U.S. EPA REGION 1

Determination on Remand from the EPA Environmental Appeals Board
Brayton Point Station, NPDES Permit No. MA0003654

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Region 1 - New England Office
Office of Ecosystem Protection

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EPA Region I

Determination on Remand from the EPA Environmental Appeals Board (Brayton Point Station, NPDES Permit No. MA0003654)

I. Introduction

On October 6, 2003, the Region 1 office (Region 1 or Region) of the United States Environmental Protection Agency (EPA) reissued a National Pollutant Elimination System (NPDES) permit to the Brayton Point Station power plant (BPS) in Somerset, MA (NPDES Permit No. MA0003654) (Permit). AR 3370. Region 1 reissued the Permit in conjunction with the Massachusetts Department of Environmental Protection (MassDEP). The Region issued the Permit under the federal Clean Water Act, 33 U.S.C. § 1251, *et seq.* (CWA), while MassDEP issued the Permit under the Massachusetts Clean Waters Act, M.G.L. Chapter 21 §§ 26-53. The Permit was reissued to replace BPS's prior permit, issued in 1993 (1993 Permit). The 1993 Permit expired in 1998 but was administratively continued as a result of the permit holder's filing a timely application for permit reissuance. *See* 40 C.F.R. § 122.6(a).

At the time of permit reissuance, BPS was owned and operated by USGen New England (USGen), a subsidiary of PG&E Corporation. USGen timely appealed the Permit to EPA's Environmental Appeals Board (EAB or Board). Dominion Energy Brayton Point (Dominion-BPS or permittee) then acquired BPS from USGen and continued to pursue the permit appeal.

On February 1, 2006, the EAB issued its decision on the merits of the permit appeal. *In re Dominion Energy Brayton Point, L.L.C. (Formerly USGen New England, Inc.) Brayton Point Station*, NPDES Appeal No. 03-12 (EAB, Feb. 1, 2006) (*Remand Order*).[1] In most respects, the Remand Order upholds the Permit and the Region's analyses in support thereof. *See, e.g., Remand Order*, at 5-7, 293-294 (summary of EAB rulings in the case).

Still, the Board remands the Permit to the Region to "reopen the permit proceedings for the limited purposes" of addressing two administrative issues and two substantive issues. *Id.* at 293. The remanded issues have been addressed by Region 1 as follows:

- *First Administrative Issue:* The Board directed the Region to correct the typographical error in the Permit which mistakenly stated the units for the permit's *total iron* limit in pounds per day rather than in milligrams per liter. *See id.* at 291-292. Region 1 made this correction in a minor permit modification issued on June 26, 2006.

- *Second Administrative Issue:* The Board directed the Region to place the "production foregone re-analysis" by Region 1's consultant, Stratus Consulting, Inc., in the

[1] The *Remand Order* can be located on the EAB's website at www.epa.gov/eab.

administrative record if it is not currently in the record. *Id.* at 6, 268, 293. The referenced material was inadvertently left out of the administrative record previously and Region 1 has included it in the administrative record now.

- *First Substantive Issue:* In order to establish a CWA § 316(a) variance that would assure the protection and propagation of the balanced indigenous population of fish, shellfish and wildlife in and on Mount Hope Bay, the Region set summer thermal discharge limits that would ensure that no more than 10% of the bay exceeds 24°C for five or more days per summer month. *See Id.* at 113 - 117; Region 1 Draft Permit Determination Document (AR 162) at 6-56. While upholding both the area impacted and the maximum temperature thresholds, *id.* at 118-133, the Board remanded the Permit so that the Region could further articulate its rationale for the five-day threshold. The Board found that the Region's rationale for the latter threshold was conclusory and thus insufficiently developed for the Board to review and "determine whether it meets the requirement of rationality." *Id.* at 133-135. The Board instructed the Region to either reaffirm or modify the five-day exceedance value and adequately explain the rationale for its choice. In response, Region 1 has reconsidered the five-day threshold and determined that this value is appropriate and should be reaffirmed. The Region provides a detailed rationale for its determination in the text below. Since the Region has reaffirmed the five-day threshold, no changes to the Permit's thermal discharge limits are necessary or appropriate.

- *Second Substantive Issue:* The Board remanded the Permit so that Region 1 could revisit certain issues pertaining to the evaluation of sound emissions likely to result from using mechanical draft, wet cooling towers at BPS. These issues arise in the context of the Region's determination of technology-based cooling water intake limits for the BPS Permit under CWA § 316(b). More specifically, these issues arise in connection with the Region's determination under CWA § 316(b) that mechanical draft, wet cooling towers represent the Best Technology Available for minimizing adverse environmental impact at BPS. The Permit's cooling water intake limits reflect this determination. The EAB did not dictate that the Region's conclusions necessarily needed to be changed. The Board stated, instead, that the Permit was being remanded for the Region either "to supplement its response to comments with a rationale that addresses Petitioner's concerns raised on appeal regarding the NIA [(*i.e.*, the Noise Impact Assessment)] or to modify the permit requirements, as appropriate." *Id.* at 288. In response, Region 1 has reconsidered the pertinent issues regarding cooling tower sound emissions and determined that the Region should reaffirm its prior overall conclusion on these issues. Specifically, Region 1 has determined that BPS can convert entirely to closed-cycle cooling and likely comply with Massachusetts noise control regulations and not cause otherwise unacceptable noise impacts. MassDEP has reviewed the Region's analysis of this issue and concurred with it in writing. As a result of the Region's present determination, no changes to the Region's prior BTA determination or the Permit's intake limits under CWA § 316(b) are necessary or appropriate. Region 1 provides a detailed rationale for its determination in the text below, including responses to the concerns raised by BPS on appeal and by the EAB in its

Remand Order.

Below Region 1 describes the resolution of the two remanded administrative issues and sets forth its determinations with regard to the two remanded substantive issues. While the purpose of this document is limited to addressing the specific issues remanded by the EAB, the Region has provided factual and legal background to eliminate or minimize the need for the reader to refer to other documents or recall the relevant issues.

II. Procedural Background

Region 1 and MassDEP reissued the Permit to BPS on October 6, 2003. AR 3370. Under CWA § 401, MassDEP also certified that the Permit would achieve compliance with state water quality requirements. AR 3247. Under section 307(c)(1)(A) of the Coastal Zone Management Act (CZMA), 16 U.S.C. § 1456(c)(1)(A), the Massachusetts Coastal Zone Office (MA CZM) concurred that the Permit was consistent with the enforceable policies of the state's coastal zone program, but indicated that it must be notified if the Permit is changed. AR 3345. In addition, the National Marine Fisheries Service of the National Oceanic and Atmospheric Administration (NOAA-Fisheries) concluded that no additional conservation measures were required beyond the conditions of the Permit in order to comply with the Essential Fish Habitat (EFH) protection requirements of the Magnuson-Stevens Fishery Conservation and Management Act, 16 U.S.C. § 1855, but that if the Permit's conditions were to be relaxed, then the EFH consultation might need to be reinitiated. AR 1155.[2]

USGen filed a timely petition for review of the Permit with the EAB in November, 2003. As noted above, Dominion-BPS later acquired BPS from USGen and has continued to pursue the permit appeal. The Utility Water Act Group (UWAG) intervened as *amicus curiae* in the EAB proceeding in support of USGen, while MassDEP, the State of Rhode Island, the Conservation Law Foundation of New England, Inc. (CLF), Save the Bay, the Taunton River Watershed Alliance, Inc., and the Kickemuit River Council all intervened as *amicus curiae* supporting the Region's view that the Permit should be upheld by the Board.[3] Following extensive briefing and oral argument, the EAB issued its decision on the merits of the permit appeal (*i.e.*, the *Remand Order*) on February 1, 2006.

Dominion-BPS's appeal of the Permit primarily challenges the Permit's new thermal discharge

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[2] Since the Region's present decisions will not result in any changes to the limits included in the Permit, it is not necessary to reinitiate any of the consultations with, or seek new certifications from, any of the regulatory agencies discussed in this paragraph.

[3] While some of these amicus parties disagreed with certain of the Region's arguments and argued that the Permit should or could have been even more stringent in certain respects, all of them essentially supported the Permit and argued that the Board should uphold it.

and cooling water intake limits. Therefore, Region 1 has deemed these limits to be "contested conditions" of the Permit which must be stayed because of the appeal. Region 1 issued a letter on April 26, 2004, delineating which Permit limits would be stayed as "contested conditions" and which limits would go into effect as "uncontested conditions." AR 4000. Thus, some portions of the Permit are presently in effect, while others are stayed. For the stayed conditions, such as the Permit's thermal discharge and cooling water intake limits, the corresponding provisions of the 1993 Permit continue to apply, together with the pertinent terms of the "Memorandum of Agreement II," AR 711, regarding BPS's thermal discharges and cooling water withdrawals. *See also* AR 4000, at 2, n. 1.

As mentioned above and discussed in detail below, the EAB's *Remand Order* directed the Region to address two administrative matters and reexamine two substantive issues.[4] With respect to the two substantive issues, the Board did not dictate that the Region must change its conclusions. Instead, the Board directed the Region to reexamine both issues and provide an adequate written explanation of its decision for each. In connection with this effort, the EAB also directed the Region to determine whether or not it was necessary to seek additional public comment on either or both of the issues. Region 1 addresses all of the remanded issues below.

III. Actions to Resolve Remanded Administrative Issues

The actions taken by the Region to resolve the two administrative issues remanded by the EAB are described below.

A. Correction of Units for Limit on Total Iron Discharges

In the *Remand Order*, the Board directed the Region to correct a typographical error in the Permit which mistakenly expressed the limit on discharges of *total iron* in terms of pounds per day

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[4] In connection with its appeal of the Permit, the permittee filed a motion seeking that the EAB order that an evidentiary hearing be provided in connection with the Permit. On July 23, 2004, the EAB issued an extensively reasoned decision denying the company's motion. *In re Dominion Energy Brayton Point, L.L.C. (Formerly USGen New England, Inc.), Brayton Point Station*, 11 E.A.D. 525 (EAB 2004). The permittee then petitioned the United States Court of Appeals for the First Circuit to review the EAB's decision, but on September 29, 2004, the court dismissed the petition. *USGen New England, Inc. v. United States Environmental Protection Agency*, Appeal No. 04-2116 (1st Cir., Sept. 29, 2004) (Judgment). The permittee then filed a citizen suit under CWA § 505 seeking an order from the District Court for the District of Massachusetts that EPA had a mandatory duty under the CWA to provide an evidentiary hearing. The District Court dismissed the action, however, and Dominion-BPS appealed the dismissal to the First Circuit. On March 30, 2006, the First Circuit affirmed the District Court's dismissal of the case, ruling that EPA did not have a non-discretionary duty to provide an evidentiary hearing. *Dominion Energy Brayton Point, LLC v. Johnson*, 443 F.3d 12 (1st Cir. 2006).

rather than milligrams per liter. *See Remand Order*, at 291-92. The Region had already acknowledged this error and stated its intent to "fix this inadvertent typographical error in a minor permit modification." *Id.* at 292. Accordingly, the Region issued a minor permit modification on June 26, 2006, changing the units for the *total iron* limit from pounds per day to milligrams per liter. AR 4028.

