| redfish (*Sebastes fasciatus*) | n/a | | | |
| witch flounder (*Glyptocephalus cynoglossus*) | | | | |
| winter flounder (*Pseudopleuronectes americanus*) | X | X | X | X |
| yellowtail flounder (*Limanda ferruginea*) | X | X | X | X |
| windowpane flounder (*Scophthalmus aquosus*) | X | X | X | X |
| American plaice (*Hippoglossoides platessoides*) | X | X | X | X |
| ocean pout (*Macrozoarces americanus*) | X | X | X | X |
| Atlantic halibut (*Hippoglossus hippoglossus*) | X | X | X | X |
| Atlantic sea scallop (*Placopecten magellanicus*) | X | X | X | X |
| Atlantic sea herring (*Clupea harengus*) | X | X | X | X |
| monkfish (*Lophius americanus*) | X | X | | |
| bluefish (*Pomatomus saltatrix*) | | | X | X |
| long finned squid (*Loligo pealeii*) | n/a | n/a | X | X |
| short finned squid (*Illex illecebrosus*) | n/a | n/a | X | X |
| Atlantic butterfish (*Peprilus triacanthus*) | X | X | X | X |
| Atlantic mackerel (*Scomber scombrus*) | X | X | X | X |
| summer flounder (*Paralichthys dentatus*) | | | | X |

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| Species | Eggs | Larvae | Juveniles | Adults |
|---|---|---|---|---|
| scup (*Stenotomus chrysops*) | n/a | n/a | X | X |
| black sea bass (*Centropristis striata*) | n/a | | | |
| surf clam (*Spisula solidissima*) | n/a | n/a | X | X |
| ocean quahog (*Artica islandica*) | n/a | n/a | | |
| spiny dogfish (*Squalus acanthias*) | n/a | n/a | X | |
| tilefish (*Lopholatilus chamaeleonticeps*) | | | | |
| bluefin tuna (*Thunnus thynnus*) | | | X | X |

### 12.1 Description of Federal Action

As described in this fact sheet, EPA is proposing to reissue the NPDES permit for PNPS authorizing the withdrawal of once-through cooling water and the discharge of process water and stormwater through multiple outfalls. PNPS currently operates a single reactor unit with a boiling water reactor and turbine generator. Seawater is withdrawn from Cape Cod Bay through an intake embayment formed by two breakwaters. Seawater, primarily used for condenser cooling water, is pumped from the cooling water intake structure (CWIS) by two circulating water pumps and five salt service water pumps at a maximum volume of 467 MGD. Once-through condenser cooling water (Outfall 001) is combined with plant service cooling water (Outfall 010) and discharged to Cape Cod Bay via the discharge canal. In addition, PNPS discharges effluent for thermal backwash, intake screen wash water, neutralizing sump waste commingled with demineralizer reject water, station heating water, and stormwater, through various outfalls on an intermittent basis. A more detailed description of each of these waste streams and outfalls is provided in Section 2.0 of this fact sheet.

On October 13, 2015, Entergy announced that PNPS ~~will~~intends to cease generation of electricity at the facility ~~no later than~~by June 1, 2019. Assuming that occurs, EPA expects that operation of the facility to support electrical generation will continue until May 31, 2019. Beginning June 1, 2019, seawater withdrawal and effluent discharge will be dramatically altered as a function of entering the decommissioning phase. To the best of its ability based on available information, EPA has taken this into account and has tailored the permit to reflect post-shutdown operations and discharges as appropriate. However, since the permittee cannot fully anticipate all changes in permitted flows that will take place post-shutdown, this permit may be modified post-shutdown if warranted by any new or increased discharges.

The draft permit establishes technology- and water quality-based effluent limitations and conditions designed to ensure the protection of designated uses of Cape Cod Bay, including as an excellent habitat for fish, other aquatic life and wildlife, including for their reproduction, migration, growth and other critical functions consistent with the Massachusetts surface water quality standards at 314 CMR 4.05(4)(a).

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### 12.2 Analysis of Potential Effects on EFH

The primary effects of PNPS on EFH and the managed species are related to the discharge of heated water, and the impacts of entrainment and impingement associated with the CWIS, either directly or indirectly (e.g., entrainment of prey species).

#### 12.2.1 Impacts from Seawater Withdrawals at the CWIS

EPA characterized the potential impacts of entrainment and impingement mortality from PNPS' CWIS in detail in Attachment D, Section 3.0 ("Biological Impact of Cooling Water Intake Structures"). EPA briefly summarizes the impacts here. Based on sampling conducted by the facility since 1980, EPA estimates that, on average, PNPS entrains about 2.8 billion eggs and 354 million larvae annually, and impinges about 42,800 fish annually. PNPS has reported entrainment of early life stages of 17 EFH species and impingement of 20 EFH species. Additionally, entrainment likely impacts an unknown number of phytoplankton and zooplankton, as well as tens of thousands of macroinvertebrates (e.g., worms, shrimp, and crabs) that may be important prey for EFH species.