B. Addition of Stratus' "Production Foregone Re-Analysis" to the Administrative Record

The Board directed the Region to place the "production foregone re-analysis" by Region 1's consultant, Stratus Consulting, Inc. (Stratus), in the administrative record if it is not already in the record. *Id.* at 6, 268 and 293. The Region found that it had inadvertently failed to include in the record certain attachments to the Stratus memorandum included in the record at RTC, App. X. These attachments include certain text and data regarding the production foregone re-analysis by Stratus. *See* RTC, App. X at 2. Region 1 has now placed a new copy of the complete document, including previously missing attachments, in the administrative record as AR 4020.

IV. Actions and Determinations to Resolve Remanded Substantive Issues

The Permit issued by the Region to BPS in October 2003 sets new, more stringent limits on thermal discharges and cooling water withdrawals by the power plant. The limits for both parameters are imposed as performance standards which the permittee is free to meet in any manner that it chooses. Nevertheless, each set of limits independently is expected to result in BPS converting its current open-cycle cooling system to a closed-cycle (or recirculating) cooling system using "mechanical draft, wet cooling towers." *See Remand Order* at 8. This is expected because, as all parties have agreed, this single technology appears to be the most cost-effective, practicable means of compliance with each set of limits.

The Permit's thermal discharge limits are based on CWA § 316(a), while the cooling water intake limits are based on both CWA § 316(b) and state water quality standards. The EAB remanded one technical issue related to the Region's determination under CWA § 316(a) and one technical issue related to the Region's determination under CWA § 316(b). The Board did not, however, remand any aspect of the Region's determination of water quality-based cooling water intake limits.

The factual, scientific, legal and policy bases for the Permit's thermal discharge and cooling water intake limits are set forth in a number of Region 1 documents. The principal documents in this regard are (1) Region 1's *Clean Water Act NPDES Permitting Determinations for Thermal Discharge and Cooling Water Intake from Brayton Point Station in Somerset, MA* (July 22, 2002) (DPDD), issued in support of the Draft Permit, AR 192, and (2) Region 1's *Responses to Comments – Public Review of Brayton Point Station NPDES Permit No. MA 0003654* (October

3, 2003), issued in support of the Final Permit (RTC). AR 3346 and 3347. The basis for the Permit's limits was also further detailed and explained in briefing and oral argument before the EAB and is discussed by the Board in the *Remand Order*.

The present document addresses the specific issues remanded by the Board. The remanded thermal discharge and cooling water intake issues are discussed in turn below.

A. Thermal Discharge Issue Under CWA § 316(a) - 5-Day Critical Temperature Exceedance Threshold

The Board partially remanded the Permit so that the Region could further articulate its reason for limiting the maximum number of allowed monthly temperature exceedances to five days. *See Remand Order*, at 135. Stating that "[t]he Region ... did not explain in its Determinations Document precisely why it ultimately selected five days (as opposed to any other number of days, such as six or seven)," the Board found that the Region's rationale for the exceedance frequency was stated in conclusory fashion. *Id.* at 134. Thus, the Board concluded that the Region's reasoning was not sufficiently developed for the Board to review it and "determine whether it meets the requirement of rationality." *Id.* at 135.[5] The Region has followed the Board's instructions on remand and conducted a thorough review of the legal and scientific underpinnings of its decision and now provides a full explanation of the rationale for its determination herein. As discussed below, the questions presented involve scientific uncertainty and considerable technical complexity and the Region's decision involves the application of scientific expertise and judgment. For the reasons discussed below, the Region reaffirms its original conclusion that five is the maximum number of days of critical temperature exceedance per summer month that would reasonably assure the protection and propagation of a balanced, indigenous population of shellfish, fish and wildlife (BIP) in and on Mount Hope Bay. As a result, Region 1 had determined that no changes to the Permit's thermal discharge limits would be appropriate.

1. Technology-Based and Water Quality-Based Thermal Discharge Limits in NPDES Permits

Congress enacted the CWA, "to restore and maintain the chemical, physical, and biological integrity of the Nation's waters." CWA § 101(a), 33 U.S.C. § 1251(a). To achieve this objective, the CWA makes it unlawful for any person to discharge any pollutant into the waters of the United States from any point source, except as authorized by specified permitting sections of the Act. CWA § 301(a), 33 U.S.C. § 1311(a) ("Effluent Limitations"). Section 402 establishes one of the CWA's principal permitting regimes, the National Pollutant Discharge Elimination

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[5] BPS asserted that the five-day critical temperature exceedance threshold was arbitrary, but offered no specific facts or arguments to demonstrate why the Region's selection of five days was incorrect or why another value would be correct. Still, the task remains for the Region to explain its choice on this point.

System, or NPDES. CWA § 402(a), 33 U.S.C. § 1342(a). Under Section 402, EPA may "issue a permit for the discharge of any pollutant, or combination of pollutants," in accordance with certain conditions, including compliance with the requirements of Section 301. *Id.* NPDES permits generally contain discharge limitations and establish related monitoring and reporting requirements. CWA §§ 402(a)(1) and (2), 33 U.S.C. §§ 1342(a)(1) and (2).

For existing sources of pollutants, discharge limits are typically derived from CWA § 301. 33 U.S.C. § 1311. These effluent limits are either technology-based or water quality-based. *See* CWA § 301(b)(1), 33 U.S.C. § 1311(b)(1). Technology-based effluent limitations are generally developed on an industry-by-industry basis and establish a minimum level of treatment that is technologically available and economically achievable for facilities within a specific industry. CWA §§ 301(b), 304(b), 33 U.S.C. §§ 1311(b), 1314(b); 40 C.F.R. Part 125, Subpart A; *see also*, 40 C.F.R. Parts 405-471 (effluent limitations guidelines for various point source categories). If no industry-specific effluent limitations guidelines exist, permit issuers must use their "best professional judgment" to establish appropriate technology-based effluent limits on a case-by-case basis. CWA § 402(a)(1), 33 U.S.C. § 1342(a)(1); 40 C.F.R. §§ 122.44, 125.3.

Under the CWA, the term "pollutant" is expressly defined to include heat. CWA § 502(6), 33 U.S.C. § 1362(6). Discharges of heated water (*i.e.*, thermal discharges) are thus prohibited by CWA § 301(a) unless authorized by a permit. As a pollutant, heat is considered by EPA to be both nonconventional and nontoxic. *See* CWA § 304(a)(4), 33 U.S.C. § 1314(a)(4); s*ee also*, 40 C.F.R. §§ 401.15, 401.16. CWA Sections 301(b)(2)(A) and 301(b)(2)(F), which generally apply to nonconventional, nontoxic pollutants, govern the establishment of appropriate technology-based effluent standards for heat. 33 U.S.C. §§ 1311(b)(2)(A), (b)(2)(F). Section 301(b)(2)(A) of the CWA sets forth the technology-based standard for such a pollutant, requiring application of "the best available technology economically achievable," or BAT. 33 U.S.C. § 1311(b)(2)(A); *see also,* 40 C.F.R. § 125.3(a).

Water quality-based effluent limits are designed to ensure that state water quality standards are met regardless of the decisions made regarding technology, economics and policy in establishing technology-based limits. State water quality standards are comprised of three essential parts: (1) one or more "designated uses" (*e.g.*, fish habitat, recreation, public water supply) for each water body or water body segment in the state; (2) water quality "criteria" expressed in numeric concentration levels for short ("acute") or longer ("chronic") exposure times and/or narrative statements specifying the amounts of various pollutants or containing narrative statements about the desired condition of the water that protects designated uses; and (3) an antidegradation provision. *See* CWA § 303(c)(2)(A), 33 U.S.C. § 1313(c)(2)(A); 40 C.F.R. §§ 131.10-.12. Thus, water quality-based effluent limits are designed to ensure that the designated uses and numeric and narrative water quality criteria established for particular water bodies are attained.

With respect to heat, state water quality standards may set numeric criteria limiting a water body's maximum and minimum ambient temperatures as well as the extent to which a discharge is permitted to alter the water body's temperature. In addition, water quality standards may

impose temperature-related narrative criteria (*e.g.*, that a discharge should not alter the natural diurnal variation in the temperature of the receiving water). Finally, water quality standards may set designated uses for a particular water body that could be affected by temperature and could, therefore, drive the formulation of permit limits for thermal discharges.[6]

CWA § 301(b)(1)© contains the general water quality-based standard and requires that effluent limits achieve:

> any more stringent limitation, including those necessary to meet water quality standards, treatment standards, or schedules of compliance, established pursuant to any State law or regulations (under authority preserved by section [510] of [the Act]), * * * or required to implement any applicable water quality standards established pursuant to the [CWA].

33 U.S.C. § 1311(b)(1)©. Therefore, after deriving the technology-based and water quality-based effluent limits,[7] EPA must impose a water quality-based effluent limit if it is the more stringent. *See U.S. Steel Corp. v. Train*, 556 F.2d 822, 837-838 (7th Cir. 1977); *In re City of Moscow*, 10 E.A.D. 135, 168 (EAB 2001).

2. Thermal Discharge Variances under CWA § 316(a)

While NPDES permits generally must include the more stringent of the effluent limits derived from technology and water quality-based requirements, CWA § 316(a) establishes a special variance procedure that allows EPA to impose alternative, less stringent thermal discharge limits in an NPDES permit if certain criteria are met. Specifically, CWA § 316(a) provides, in relevant part:

> [w]ith respect to any point source otherwise subject to the provisions of section . . . [301 or section 306 of the CWA], whenever the owner or operator of any such source, after opportunity for public hearing, can demonstrate to the satisfaction of the Administrator (or, if appropriate, the State) that any effluent

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[6] It is also possible that water quality standards for pollutants or conditions other than temperature could drive permits limits for thermal discharges. For example, if thermal discharges were causing or contributing to a water body's failure to meet water quality criteria for dissolved oxygen or for the prevention of eutrophication, that fact might lead to certain water quality-based thermal discharge limits.

[7] In the discussion below, these technology-based and/or water quality-based effluent limits for thermal discharges are sometimes referred to as "baseline" effluent limits (*i.e.*, limits that would apply to thermal discharges absent a CWA § 316(a) variance).

> limitation proposed for the control of the thermal component of any discharge from such source will require effluent limitations more stringent than necessary to assure the pro[t]ection and propagation of a balanced indigenous population of shellfish, fish, and wildlife in and on the body of water into which the discharge is to be made, the Administrator (or, if appropriate, the State) may impose an effluent limitation under such sections for such plant, with respect to the thermal component of such discharge (taking into account the interaction of such thermal component with other pollutants), that will assure the protection and propagation of a balanced, indigenous population of shellfish, fish, and wildlife in and on that body of water.

33 U.S.C. § 1326(a).[8] Thus, CWA § 316(a) authorizes less stringent alternative thermal discharge limits when it is demonstrated to EPA that the limits "*will assure* the protection and propagation of a balanced, indigenous population of shellfish, fish and wildlife in and on that body of water" (BIP).[9] *Id.* (emphasis added).

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[8] An affirmative determination under this statutory provision is commonly referred to as a "CWA § 316(a) variance." *See, e.g,.* 40 C.F.R. § 125.72 (heading).

[9] The CWA does not define the term "balanced indigenous population," but EPA regulations provide a definition offering guidance for determining the appropriate BIP:

> [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 pursuant to section 316(a).

40 C.F.R. § 125.71(c). *See also, In re Pub. Serv. Co. of Ind., Inc.*, 1 E.A.D. 590, 601 (Adm'r 1979) ("The regulation definition is in the nature of a guideline: it describes important factors to be weighed and considered, but it does not spell out an all inclusive checklist of criteria that lends itself to rote application."). The EAB upheld as reasonable the Region's approach to characterizing the BIP in this case. *Remand Order* at 92-93.

EPA regulations reiterate the text of CWA § 316(a) and also set forth specific criteria for evaluating whether protection and propagation of the affected species will be assured. *See* 40 C.F.R. §§ 125.70 and 125.73. Like the statute, the regulations require a discharger seeking a section 316(a) variance to first demonstrate that the otherwise applicable, baseline thermal discharge effluent limits are more stringent than necessary to assure the protection and propagation of the BIP. 40 C.F.R. § 125.73(a). The discharger seeking a variance clearly bears the burden of demonstrating that these non-variance baseline limits are too stringent. *See Remand Order*, at 84; DPDD at 6-9 to 6-12.

An applicant that successfully demonstrates that baseline water quality and technology limits are more stringent than necessary to assure protection and propagation of the BIP must also demonstrate that its proposed alternative thermal discharge limits will not interfere with the protection and propagation of the BIP. Specifically, in order to obtain a Section 316(a) variance, a discharger 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 a balanced, indigenous community of shellfish, fish and wildlife in and on the body of water into which the discharge is to be made.

40 C.F.R. § 125.73(a).[10] An existing discharger may demonstrate that its proposed alternative effluent limits are sufficient to assure the protection and propagation of the BIP based on either a retrospective or prospective analysis. *Id.* § 125.73(c)(1).

A retrospective demonstration must show "that no appreciable harm has resulted from the normal component of the [existing] discharge[,] taking into account the interaction of such thermal component with other pollutants and the additive effect of other thermal sources to [the BIP] in and on the body of water into which the discharge is made." *Id.* § 125.73(c)(1)(I). If the applicant can demonstrate a lack of harm from past operations, then one may be able to infer no future harm if operations and impacts from other stressors are expected to continue into the future at rates similar to, or less than, those that prevailed in the past. A prospective analysis, on the other hand, attempts to predict effects in the future based on the plant operating conditions and other impacts that are expected to exist in the future. This type of demonstration must show that even if there has been "previous harm, the desired alternative effluent limitations (or appropriate modifications thereof) will nevertheless assure the protection and propagation of [the BIP]" in the receiving water. *Id.* § 125.73(c)(1)(ii). In either case, EPA "shall consider the length of time in which the applicant has been discharging and the nature of the discharge" when

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[10] In applying CWA § 316(a), engineering and economic issues are not a consideration. *See Remand Order*, at 175, n. 205.

determining if prior appreciable harm has occurred. *Id.* § 125.73(c)(2). As with the threshold showing under CWA § 316(a) that baseline thermal effluent standards would be overly protective of the BIP, the discharger seeking a variance clearly bears the burden of demonstrating that its proposed alternative effluent limitations are sufficient to assure protection and propagation of the BIP. *See Remand Order*, at 84-85.

3. Region 1's Denial of BPS's CWA § 316(a) Variance Demonstration

BPS submitted both retrospective and prospective analyses. *See Remand Order*, at 86. Ultimately, Region 1 concluded that the effluent limits that the permittee had proposed in its variance were not stringent enough to reasonably assure the protection and propagation of the BIP and, therefore, that more stringent effluent limits would be necessary. *See id.* at 86-88; DPDD at 6-54 to 6-58.

Region 1 rejected the permittee's retrospective demonstration in light of evidence that BPS's discharges had resulted in past appreciable harm to the BIP in Mount Hope Bay. As of 2002, the Region had concluded that finfish populations in Mount Hope Bay were in "dire condition," having suffered sharp declines in abundance over the previous thirty years. *Id.* at 6-55. From 1972 to 1984, the bay's finfish populations exhibited sharp boom/bust fluctuations, indicative of an unstable population potentially prone to collapse.[11] *Id.* at 2-3 to 2-4, 6-27 to 6-30. In 1984-1985, around the time that BPS converted one of its electrical generating units from closed-cycle to open-cycle cooling – thus increasing its thermal discharges into, and cooling water withdrawals from, the bay, both by approximately 40% – the finfish population did collapse *Id.* at 6-28 to 6-29. The numerous adverse, thermally-related impacts and ecosystem changes experienced in Mount Hope Bay and contributed to by BPS were summarized by the Board as follows:

> According to the Region, the most obvious and least contested of these are: negative effects on the phytoplankton (*i.e.*, absence of the normal winter-spring phytoplankton bloom, appearance of nuisance algal blooms), increased abundance of certain animal species in the bay (*i.e.*, increased abundance of smallmouth flounder, overwintering of striped bass and bluefish in the discharge canal, and overwintering of the ctenophore *(Mnemipsis leidyi)*, and decreased abundance of certain fish (*i.e.*, thermal avoidance of most of the bay by adult winter flounder).

Remand Order, at 87-88; *see also*, DPDD at 6-44 to 6-45, 6-54 to 6-56. Relying on trawl data

[11] BPS was operational for 9 years (Units 1, 2 and 3 came on line in 1963, 1965 and 1969, respectively) before fish abundance data began to be collected in 1972. Therefore, there is no baseline data providing a quantitative estimate of fish abundance levels prior to BPS's impact. *Id.* at 6-28.

provided by the applicant, the Region observed that the average abundance of winter flounder, windowpane, tautog and hogchoker amounted to less than 1 fish caught per otter trawl sample. *Id.* at 6-55. In the case of winter flounder, this represented a 100-fold reduction over historical levels. Region 1's analysis concluded that BPS operations were a significant contributor to the declining quantity of fish in Mount Hope Bay and, moreover, that the facility's thermal plume had adversely affected the habitat in the bay by warming the bay's water to the point that it restricted the movement of the remaining fish by producing temperatures that caused thermal avoidance or attraction. Specifically, Region 1 found that:

> For the fish community, there is a documented blockage of striped bass and bluefish migration due to thermal attraction and an increased abundance of smallmouth flounder (a southern warmwater fish). Moreover, the plant's thermal discharge results in large areas of the bay having water temperatures that cause avoidance by winter flounder juveniles. The thermal discharge is apparently restricting adult winter flounder to predominantly the deepest portions of the bay. Finally, the entrainment of huge quantities of fish eggs and larvae and the impingement of large numbers of juvenile and adult fish may dampen or eliminate fish stock recovery.

DPDD at 6-56. Thus, the Region concluded that "the balanced indigenous population of fish has not been maintained in Mount Hope Bay and that the plant's thermal discharge is a significant contributor to this problem." *Id.*[12]

Region 1 also rejected BPS's prospective CWA § 316(a) demonstration, concluding that future operations under BPS's variance proposal would not reasonably assure the protection and propagation of the BIP. To the contrary, the Region's analysis predicted that the company's proposal would *preclude* recovery of a balanced indigenous community in Mount Hope Bay and, indeed, would lead to continued adverse impacts. As discussed above, Mount Hope Bay has experienced and is experiencing numerous adverse, thermally-related impacts and changes, including, for example, thermal avoidance of most of the bay by adult winter flounder, as well as the increased prevalence of species normally found in warmer waters (*e.g.*, smallmouth flounder)

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[12] While this analysis on remand is directed toward explaining the Region's selection of the five-day critical temperature exceedance threshold, it should be pointed out that in the roughly four years since Region 1 arrived at its conclusion regarding the BIP in Mount Hope Bay, the BIP has shown no sign of recovery. Prior to the collapse of fish populations in the mid-1980s, the permittee's monitoring program collected an average of more than 60 fish per tow (Dominion, 2006 (AR 4032)). After the collapse, the permittee's monitoring program was collecting less than 10 fish per tow. *Id.* In 2005, less than 7.1 fish per tow were collected. *Id.* This reflects the abundance of all species in the bay, not just winter flounder. The decline in winter flounder stocks has been even more pronounced than the general fish abundance trends. Winter flounder averaged over 40 per tow prior to the collapse and from 1988 through 2005 has averaged less than 1 per tow. *Id.*

and thermotolerant species that can compete with larval flounder for zooplankton prey (*e.g.*, ctenophore). Region 1 concluded that BPS's proposed thermal discharge scenario would not relieve any of these impacts and would result in:

> [c]hronic toxicity to juvenile winter flounder, avoidance of large sections of the bay by juvenile flounder and a reduced winter flounder egg hatching rate. In addition, based on the combination of water temperature and water clarity, Mount Hope Bay represents an exclusion zone for the growth of eelgrass. The plant's thermal discharge serves to directly and indirectly depress dissolved oxygen concentrations in the bay. These impacts in conjunction with the high quantity of impingement and entrainment losses certainly will not allow for the recovery of winter flounder or the wider balanced indigenous community.

Id. at 6-56.[13] Based on the above, Region 1 concluded that BPS had not shown that its proposed alternative thermal effluent limits would reduce thermal impacts sufficiently to provide reasonable assurance of the protection and propagation of the BIP. *Id.*

The EAB upheld the Region's conclusion that BPS failed to demonstrate that its proposed thermal effluent limits met the CWA § 316(a) standard. *Remand Order*, at 102.