PNPS calculated equivalent adults for a subset of species using species- and life-stage specific survival rates from the scientific literature and the number of eggs and larvae entrained. Not all EFH species were included in this analysis because the species- and life-stage survival data are not available for every species. For those EFH species for which adequate data are available, the permittee estimates that entrainment likely results in the average annual loss of more than 17,000 age-3 winter flounder, 12,800 age-1 Atlantic herring, 1,800 age-2 Atlantic cod, and 1,400 age-3 Atlantic mackerel. Cumulatively over the life of the facility, impingement and entrainment at PNPS have likely resulted in the loss of millions of adult fish designated as EFH species, though no adverse impact of these losses on fish populations has been demonstrated.

Based on Entergy's ~~proposal to terminate the~~expected termination of electric generation ~~of electricity~~ at PNPS by June 1, 2019, the draft permit ~~requires the permittee to cease~~ includes conditions that address the cessation of seawater withdrawals for the main condenser by this date. Elimination of seawater withdrawals for electrical generation will result in an average flow reduction of 96~~% beginning no later than~~%, expected to begin June 1, 2019. By eliminating seawater withdrawals for the main condenser, PNPS will achieve an actual through-screen intake velocity of no more than 0.5 fps. Together, EPA has determined that a 96% reduction in flow and 0.5 fps actual through-screen velocity are the "best technology available" to minimize the adverse environmental impacts from impingement and entrainment. This determination is explained in more detail in Sections 6.0 and 7.0 of Attachment D ("Assessment of Cooling Water Intake Structure Technologies and Determination of Best Technology Available Under CWA § 316(b)"). EPA believes that this flow reduction will effectively minimize any potential impacts from impingement and entrainment on species with designated EFH in Cape Cod Bay.

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### 12.2.2 Impacts from Effluent Discharges

Discharge of heated effluent can have both lethal and sublethal effects on organisms in the vicinity of the thermal plume. Lethal thermal shock is most likely to occur closest to the discharge source. Sublethal effects may include reduced egg hatching success, larval developmental inhibition, or a change in the composition of the biotic community. Environmental responses to thermal effluent include avoidance of biota, scouring of vegetation and, in some cases, attraction to the thermal plume is possible.

The draft permit includes a maximum effluent temperature limit of 102°F and maximum rise in temperature of 32°F at Outfall 001 (heated non-contact cooling water from the main condenser), which is consistent with the limits in the current permit. The company's thermal discharge and its effects on ocean temperatures were modeled by Pagenkopf and others from MIT (Pagenkopf, *et al.*, 1974; 1976). Field characterizations of the plume were also conducted by MIT in the early 1970's in part to validate the model. Additional field studies to characterize ocean-bottom plume dimensions were conducted by EG&G (1995). A detailed description of the thermal plume and its effects on aquatic organisms, including species for which EFH has been designated, are provided in Attachments B and C of this fact sheet.

The PNPS thermal discharge is released to Cape Cod Bay. The near-field shape of the plume and its degree of contact with the bottom are constantly changing throughout the tidal cycle. At stages near low-tide, the plume has its greatest effect on the bottom, but due to the slope of the bottom adjacent to the facility, the large tidal range (about 10'), and other variables, the most extensive measured plume effects (heat and velocity) to the bottom have been limited to about an acre or less, although, in theory, plume effects to the bottom could be greater. Due to its buoyancy, the bulk of the plume rises to the surface and its horizontal spread increases with distance from the point of release. In tidal periods around and including low tide, the plume can interact directly with the bottom to a distance of about 700 ft. (but changes with the degree of tidal fluctuation which varies over the course of each month and seasonally). As the tide progresses from low to high and the height of the water column increases, the plume lifts from the bottom but spreads to a much greater extent in the far-field. Because the shape of the plume is constantly changing throughout the day, from day to day and throughout the seasons, there is little consistency to the location of the impact of the far-field plume on water temperatures. Far-field delta temperatures of 1°C from background are typically found in only the top 3-8 feet of the water column. Heat in the plume is extracted both by surrounding water and by the atmosphere. The rate of release of plume heat to the atmosphere is greatly affected by wind velocity, the difference between ambient air temperature and water temperature, humidity, tidal stage (which affects the horizontal and vertical shape of the plume) and other factors.