4. CWA § 316(a) Variance-Based Thermal Discharge Limits Developed by Region 1

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[13] Mount Hope Bay once supported extensive eelgrass meadows. In the 1930s, an extensive die-off of eelgrass occurred along the entire eastern seaboard of the United States (Short *et al.*, 1988) (AR 4021). Numerous theories exist as to the cause of this dramatic decline including an episodic disease outbreak, poor water quality and a temperature-mediated decline (Short *et al.*, 1988 (AR 4021)). Eelgrass is a cold water plant that ranges from North Carolina to Canada and grows on predominantly soft bottom substrates (Thayer *et al.*, 1985) (AR 593). A protected (low wave energy) shallow, soft bottom embayment, such as Mount Hope Bay, is the ideal physical habitat for eelgrass growth (Thayer *et al.*, 1985) (AR 593). However, the combination of warm water temperatures and low water clarity could prevent its re-establishment. Eelgrass is also a habitat former, providing cover, foraging, spawning or nursery habitat for other species, including winter flounder. Manderson *et al.* (2000) (AR 4014) showed that the presence of eelgrass significantly reduced mortality rates in juvenile winter flounder from summer flounder predation. *See generally*, EPA's 1977 CWA § 316(a) Technical Guidance Manual at 22 (AR 645) ("Any thermal elimination of habitat formers from the estuarine or marine environments or their contiguous wetlands constitutes a basis for denial" of a 316(a) variance demonstration.); s*ee also*, *Remand Order*, at 140, n. 165 (discussing the Region's analysis of eelgrass decline in Mount Hope Bay).

When a discharger fails to demonstrate that its proposed alternative thermal discharge limits will satisfy CWA § 316(a), EPA has interpreted the statute to authorize it to either impose baseline technology and/or water quality-based limits or determine whether a different set of alternative limits will satisfy the statute and support a variance. *Remand Order*, at 14 ("the Agency may impose a variance it concludes does assure the protection and propagation of the BIP"). EPA must take a rigorous, reasonably conservative approach to granting and reissuing variances in order to meet the CWA's standard of assuring the protection and propagation of the BIP. *See In re Public Service Company of New Hampshire*, 10 ERC 1257, 1264 (June 10, 1977) (Permit Appeal Decision by Administrator of EPA) ("The burden of proof in a 316(a) case is a stringent one."). CWA § 316(a) states that the applicant must demonstrate *to the permitting authority's satisfaction* that the applicable non-variance-based permit limitations are more stringent than necessary to *assure* the protection and propagation of the BIP. When EPA decides to issue a variance on its own initiative,[14] it takes on this heavy burden and is obligated to show that its variance decision meets the statutory standard. *Remand Order*, at 14, 110-112; *see also*, 40 C.F.R. § 125.73(c)(1)(ii). In developing its own variance-based limits, EPA is not, however, required to determine and apply the least stringent thermal limits that would satisfy CWA § 316(a). Rather, EPA must determine that any alternative variance-based limits that it imposes in the permit will reasonably assure the protection and propagation of the BIP, as required by CWA § 316(a). *Remand Order*, at 110-112.

While the burden of satisfying CWA § 316(a) is stringent, EPA has not interpreted the statute to require absolute certainty before a variance can be granted. *In re Pub. Serv. Co. of New Hampshire*, 10 ERC at 1265. In reality, achieving absolute certainty about a § 316(a) determination is likely to be impossible. *Id.* EPA has interpreted the statute to require that alternative thermal discharge limits provide *reasonable assurance* of the protection and propagation of the BIP, while indicating that "[t]he greater the risk, the greater the degree of certainty that should be required." *Id.* at 1265; *see also*, 44 Fed. Reg. 32894 (June 7, 1979). EPA has also stated that it "'must make decisions on the basis of the best information reasonably attainable.'" *In re Pub. Serv. Co. of New Hampshire*, 10 ERC at 1265 (quoting 1974 EPA Draft § 316(a) Guidance). At the same time, EPA has explained that it "may not speculate as to matters for which evidence is lacking," *id.* at 1264, and that if "'deficiencies in information are so critical as to preclude reasonable assurance, then alternative effluent limitations should be denied.'" *Id.*; *see also, In the Matter of: Public Service Company of Indiana, Inc., Wabash River Generating Station*, 1979 EPA App. LEXIS 4, [*34] - [*40], 1 E.A.D. 590 (November 29, 1979) (Administrator remanded permit to Regional Administrator where Region had decided to grant variance-based thermal discharge limitations despite lack of data regarding thermal effects under

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[14] In the *Remand Order*, the Board states that it is "far from clear" that the Agency must develop or consider developing its own set of variance-based limits once it has denied a variance proposal from a permit applicant. *See Remand Order*, at 14, n. 13. In the absence of an EPA-developed variance, the permit's limits would be based on the baseline technology-based and/or water quality-based permit limits.

worst case, low flow conditions).

Having rejected the alternative limits proposed by BPS, Region 1 determined that the baseline thermal discharge limits were more stringent than necessary and that a different set of alternative limits, albeit significantly more stringent than those proposed by BPS, would satisfy § 316(a). *See* RTC at III: 69-70; DPDD at 6-56 to 6-58. The Region adopted a reasonably conservative approach with respect to key aspects of its thermal discharge analysis – selection of thermally sensitive species, maximum areal impact, critical temperature thresholds, and duration and frequency of critical temperature exceedance. *See, e.g., Remand Order*, at 127 (finding "no clear error in [the Region's] decision to take a relatively conservative approach" in selecting critical temperature threshold). *See also* DPDD at 6-10 to 6-12 (describing legal basis for adopting conservative approach in the context of 316(a) variance determinations). Ultimately, Region 1 set both summer and winter discharge limits of 0.14 trillion BTUs (tBTUs) per month, for an annual discharge limit of 1.7 tBTUs, with a maximum discharge temperature limit of 95° F. *Id.* at 6-56 to 6-58. The analyses for the summer and winter limits were separate and had distinct aspects (*e.g.*, relied on different critical temperatures based on the most sensitive species and life stage for that period) but worked out to support the same monthly thermal discharge limits of 0.14 tBTUs. *See* "EPA Region 1 Brief in Response to Briefs of USGenNE and UWAG in Support of USGenNE's NPDES Permit Appeal," at 12-17.

The summer discharge limits were designed to ensure that no more than 10% of the bay exceeds 24°C for five or more days per summer month.[15] *See* DPDD at 6-56. The EAB remanded the Permit for the Region to reconsider the five-day critical temperature exceedance threshold element of the formula for deriving the summer limits, and to render and explain a decision either to retain or change the five-day value. The Region discusses its derivation of the summer thermal discharge limit below by first outlining the areal impact and critical temperature elements upheld by the Board and then moving to the remanded five-day exceedance threshold issue.

a. *Maximum Areal Impact - 10% of the Bay*

CWA § 316(a) requires that alternative variance-based thermal discharge limits reasonably assure the protection and propagation of the BIP of the receiving water in question. In this case, the receiving water is the Mount Hope Bay estuary. Providing viable spawning and nursery habitat are among the most important biological functions of an estuary. Like other estuaries, the Mount Hope Bay estuary has great biological significance because of its role in providing, among other things, critical spawning and nursery habitat for a variety of organisms, including winter flounder. Winter flounder have a high degree of fidelity to their natal spawning sites; thus, there is a Mount Hope Bay-specific population of winter flounder. Due to this high degree of natal fidelity, recovery of Mount Hope Bay's winter flounder population will require the protection of

[15] The "summer" permit conditions apply in June through September. The "winter" permit conditions apply the rest of the year.

spawning and nursery habitat in Mount Hope Bay itself. Protection of this habitat will enhance the production and recruitment of juveniles to Mount Hope Bay's winter flounder population. *See* DPDD at 7-116 to 7-117.

The Region developed its thermal discharge limits under CWA § 316(a) using an "area-impacted" analytical approach long supported by EPA. This approach identifies likely adverse biological effects associated with critical water temperatures and seeks to minimize them in important habitat areas to assure protection and propagation of the BIP. EPA's 1977 CWA § 316(a) Technical Guidance Manual ("1977 EPA Draft 316(a) Guidance") (AR 645) recognizes that not all areas of receiving waters are of equal ecological value. It highlights the particular importance of spawning and nursery habitats and emphasizes the need to avoid impacting those areas. *Id.* at 29; *see also*, DPDD 6-19 to 6-20. The guidance indicates that when assessing thermal discharge effects on fish, spawning and nursery areas cannot be considered to be "low potential impact areas." The guidance goes on to state that a § 316(a) variance may need to be denied if, among other things, the thermal discharge would cause direct or indirect mortality from excessive heat, would reduce reproductive success or growth as a result of plant discharges, or would cause exclusion from unacceptably large areas.

Winter flounder nursery areas constitute critical habitat for the BIP in Mount Hope Bay. Winter flounder spawn in Mount Hope Bay in the winter to early spring. The eggs hatch and larval winter flounder begin to settle into their nursery habitat in late spring/early summer. They utilize the nursery habitat through the summer and well into the next year. Consistent with the 1977 EPA Draft 316(a) Guidance, the Region specifically considered potential impacts on spawning and nursery areas when determining the size and intensity of the thermal discharge plume to be permitted with the goal of reasonably assuring the protection and propagation of the BIP. *See* DPDD at 6-56 to 6-57. Given the collapse of local finfish populations and the host of lethal and sublethal effects on juvenile, including young-of-the-year, winter flounder associated with elevated temperatures, as discussed below, Region 1 determined that the:

> biological benefits of avoiding thermal impacts on spawning and nursery habitat in the Bay would be "substantial," but also acknowledged that they were difficult to quantify especially in light of data gaps. The Region went on to explain that it used the best information available to determine the location of the winter flounder spawning and nursery habitat, such as published studies regarding spawning area preferences and "the location of winter flounder nursery areas identified by the MRI winter flounder young-of-the-year beach seine survey." [internal footnotes and citations omitted]

Remand Order, at 130. In light of a map of winter flounder nursery habitat that had been generated by the permittee's consultant, Region 1 determined that "a large thermal plume would

dramatically effect (sic) the amount of juvenile habitat available."[16] *Id.* at 6-56 to 6-57. The map showed the nursery habitat of juvenile winter flounder to be located in the "shallow sandy subtidal areas that predominate in the northern portion of the bay" and that are in close proximity to the BPS discharge canal. The Region:

> . . . plotted on a map the maximum area a thermal plume from BPS could occupy while still avoiding the majority of key identified nursery habitat areas. . . . This area covered only approximately 10 percent of Mt. Hope Bay.

"EPA Region 1 Brief in Response to Briefs of USGenNE and UWAG in Support of USGenNE's NPDES Permit Appeal," at 14-15 (footnote and citations omitted). Thus, Region 1 concluded that "a greater than 10% areal impact of the bay would not preserve sufficient juvenile habitat in the summer to allow for [their] recovery." DPDD at 6-57. Again, the primary reason for the relatively small area of impact allowed (10% of the bay) is that the key nursery areas are in shallow areas of the estuary in close proximity to BPS's thermal discharge.

In identifying the allowed impact area, the Region was presented with a range of options and ultimately took a reasonably conservative approach:

> A thermal plume from BPS that meets EPA's proposed permit limits [and thus uses the ten percent areal cutoff] would have minimal overlap with winter flounder nursery habitat identified by MRI (1999) in the lower Taunton, Cole, and Kickamuit Rivers. EPA determined that it would not be possible to significantly minimize impacts on winter flounder spawning habitat in the Lee River without virtual elimination of the thermal discharge because of the proximity of the discharge canal to that river. However, by focusing on preserving winter flounder nursery habitat in the lower Cole, Kickamuit, and Taunton Rivers, EPA found that allowing a thermal impact of 10 percent of the bay, or 1.4 square miles, would spare the majority of those habitat areas. EPA concluded that although this level of protection would not eliminate all adverse effects from BPS thermal discharges, it should be sufficient to reasonably assure the protection and propagation of the BIP in and on Mount Hope Bay. The Agency could not reasonably reach that conclusion with significantly less stringent limits.

Id. at III-31. The Board agreed and concluded that selection of the ten percent areal cutoff value was rational. *Remand Order*, at 132-133.

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[16] The BPS consultant's map was based on its own catch data. *See* November 2001 USGenNE § 316(a) and (b) Demonstration, Vol. I, Appendix B, p. B-98 (AR 555).

b. *Selection of Critical Temperature - 24° C*

While it is obviously necessary to set thermal discharge temperatures to avoid excessive direct mortality in order to reasonably assure the protection and propagation of the BIP in a receiving water, it is also necessary to set thermal discharge limits to prevent excessive indirect mortality and sublethal effects.[17] These sublethal effects may include forced avoidance of spawning and nursery habitat, interference with feeding, increased activity levels and other reactions that inhibit normal growth. These sublethal effects may also lead to indirect mortality.

Juvenile winter flounder minimize predation mortality by inhabiting shallow water (<2 m). The consequence for juvenile winter flounder of being forced to avoid their preferred shallow water habitat is likely to be increased predation mortality.[18] In addition, in early life stages, newly settled young-of-the-year winter flounder are vulnerable to a number of predators, including sand shrimp (Taylor and Collie, 2003) (AR 4022), green crabs (Fairchild and Howell, 2000) (AR 4015) and summer flounder (Manderson *et al.*, 2004) (AR 4019). The longer the period of time that juveniles stay within a size that is susceptible to predation, the greater the mortality rate from predation. (Able & Fahay, 1998) (AR 692). Therefore, activities that disrupt normal feeding and activity levels (such as decreased feeding, excessive activity levels, burrowing in cooler sediments or engaging in other avoidance behavior) will detract from the quantity of energy directed to growth. If these activities are sustained for an extended period, they will reduce growth rates and contribute to the overall predation mortality rate.

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[17] A fish that is unable to avoid a thermal plume will succumb to heat death if temperatures are high enough. Each of the discharge scenarios modeled as a part of the CWA § 316(a) variance analysis predicted varying degrees of chronic mortality among juvenile winter flounder. Under existing discharge conditions, the company itself predicted an area in the Lee River to experience 15% chronic mortality due to the thermal discharge. For areas within the four rivers and Spar Island that comprise the majority of the nursery habitat, BPS also predicted an area-weighted average chronic mortality of 4.6% from the existing discharge. *See* November 2001 USGenNE § 316(a) and (b) Demonstration, Vol. 1, Appendix B, Figure 2-42, p. B-130, attached hereto as Exhibit 1. *See also,* DPDD Fig. 6.3-4 (chronic mortality estimate for Enhanced Multi-Mode), attached hereto as Exhibit 2. The permittee also estimated an area-weighted average mortality of 1.5% assuming closed cycle cooling for the whole plant. *See id.,* Figure 2-49, p. B-137, attached hereto as Exhibit 3.

[18] For example, Manderson *et al.* (2004) (AR 4019) examined the use of shallow water by juvenile winter flounder. They found that juvenile size increased with depth; thus the smallest size classes were in waters less than 1 meter deep. The authors also found that summer flounder, a known predator of winter flounder, were much more prevalent in deeper water and stomach content analysis showed the presence of juvenile winter flounder. Finally, the authors tethered juvenile winter flounder at various depths and found predation rates on tethered fish increased with depth.

Careful consideration of these factors is especially important for the Mount Hope Bay estuary in light of the depleted state of the estuary's fish populations, including winter flounder. Although use of optimal growth temperatures would have yielded a more conservative (*i.e.*, stricter) limit, given that the optimal growth temperature is lower than the avoidance temperature, Region 1 decided to focus principally on avoidance temperatures in the development of summer permit limits. This is because thermal discharges that would cause juvenile fish to avoid the key nursery areas would be causing a clear, significant harm to the BIP of this receiving water, while the overall effect of small, short-term reductions in growth rates is less clear. As stated above, juveniles forced to avoid key nursery habitat are likely to experience significant indirect mortality. Thermal discharges that render Mount Hope Bay's critical nursery habitat unsuitable for juvenile winter flounder would be directly undermining the value of the habitat provided by the bay and could not be said to be assuring the protection and propagation of the bay's BIP. Thus, Region 1 concluded that if thermal discharge limits would cause excessive forced avoidance of the key nursery habitat for juvenile winter flounder in the summer – not to mention reduced growth rates – then those limits would not satisfy CWA § 316(a).

Region 1 also concluded that the data indicated that the current thermal discharge from BPS is contributing to a shift in adult and juvenile winter flounder distribution in Mount Hope Bay from shallow water habitat to deeper water habitat based on temperature preference. *See* DPDD at 6-43 to 6-45, 6-55 to 6-56; RTC III: 39-40. As stated above, juvenile winter flounder naturally prefer to inhabit the shallow, sandy subtidal areas that predominate in the northern portion of the bay. *See* DPDD at 6-56. However, these areas are particularly susceptible to the effects of the thermal plume given their proximity to the discharge canal and their relatively shallow depth. There is limited dilution available and limited time for the dissipation of heat from the thermal plume between the point of discharge and the nursery habitats. The permittee's trawl data from Mount Hope Bay indicate that adult and older juvenile winter flounder are vacating the shallow waters during the warmer times of the year (AR 3346, RTC III at 39-40).[19]

In order to develop thermal discharge limits that would be adequately protective of the BIP, Region 1 compared "critical threshold temperatures" for various species in Mount Hope Bay. The Region's thermal discharge limits were derived from, among other things, the critical

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[19] The Rhode Island Department of Environmental Management (RI DEM) submitted data comparing winter flounder abundance with temperature (Reitsma, 2002) (AR 355). The data suggests that winter flounder response to water temperature is fairly dramatic. Figures 6.3-2 and 6.3-3 of the DPDD (AR 192) show that adult winter flounder abundance drops to nearly zero above 15° C and juvenile abundance declines in a similar fashion above 24 or 25° C. The response of these fish are dramatic and indicative of a temperature threshold effect. *See* DPDD at 6-34 to 6-35. *See also*, *Remand Order*, at 123-124, n. 150 (characterizing Region 1's interpretation of DEM data as reasonable in light of its conservative approach). Elevated temperatures above 24°C are most likely to occur in the shallow waters that are near BPS's discharge canal and also include the key nursery habitat.

temperatures for the most sensitive species. *See* 1977 EPA Draft 316(a) Guidance at 37-38 (emphasizing that, "[t]he most thermally sensitive species (and species group) in the local area should be identified and their importance should be given special consideration," as should species of commercial or recreational value); s*ee also,* RTC at III: 8-9, 35-36 (basing thermal limits on or most sensitive species is accepted practice under 316(a)). Region 1's thermal discharge limits for the summer were ultimately keyed to the critical temperatures identified for winter flounder *juveniles,* the most thermally sensitive species and life stage normally occurring in the bottom waters in the summer. Therefore, the critical value for summer (24°C in bottom waters) was based on temperatures that would trigger *avoidance* by juvenile winter flounder of key nursery habitat. *See* DPDD at 37-38.

Because the studies relied upon by Region 1 did "not provide one definitive cutoff for the temperature threshold," the agency was "required to make a scientific judgment based upon the available data." *Remand Order*, at 118. The Region selected a critical temperature threshold that "represented an acceptable level of impact but did not represent a zero impact temperature." RTC at III-11. In Region 1's view, selecting a value at the highest end of the range was not warranted in light of the stressed condition of the BIP, evidence of long term temperature rise, difficulty in predicting trophic effects resulting from relatively incremental temperature changes, and the statutory context. DPDD at 6-36. The Region also chose not to default to the lowest end of the range because although 24°C "clearly is in excess of a no-effects level . . .[,] the ecological impact of increased burrowing and decreased feeding [which occur at lower temperatures] is difficult to determine." RTC at III-11.[20] Instead, Region 1 decided to rely on a reported value toward the mid-range of the available avoidance temperatures in the record.[21]

The Board upheld the Region's conservative approach, holding:

> . . . based on our review of the administrative record, we find that the Region provided a reasonable rationale for its approach in

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[20] EPA's "Quality Criteria for Water 1986," also known as the "Gold Book" (AR 4002), at p. 290, states that "[a]voidance will occur as [a] warmer temperature exceeds the preferendum by 1 to 3°C" (citing Coutant, 1975). Research by Casterlin and Reynolds (1982) (AR 385) suggests that the preferendum for juvenile winter flounder is around 19°C. Applying the principle stated in the Gold Book, this would suggest avoidance would begin by 20 to 22°C.