EPA and MassDEP have concluded that the current permit limits will assure the protection and propagation of the balanced, indigenous population and that there are likely to be no adverse effects from the thermal plume on benthic flora, benthic fauna, and pelagic fish, including species for which EFH has been designated. See Section 7 and Attachments B and C of this fact sheet for further discussion of the potential impacts of the thermal plume. Moreover, upon the expected termination of the generation of electricity at PNPS ~~(no later than June 1, 2019),~~, PNPS

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will no longer discharge non-contact cooling water from the main condenser after terminating electrical generation which will eliminate the primary source of heated effluent to Cape Cod Bay. As a result, PNPS will be able to meet more stringent temperature limits no later than June 1, 2019.

### 12.3 Conclusion

EPA has concluded that the limits and conditions in the draft permit minimize adverse effects to EFH for the following reasons:

- All permitted limits in the draft permit are as stringent as or more stringent than those in the current permit and consistent with Massachusetts surface water quality standards for the protection of fish and fish habitat.
- The draft permit prohibits the discharge of pollutants or combination of pollutants in toxic amounts.
- The draft permit includes numeric limitations for pH, oil and grease, total residual oxidants, tolyltriazole, sodium nitrate, and total suspended solids that are protective of state water quality standards.
- The thermal plume from PNPS is relatively small compared to the receiving water and dissipates rapidly. Over 40 years of biological monitoring data demonstrate that the variance-based limits will assure the protection and propagation of a balanced, indigenous community of shellfish, fish and wildlife.
- ~~Following~~To reduce impingement mortality, the draft permit requires PNPS to continuously rotate the traveling screens in the interim period from the effective date of the permit until termination of electrical generation.
- In addition, following the expected termination of electrical generation at PNPS, the facility will cease discharges of non-contact cooling water from the main condenser, which will drastically reduce the maximum effluent temperature and rise in temperature compared to the existing conditions.

~~The~~ Moreover, the draft permit establishes requirements related to the CWIS that, following the expected termination of electrical generation at PNPS, would reduce cooling water withdrawals from Cape Cod Bay by 96%, prohibit cooling water withdrawals for the main condenser, and require the facility to achieve a through-screen velocity no greater than 0.5 fps. These conditions become effective upon ~~terminating electrical~~the expected termination of electric generation at the plant ~~and no later the June 1, 2019~~ and are expected to reduce impingement and entrainment of all aquatic life by 96%. These conditions will also significantly reduce the temperature differential and extent of the thermal plume.

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- ~~To reduce impingement mortality, the draft permit requires PNPS to continuously rotate the traveling screens in the interim period from the effective date of the permit until termination of electrical generation.~~

It is the opinion of EPA that the conditions and limitations contained in the draft permit will adequately protect all aquatic life both under current operating conditions and after the expected termination of electric generation, including those with designated EFH in Cape Cod Bay, and that further mitigation is not warranted. If adverse impacts to EFH are detected as a result of this permit action, or if new information is received that changes the basis for our conclusion, NMFS will be notified and an EFH consultation will be initiated. NMFS has been notified of the permit action and has been provided with copies of the draft permit and fact sheet during the public comment period.

## 13.0 MONITORING AND REPORTING

The effluent monitoring requirements have been established to yield data representative of the discharge under authority of Section 308 (a) of the CWA in accordance with 40 C.F.R. §§ 122.41(j), 122.44 (*l*), 122.48.

The draft permit requires the permittee to report monitoring results obtained during each calendar month in the Discharge Monitoring Reports (DMRs) no later than the 15th day of the month following the completed reporting period.

The draft permit includes new provisions related to electronic DMR submittals to EPA and MassDEP. The draft permit requires that, no later than three (3) months after the effective date of the permit, the permittee submit all DMRs to EPA using NetDMR, unless the permittee is able to demonstrate a reasonable basis, such as technical or administrative infeasibility, that precludes the use of NetDMR for submitting DMRs and reports ("opt-out request").

In the interim (until three months from the effective date of the permit), the permittee may either submit monitoring data to EPA in hard copy form, or report electronically using NetDMR.

NetDMR is a national web-based tool for regulated Clean Water Act permittees to submit DMRs electronically via a secure Internet application to U.S. EPA through the Environmental Information Exchange Network. NetDMR allows participants to discontinue mailing in hard copy forms under 40 C.F.R. § 122.41 and § 403.12. NetDMR is accessed from the following url: http://www.epa.gov/netdmr. Further information about NetDMR can be found on the EPA Region 1 NetDMR website located at http://www.epa.gov/region1/npdes/netdmr/index.html.

EPA currently conducts free training on the use of NetDMR, and anticipates that the availability of this training will continue to assist permittees with the transition to use of NetDMR. To learn more about upcoming trainings, please visit the EPA Region 1 NetDMR website http://www.epa.gov/region1/npdes/netdmr/index.html.