[21] Furthermore, as the Region explained in the RTC, at III-30, the modeling used to predict critical temperature exceedances was based on daily average values, rather than a shorter time interval. Relying on daily averages allows temperatures to exceed the target temperature for some time during the day as long as those times are offset by other periods of lower temperature. Region 1 noted that it believed this approach was reasonable and that "the complexity of the model made the time and expense of running the model at intervals less than a day prohibitive." *Id.*

> selecting temperature threshold values and in its ultimate selection of the temperature threshold values, which notably were within the range of the reported values in the scientific studies it considered. The studies the Region relied on in its selection of a temperature threshold value of 24°C show a range of avoidance temperatures from 22.2° to somewhere "at or below 27° C." Furthermore, considering other effects such as feeding inhibition and sublethal effects, the studies suggest that the temperature threshold range could even be lower than 22.2° C. The Region clearly indicated that it intentionally took a conservative approach in developing this value, in part because the section 316(a) standard for granting variances from otherwise applicable requirements requires the protection and propagation of a BIP. *E.g.*, RTC at III-11, -34. We see no clear error in its decision to take a relatively conservative approach. Petitioner has not persuaded us of any clear errors in the Region's analysis. Consequently, we do not find that the Region clearly erred in selecting the temperature threshold values.

Remand Order, at 126-127 (footnotes omitted).

c. *Selection of the Critical Temperature Exceedance Threshold of Five Days*

(1) **Introduction**

After selecting temperature thresholds, Region 1 then used the results from the hydrothermal model developed by BPS, in consultation with the regulatory agencies, to estimate "the volume of the bay that would exceed these critical threshold temperatures and the duration of the exceedance for various thermal discharge scenarios." DPDD at 6-38. These scenarios included the existing thermal discharge, BPS's proposed permit limits, the no discharge condition and certain other scenarios. DPDD at 6-31, 6-39 to 6-42. Based on these scenarios, Region 1 estimated for each season and each layer of the water column the percentage of the bay's water volume that would exceed the threshold temperatures for one, two, three, four and greater than or equal to five days. *See, e.g., id.* at 6-39, Table 6.3-2 (showing "Percent of Bottom Water Volume Less Than, Equal to or Greater Than a Daily Mean Temperature of 24° C in Warm Summer Conditions").

In order to establish a section 316(a) variance that would assure protection and propagation of the BIP in Mount Hope Bay, the Region selected summer discharge limits that would ensure that no more than 10% of the bay exceeds 24° C for five or more days per summer month, conservatively assuming warm, summertime conditions in the bay. *See Remand Order* at 113-117. While upholding both the area impacted and the maximum critical temperature thresholds, *id.* at 117-133, the Board remanded the Permit so that the Region could further articulate its reason for

limiting the maximum number of allowed monthly temperature exceedances to five days. The Board stated that "[t]he Region ... did not explain in its Determinations Document precisely why it ultimately selected five days (as opposed to any other number of days, such as six or seven)." *Id.* at 134. The Board found that the Region's rationale for the exceedance frequency was conclusory and, therefore, not sufficiently developed for the Board to review and "determine whether it meets the requirement of rationality." *Id.* at 135.

Region 1 has reassessed this set of issues on remand and must agree with the Board that the explanation provided for the Permit was not sufficiently detailed. Therefore, we have endeavored to cure this problem by reconsidering the issues and providing a more complete explanation of our decision below. As the EAB suggests, the question is not only why a number larger than five days was not selected, but also why a number less than five days was not selected.

(2) General Points About the Pertinent Science and Data

Predicting thermal effects is a function of species, life stage, exposure temperature, and exposure duration and frequency. Unfortunately, the scientific literature has not produced data on every possible variation and combination of these factors. Thus, some amount of interpolation between study results or extrapolation is necessary in the derivation of precise values in setting permit limits. As with the selection of the critical temperature and areal thresholds, the Region's determination of the maximum number of exceedance days was based on: (I) the scientific literature documenting lethal and sublethal temperature effects, including thermal avoidance; (ii) hydrothermal modeling results depicting the extent of the thermal discharge plume under different operating scenarios, with particular attention to the plume's impact on critical nursery habitat; and (iii) the exercise of reasonable discretion and judgment in the face of unavoidable scientific uncertainty regarding whether particular thermal discharge limits will be sufficient to assure the protection and propagation of the BIP of Mount Hope Bay. *See generally*, DPDD, Chapter 6; *see also*, RTC at III-30, III-57.

There is uncertainty involved in predicting precisely how a particular species of fish will react to elevated water temperatures, as well as in determining the extent of the exposure required to produce a given reaction. Of course, at the extremes of exposure, predictions become more certain. Fish can exhibit a range of physiological and behavioral responses to changing water temperatures. Physiologically, temperature change will produce measurable changes in digestion rates, food conversion rates, appetite, and metabolic scope for activities and growth, with each of these variables declining when the optimum temperature is exceeded (Coutant, 1977) (AR 4010). Temperature change will also affect fish behavior. Changes in swimming activity, burrowing activity, feeding rates and avoidance of specific locations have been observed in response to water temperatures above optimum levels (Coutant, 1977 (AR 4010); Casterlin and Reynolds, 1982 (AR 385); Olla *et al.*, 1969 (AR 532)). On the extreme ends of temperature exposure, water temperatures that are substantially warmer or cooler than the temperature optimum of a species can result in fish mortality (Coutant, 1977) (AR 4010).

Adequately controlling adverse thermal impacts is critical to the restoration of the once abundant winter flounder population in Mount Hope Bay. There is uncertainty, however, regarding the precise exposure time required to elicit an avoidance response. There is also uncertainty regarding the precise overall effect that various periods of avoidance will have, though forced avoidance of nursery habitat by juvenile winter flounder clearly represents an adverse effect. Forced avoidance of their critical habitat subjects these fish to increased risk of mortality due to predation. The available scientific literature primarily relied upon by the Region discusses the impacts of temperature from exposure times of 3 to 15 days. This body of work neither establishes (nor speculates as to) the exact duration of exposure to critical temperatures that will elicit an avoidance response or the precise duration of avoidance of nursery habitat by juveniles that will result in significant indirect mortality. This research also does not provide Region 1 with definitive, site-specific benchmarks for *juvenile winter flounder in Mount Hope Bay* that can be precisely calibrated to prevent or minimize the potential for thermal discharges from BPS to drive the fish from their key habitat in the bay or otherwise materially diminish the overall health and abundance of the community. Instead, the literature contains evidence of a variety of harmful behavioral and physiological changes that occur *by* various points across a spectrum of exposure times.

It is also important to understand that the data from the modeling studies performed for the BPS Permit show that when the critical temperature of 24°C is exceeded for two, three, four or five or more days in a month, the days of exceedance are consecutive.[22] *See* Exhibits 4 through 7,

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[22] In response to a comment from BPS stating that when the model showed five days of temperature exceedance, they "were not 5 consecutive days," RTC at III-29, Region 1 provided an imprecise and potentially confusing response. The Region stated, "EPA acknowledges that the model exceedances may not have always represented 5 consecutive days, but also recognizes that in many cases it likely represented a total quantity of time far greater than 5 days." *Id.* at III-30. By this language, Region 1 was trying to acknowledge that it was theoretically possible that the five days of critical temperature exceedance would not always be consecutive. This response, however, failed to emphasize that the days would *most likely be consecutive* and in a case in which they were not, they would be very nearly so. In other words, the five days of critical temperature exceedance would tend to be clustered together, with any break in consecutiveness occurring for only a short time and with a small drop in temperature. This stands to reason because of the way in which baseline ambient temperatures, which tend to change gradually, and the power plant's discharge combine to contribute to the overall temperature in the receiving water. Furthermore, Region 1's response failed to emphasize that the actual data from the model predicted that the days of exceedance would be consecutive. *See* Exhibits 4 through 7 (AR 386). Thus, while the Region acknowledged the theoretical possibility that the days of exceedance might not always be completely consecutive, the consequences of this are limited as a practical matter. The Region's response also, of course, pointed out that each of the modeled scenarios that showed more than five days of critical temperature exceedance in fact showed many more than five days of such exceedance.

attached hereto. (AR 386). This was an important consideration in the Region's selection of the five-day critical temperature exceedance threshold.

(3) Selection of Threshold for Frequency of Critical Temperature Exceedances

In developing its thermal discharge limits, Region 1 evaluated how many days of exceedance of the critical temperature would be acceptable. The Region considered that one or two days of exceedance of the juvenile winter flounder avoidance temperature of 24°C might cause avoidance and result in indirect mortality or adverse sublethal effects, and that the likelihood and magnitude of these adverse effects would likely increase as the duration of the exceedance increased. Region 1 did not, however, select one or two days for the critical temperature exceedance threshold because of the uncertainties already discussed above. First, the precise extent to which a one- or two-day exceedance would trigger avoidance is unknown. Second, the overall effects that would result from avoidance caused by a one- or two-day exceedance are unclear; it is possible that organisms driven from the critical nursery habitat might be able to safely return after this relatively short transgression of the critical temperature. Therefore, while a highly conservative approach might have resulted in a one- or two-day threshold, Region 1 did not take such an approach because CWA § 316(a) requires reasonable assurance of protection and propagation of the BIP and does not impose a no adverse effects standard.

The scientific literature does, however, provide a reasonable basis for concluding that by three days of exposure to the critical avoidance temperature, juvenile winter flounder would likely choose to avoid waters at that temperature.[23] Casterlin and Reynolds (1982) (AR 385) conducted a lab experiment which allowed juvenile winter flounder to select their preferred water temperature in a series of constant temperature shuttleboxes. Temperatures within any individual shuttlebox did not vary. Sixteen fish were exposed for three days and the data revealed a clearly discernible preference/avoidance pattern. The temperature preferences were presented as a cumulative frequency graph showing the relative frequency distribution of temperatures selected by the yearling. *See* Exhibit 8, attached hereto. Region 1 interpreted this data to indicate that by three days of exposure to the critical temperature, juvenile winter flounder would be likely to express their temperature preferences. Therefore, based on this study, the Region conservatively regarded three days as a baseline value for the exposure time necessary to trigger avoidance.[24]

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[23] It should be noted that the juvenile winter flounder will only be able to avoid the thermal plume if it is not too large for the fish to swim beyond – young-of-the-year juvenile winter flounder are quite small and are unlikely to be able to swim very far – or they are able to avoid it by burrowing into the sediment (Olla et al., 1969 (AR 532). In either case, the forced avoidance response is an adverse effect on the organisms that threatens their survival.

[24] In this context, Region 1 uses the term "conservative" to refer to its scientific interpretation of the data from the study, rather than the degree of environmental protectiveness of the Region's approach. Although it is unlikely that all the fish waited (or would wait in a

In the context of upholding the Region's selection of the critical temperature threshold, the Board summarized the Casterlin and Reynolds (1982) (AR 385) paper as follows:

> The resulting distribution (or bell) curve shows that fish voluntarily selected temperatures ranging from 8 to 27° C during the course of the study, with the downside of the high temperature end of the curve beginning at or before 21° C. Fish apparently selected temperatures of 24, 25, and 26° C for about 4-5% of the time and a temperature of 27° C for about 3% of the time.
>
> ***
>
> Significantly, although the authors do state that "avoidance responses are initiated at or below 27°C," as quoted by Petitioner, the authors also state that the final temperature "preferendum" was at 18-19° C and that "sublethal effects such as inhibition of feeding occur" between 20 and 29° C[.]

Remand Order, at 125, n. 151 (Internal citations omitted). The Board observed that while the "authors' statements (as well as the study results) are rather ambiguous in that they contain ranges of values and therefore do not point to an absolutely definitive temperature threshold value," the Region's selection of a reasonably stringent critical temperature was rational "in light of the Region's statements that it took a protective approach." *Id.*

Based on this information, Region 1 might have selected three days as the critical temperature exceedance frequency threshold. Still, the Region did not choose three days for two main reasons. First, there is some uncertainty involved in translating the Casterlin and Reynolds (1982) (AR 385) laboratory experiment to the real world of Mount Hope Bay. The temperatures in the study's shuttleboxes were maintained at constant levels, whereas water temperatures in Mount Hope Bay will fluctuate somewhat over the course of a day. Therefore, it is possible that three days of exposure to a daily average temperature of 24°C, with levels fluctuating above and below that value, would not trigger the same level of avoidance as seen in Casterlin and Reynolds (1982) (AR 385). Second, the overall effect of avoidance associated with three days of exceedance of the critical temperature cannot be predicted with certainty, though any such avoidance clearly represents some adverse effect and poses an increased threat of indirect mortality.

Given these uncertainties, Region 1 decided to factor in an additional margin for the threshold for

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natural environment) until the 72nd hour to avoid sub-optimal temperatures – rather, it is likely that avoidance began before that point – the data from the study does not provide a firm basis for that conclusion because it only looked at a three-day exposure.

critical temperature exceedances. The question remained, however, as to how much further the Region could go while still providing reasonable assurance of the protection and propagation of the BIP. In considering this question, Region 1 took four factors into account as well as EPA guidance and relevant experimental studies. First, as stated above, the modeling studies indicate that when the critical temperature would be exceeded for two, three, four or five or more days, such exceedances would be for consecutive days. Second, there is evidence that thermal stress in fish accumulates more quickly than it dissipates (Bevelhimer and Bennett, 2000) (AR 3201), which underscores the necessity of minimizing the duration, frequency and absolute number of exposures to high temperatures. The authors developed a model based on literature studies assessing cumulative thermal stress in fish exposed to chronic intermittent high temperatures. In this model, thermal stress occurs when ambient temperatures exceed specific biological threshold temperatures, which will vary by species and life stage. Based on their review of the scientific literature, the authors concluded that multiple exposures result in potentially greater sensitivity because fish may not have completely recovered from the prior exposure before facing a second or third exposure. This suggests that adverse effects due to multiple exposures, and/or exposures of increased duration, would be worse than those due to a one-time exposure of the same duration to a critical maximum temperature. Third, as the number of exceedance days increase above three, it becomes more likely that the exceedance will, in fact, cause avoidance. Finally, as the duration of avoidance increases, the risk of indirect mortality and adverse sublethal effects increases.

In considering how far to go beyond three days, Region 1 also consulted EPA's "Quality Criteria for Water 1986," also known as the "Gold Book." Region 1 recognizes that the Gold Book is a water quality standards-related document, rather than a CWA § 316(a) variance-related document, and it does not directly address § 316(a)'s standard of providing reasonable assurance of the protection and propagation of the BIP in a particular receiving water. Still, Region 1 concluded that the Gold Book's discussion of thermal effects on fish could provide relevant information to consider.[25]

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[25] Similarly, although the Permit is based on a CWA § 316(a) variance from the baseline technology-based and water quality-based standards, rather than on the state water quality standards themselves, Region 1 also took notice of the fact that its selection of a five-day critical temperature exceedance cut-off was generally consistent with the maximum value cited in MassDEP's mixing zone analysis. In that water quality standards-based analysis, MassDEP indicated that allowing avoidance temperatures to be exceeded for five or more days per month would be unacceptable, presumably for purposes of protecting the state's designated uses for Mount Hope Bay. *See* DPDD, Appendix A at 12-13. These designated uses include the provision of excellent and healthful fish habitat for the SA and SB portions of the bay, respectively. *See* RTC at V-11, n. 4. Given the general similarity between the CWA § 316(a) requirement to provide thermal conditions assuring the protection and propagation of the BIP and the requirement under the applicable Massachusetts water quality standards for SA and SB waters that conditions be maintained to provide excellent or healthful fish habitat, respectively, Region 1 regarded the basic concordance between the Region and MassDEP on the five day

EPA water quality criteria set ambient levels of pollutants or parameters, or contain narrative statements describing conditions in a water body, that, if met, will generally protect the designated uses of the water. *See supra* at § IV.A.1. Water quality criteria are developed to protect aquatic life, human health and, in some cases, wildlife from the deleterious effects of pollutants. Section 304(a) of the CWA directs EPA to publish water quality criteria guidance to assist States in developing water quality standards. EPA criteria have three elements: magnitude (the allowable level of the pollutant or pollutant parameter); frequency (how often the criteria can be exceeded); and duration (the period of time (averaging period) over which instream concentrations are averaged for comparison with criteria concentrations). *See US EPA NPDES Permit Writer's Manual* (1996) at p. 91 (AR 4003). The response of aquatic organisms exposed to pollutants is measured based on "acute" (shorter) or "chronic" (longer) exposure times. With respect to the durational component of the water quality criteria, the length of the exposure time allowed will vary according to the pollutant and the endpoint. Acute effects occur over a relatively short time period (*e.g.*, 24 hours), and the endpoint measured is often mortality. Chronic effects occur over a longer period of time (*e.g.*, a week), and the endpoints measured often include mortality and sublethal effects, such as changes in reproduction and growth. The Gold Book contains EPA-recommended and developed water quality criteria for certain pollutants, including heat. The Gold Book cites growth as a particularly sensitive measure for chronic temperature stress and characterizes an exposure of more than one week as "extensive." *See* Gold Book at 283. It also proposes one possible regulatory approach as the following:

Max. Weekly Ave. Temp.	= Optimum Growth Temp. + 1/3	(Upper Incipient Lethal Temp. - Optimum Growth Temp.)

Optimal growth temperature for juvenile winter flounder has been estimated to be approximately 15° C (Rose *et al.*, 1996 (AR 4012); Manderson *et al.*, 2002 (AR 4016)), while the upper incipient lethal temperature[26] has been estimated to be approximately 29-30° C (Hoff and Westman, 1966 (AR 4033)). *See also* AR 555, Vol. 1, App. B at B142-145 (citing Hoff and Westman, 1966). This results in a maximum seven-day average temperature of approximately 20° C.

As explained above, in conducting its 316(a) variance analysis, Region 1 opted to focus on avoidance temperatures rather than temperatures designed specifically to reduce adverse effects on growth. The Region concluded that avoidance effects more clearly and directly indicated a violation of CWA § 316(a) in this case. Still, it is abundantly clear that if the 24°C critical

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value as further evidence that the value was both adequately protective and reasonable.

[26] The upper incipient lethal temperature is the maximum temperature to which fish can be acclimated and above which will result in 50% mortality over a short-term exposure given an incremental addition of heat.

avoidance temperature is exceeded for seven days in a month, and those seven days would be consecutive, then the weekly average temperature for that week would substantially exceed the Gold Book's suggested value of 20°C for avoiding excessive adverse effects on growth. Therefore, the Region decided that an exceedance frequency threshold of seven days above the critical temperature of 24°C would not provide reasonable assurance of the protection and propagation of the BIP.

Finally, there is also research showing a substantial adverse effect on growth at exposures of 10 or more days to temperatures of 24°C to 25°C. Sogard (1992) (AR 4011) measured growth in caged juvenile winter flounder at a range of temperatures for 10 days and found a significant reduction in growth rates at temperatures of 24^0 C and above. Meng *et al.* (2000) (AR 4013) measured growth rates in caged juvenile winter flounder in Rhode Island coastal lagoons and suggested that temperatures greater than 25^0 C negatively affected growth rates in experiments ranging from 10-15 days. Again, while Region 1 has focused on avoidance effects for its analysis under CWA § 316(a), the Region can also conclude from these studies that exposure to the critical temperature of 24°C for 10 or more days would likely have significant adverse effects on growth and would preclude a conclusion that the protection and propagation of the BIP had been reasonably assured. This is particularly true given the important role of growth rates for juvenile winter flounder in the predator-prey relationship. *See supra* at IV.A.4.b. While these studies support the conclusion that Region 1 should not go as far as to allow 10 days of exceedance of the critical temperature, they do not indicate how the Region should decide with regard to a lesser exposure period because shorter exposure times were not tested and it is unclear from the data presented whether growth impacts occurred before the 10-day threshold.

(4) Selection of Critical Temperature Exceedance Frequency Threshold of Five Days

Region 1 concluded that the scientific literature and the available data did not definitively dictate a particular threshold for the number of days of critical temperature exceedance that should be allowed each summer month. Rather, it was necessary for the Region to exercise scientific and policy judgment in choosing a value from which permit limits could be derived that would provide reasonable assurance of the protection and propagation of the BIP in Mount Hope Bay. Again, in exercising its judgment, the Region was mindful of the depleted state of the bay's BIP.

As discussed above, the study by Casterlin and Reynolds (1982) (AR 385) could possibly have justified selection of a three-day exceedance threshold. This is because this laboratory study indicates that by three days of exposure, juvenile winter flounder are likely to seek to avoid non-preferred temperatures. Still, in light of uncertainty regarding both the translation of this laboratory study to the actual environment of Mount Hope Bay – as discussed above, Casterlin and Reynolds (1982) (AR 385) utilized constant temperatures in their study, while actual bay temperatures are likely to vary somewhat over the course of a day – and the precise overall effects of juvenile winter flounder being forced to avoid their critical nursery habitat as a result of a three-day period of critical temperature exceedance, Region 1 decided to allow an additional

margin beyond the three-day time period.[27]

The Region also decided it should not go as far as to accept a seven-day threshold for exceedances of the critical temperature of 24°C because doing so would be inconsistent with the Gold Book's suggested weekly average standard of approximately 20°C for avoiding excessive inhibition of growth, as well as the Gold Book's indication that an exposure of more than seven days to 20°C should be considered an "extensive" exposure. (The Sogard and Meng studies also confirm that a threshold of as much as ten days should not be allowed.)