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The draft permit also includes an "opt-out" request process. Permittees who believe they cannot use NetDMR due to technical or administrative infeasibilities, or other logical reasons, must demonstrate the reasonable basis that precludes the use of NetDMR. These permittees must submit the justification, in writing, to EPA at least sixty (60) days prior to the date the facility would otherwise be required to begin using NetDMR. Opt-outs become effective upon the date of written approval by EPA and are valid for twelve (12) months from the date of EPA approval. The opt-outs expire at the end of this twelve (12) month period. Upon expiration, the permittee must submit DMRs to EPA using NetDMR, unless the permittee submits a renewed opt-out request sixty (60) days prior to expiration of its opt-out, and such a request is approved by EPA.

In most cases, reports required under the permit shall be submitted to EPA as an electronic attachment through NetDMR, subject to the same three (3) month time frame and opt-out provisions as identified for NetDMR. Certain exceptions are provided in the permit such as for the submittal of pre-treatment reports and for providing written notifications required under the Part II Standard Permit Conditions. Once a permittee begins submitting reports to EPA using NetDMR, it will no longer be required to submit hard copies of DMRs or other reports to EPA and will no longer be required to submit hard copies of DMRs to MassDEP. However, permittees must continue to send hard copies of reports other than DMRs to MassDEP until further notice from MassDEP.

Until electronic reporting using NetDMR begins, or for those permittees that receive written approval from EPA to continue to submit hard copies of DMRs, the draft permit requires that submittal of DMRs and other reports required by the permit continue in hard copy format. Hard copies of DMRs must be postmarked no later than the 15th day of the month following the completed reporting period.

## 14.0 STATE CERTIFICATION REQUIREMENTS

EPA may not issue a permit unless the Massachusetts Department of Environmental Protection (MassDEP) certifies that the effluent limitations included in the permit are stringent enough to assure that the discharge will not cause the receiving water to violate the Massachusetts Surface Water Quality Standards. The MassDEP has reviewed the draft permit and advised EPA that the limitations are adequate to protect water quality. EPA has requested permit certification by the State pursuant to 40 C.F.R. § 124.53 and expects the draft permit will be certified.

## 15.0 PUBLIC COMMENT PERIOD, PUBLIC HEARING, AND PROCEDURES FOR FINAL DECISION

All persons, including applicants, who believe any condition of the draft permit is inappropriate must raise all issues and submit all available arguments and all supporting material for their arguments in full by the close of the public comment period, to George Papadopoulos, U.S. EPA, Office of Ecosystem Protection, Industrial Permits Section, Mailcode OEP 06-1, 5 Post Office Square, Suite 100, Boston, Massachusetts 02109-3912.

NOTE: ENTERGY'S COMMENTS REFLECT FACTUAL EDITS ONLY AND DO NOT INCLUDE EPA'S STATEMENT OF THE LEGAL CONTEXT OR REGULATORY RATIONALE, WHICH ENTERGY HAS ADDRESSED IN ITS COMMENTS.

Prior to such date, any person may submit a written request for a public hearing to consider the draft permit to EPA and the State Agency. Such requests shall state the nature of the issues proposed to be raised in the hearing. EPA will consider any request for a hearing and may decide to hold a public hearing if the criteria stated in 40 C.F.R. § 124.12 are satisfied. In reaching a final decision on the draft permit, the EPA will respond to all significant comments and make these responses available to the public at EPA's Boston office.

Following the close of the comment period and any public hearings that may be held, the EPA will issue a Final Permit decision and forward a copy of the final decision, including responses to any significant comments, to the applicant and each person who has submitted written comments or requested notice. Within 30 days following the notice of the Final Permit decision, any interested person may submit a petition for review of the permit to EPA's Environmental Appeals Board consistent with 40 C.F.R. § 124.19.

## 16.0 EPA & MASSDEP CONTACTS

Additional information concerning the draft permit may be obtained between the hours of 9:00 a.m. and 5:00 p.m., Monday through Friday, excluding holidays, from the EPA and MassDEP contacts below:

George Papadopoulos, Industrial Permits Section
5 Post Office Square - Suite 100 - Mailcode OEP 06-1
Boston, MA 02109-3912
Telephone: (617) 918-1579 FAX: (617) 918-0579

Cathy Vakalopoulos, Massachusetts Department of Environmental Protection
Bureau of Water Resources
1 Winter Street, Boston, Massachusetts 02108
catherine.vakalopoulos@state.ma.us
Telephone: (617) 348-4026; FAX: (617) 292-5696

May 18, 2016
Date

Ken Moraff, Director
Office of Ecosystem Protection
U.S. Environmental Protection Agency