In choosing a value between three and seven days – *i.e.*, four, five or six days – the Region was mindful of several factors. First, the Region considered evidence showing that thermal stress in fish accumulates more quickly than it dissipates. (Bevelhimer and Bennett, 2000) (AR 3201). This information weighs toward minimizing the frequency, duration and number of exposures. Second, the depleted state of the Mount Hope Bay BIP, including winter flounder stocks, also counsels in favor of minimizing adverse exposures. Third, the Region took account of the high standard required to satisfy CWA § 316(a)'s stringent requirement that alternative thermal discharge limits provide reasonable assurance of the propagation and protection of the BIP. Fourth, the Region factored into its judgment the considerable technical uncertainty surrounding these issues and the risks to the winter flounder population if the Region erred in its judgment. Finally, no party to the permit proceeding offered evidence specifically establishing that the value selected by the Region is excessively stringent, or that a specific, alternative value would be sufficient to assure the protection and propagation of the BIP.

In light of all of these factors, Region 1 concluded that it would be reasonable to select a critical temperature exceedance threshold of five days. This value falls in the middle of the narrow range of values that remained for consideration following Region 1's scientific analysis. The Region concluded that the five day cut-off value was consistent with its approach of selecting reasonably conservative values throughout its CWA § 316(a) variance analysis.

d. *Conclusion*

In the *Remand Order*, the EAB instructed Region 1 to review its technical decision to select a five-day threshold for the maximum number of critical temperature exceedances allowed per summer month to reasonably assure the protection and propagation of the BIP. The Board further directed the Region either to reaffirm the five-day value or to select a new threshold value, and to provide a sufficient explanation of its decision.

Under CWA § 316(a), the Region's obligation is to demonstrate that its variance-based thermal

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[27] It is worth remembering that the company's own consultants began to record levels of chronic *mortality* in juvenile winter flounder occurring after only a three-day exposure (albeit under less stringent discharge conditions than those contemplated by Region 1's § 316(a) variance). *Supra* at § IV.A.b.4.

discharge limits will reasonably assure the protection and propagation of the BIP in Mount Hope Bay. The Region derived its summer discharge limits from an analysis based on three key factors: a critical temperature threshold of 24°C, a maximum areal impact of 10% of the Bay, and a maximum critical temperature exceedance threshold of five days per month. These limits were designed to protect juvenile winter flounder and their critical nursery habitat sufficiently to reasonably assure the protection and propagation of the BIP in Mount Hope Bay. The EAB has previously upheld the Region's decisions regarding the thresholds for critical temperature and maximum areal impact. The Board remanded the decision regarding the threshold number of days for critical temperature exceedance. As evidenced in the preceding discussion, there is scientific uncertainty regarding selection of such a threshold to reasonably assure the protection and propagation of the BIP. The modeling data in this case indicates that critical temperature exceedance days occur consecutively, but the available scientific information does not definitively dictate the precise number of days exceeding 24°C that will still reasonably assure the protection and propagation of the BIP. Recognizing that its obligation is to provide such reasonable assurance, rather than to prevent all adverse effects, Region 1 applied its technical expertise to consider the scientific literature and the reasonably available data and exercised its scientific judgment to reaffirm its earlier decision to select a five-day threshold. The Region explains above that this is a reasonably conservative value and that the choice of a reasonably conservative value is consistent with the statutory requirements and is appropriate in light of the currently poor condition of Mount Hope Bay's BIP.

5. Procedure

In the *Remand Order*, at 134, the EAB ruled that the Region's explanation of its selection of the critical temperature exceedance threshold was inadequately explained in Region 1's Determination Document supporting the Draft Permit. The Board pointed out that this inadequacy could have been cured in the Region's Response to Comments issued with the Final Permit, but held that the Response to Comments was also inadequate in this regard. *Id.* Thus, the Board remanded the issue for the Region's reconsideration and for the Region to decide whether to reaffirm its earlier decision or adopt a new value and provide an adequate, rational explanation of its decision. *Id.* at 135. The Board also stated that "[t]he Region should supplement the record as necessary during the remand process . . .. " *Id.* The Board also observed that "[a]s necessary, the Region may need to reopen the record for additional public comment in relation to the new material in accordance with 40 C.F.R. § 124.14." *Id.*

The permitting regulations provide that "if any data[,] information[,] or arguments submitted during the public comment period . . . appear to raise substantial new questions concerning a permit, the Regional Administrator may . . . reopen or extend the comment period." 40 C.F.R. § 124.14(b). As the Board noted in the *Remand Order*, at 278:

> "[t]he critical elements of this regulatory provision are that new questions must be 'substantial' and that the Regional Administrator 'may' take action.' *In re NE Hub Partners, L.P.*, 7 E.A.D. 561,

585 (EAB 1998), *review denied sub nom. Penn Fuel Gas, Inc. v. EPA*, 185 F.3d 862 (3d Cir. 1999); *accord In re Ash Grove Cement Co.*, 7 E.A.D. 387, 431 (EAB 1997). Thus, based on the language of this regulation, the Board has long acknowledged that the decision to reopen the public comment period is largely discretionary." *NE Hub,* 7 E.A.D. at 585; *Amoco Oil.*, 4 E.A.D. at 980; *see also Old Dominion,* 3 E.A.D. at 797. Furthermore, where the *Agency* adds new information to the record in response to comments, "the appellate review process affords [petitioner] the opportunity to question the validity of the material in the administrative record upon which the Agency relies in issuing a permit." *Caribe,* 8 E.A.D. at 705 n.19 (EAB 2000), *accord NE Hub,* 7 E.A.D. at 587 n. 14; *Ash Grove,* 7 E.A.D. at 431.

In addition, the Board also concluded, in the context of revised economic benefits analyses included as part of the Region's response to comments, that reopening the record to seek additional public comment was not necessary where the revised analyses responded to comments on an issue already part of the permit proceeding and did not lead to changes in the Region's ultimate determination regarding the permit conditions. *Remand Order* at 279 (citations omitted).

In this case, the Region concludes that it should not exercise its discretion under 40 C.F.R. § 124.14 to reopen the record for additional public comment. The Region has neither modified the permit limits nor selected a different critical temperature exceedance threshold. The analysis on remand has neither raised nor had to deal with any substantial new questions or issues. Rather, the Region has re-evaluated the same issues and questions assessed and discussed previously. The Region's analysis on remand also has not involved the collection of new data. Rather, it has involved a reconsideration of existing information. The Region has endeavored to consider the relevant issues and consider and respond to the comments and questions posed by BPS in its original comments (and echoed by the Board in the *Remand Order*) regarding the appropriateness of, and the reasons for, the 5-day exceedance threshold. The present document represents the Region's effort to provide a clear explanation of its reasoning and conclusions on these issues. In this sense, the Region's analysis on remand is in the nature of a supplement to its earlier response to comments. In deciding not to reopen the record for additional public comment, Region 1 has also considered the long delay thus far in putting the new BPS NPDES Permit into effect and concluded that the additional time that would be needed to hold a public comment period and then respond to comments received counsels against the Region exercising its discretion to reopen the proceeding for additional public comment.

On February 17, 2006, not long after the EAB issued the *Remand Order*, Dominion-BPS sent Region 1 a letter requesting that the Region "re-open the record and accept public comment" on the 5-day threshold issue "[b]ecause the EAB concluded that the record is inadequate on [this issue] . . . and because of the importance of . . . [the issue] to the final permit." AR 4023. On

April 3, 2006, Region 1 sent a reply letter to Dominion-BPS indicating that the Region had "not yet decided whether or not to re-open the record for additional public comment." AR 4024. The Region also indicated that the company's request was noted and would be taken into account in the Region's decision-making. The Region has, in fact, considered Dominion-BPS's request but decided that this request should be denied. Dominion-BPS is correct that the EAB found certain inadequacies in the record on the 5-day threshold issue, but just as deficiencies in the record supporting a draft permit can be cured by responses to comments, this Determination on Remand by Region 1 cures the inadequacies in the record identified by the Board. The Region also recognizes that the 5-day threshold value was an important element in the Region's derivation of the Permit's summer thermal discharge limits, but the fact remains that reconsideration of this threshold value does not raise substantial new issues or questions. Certainly, the company's letter requesting additional public comment does not identify any substantial new issues or questions.

In its letter of February 17, 2006, letter, Dominion-BPS also requested that the Region 1 "hold an evidentiary hearing" on the five-day threshold issue. AR 4023. Region 1's reply letter of April 3, 2006, noted this request by the company. AR 4024. In response to Dominion-BPS's request, Region 1 declines to hold an evidentiary hearing on this issue. EPA regulations do not provide for evidentiary hearings in connection with NPDES permit proceedings and the EAB previously denied BPS's request for an evidentiary hearing in the instant permit proceeding. *See supra* at n. 4 (citing *In re Dominion Energy Brayton Point, L.L.C. (Formerly USGen New England, Inc.), Brayton Point Station*, 11 E.A.D. 525 (EAB 2004)). Furthermore, since Dominion-BPS's letter of February 17, 2006, the First Circuit on March 30, 2006, issued its decision in *Dominion Energy Brayton Point, LLC v. Johnson*, 443 F.3d 12 (1st Cir. 2006). *See supra* at n. 4. In this decision, the court ruled that EPA does not have a non-discretionary duty to provide an evidentiary hearing in the BPS NPDES permit proceeding and that EPA's regulations not providing for an evidentiary hearing are a reasonable interpretation of the Clean Water Act entitled to judicial deference. *Id.* at 16-19. Dominion-BPS has identified no reason why an evidentiary hearing should be provided in this case contrary to the regulations or the above decisions.

Finally, Region 1 notes that the EAB states in the *Remand Order*, at 135, that if Petitioner or other participants in the remand process "are not satisfied with the Region's explanation on remand," they may challenge the Region's technical determination by appealing to the Board. The EAB also indicates that such an appeal, filed under 40 C.F.R. § 124.19, will be required to exhaust administrative remedies under 40 C.F.R. § 124.19(f)(1)(iii). *Remand Order* at 294.

B. Determination of Technology-Based Cooling Water Intake Limits Under CWA § 316(b) – Consideration of Noise Impacts

The Board remanded the Permit so that Region 1 could revisit certain issues pertaining to the evaluation of sound emissions likely to result from using mechanical draft, wet cooling towers at

BPS. These issues arise in the context of the Region's determination of technology-based cooling water intake limits for the BPS Permit under CWA § 316(b). The Board stated that the Permit was being remanded for the Region either "to supplement its response to comments with a rationale that addresses Petitioner's concerns raised on appeal regarding the NIA [(*i.e.*, the Noise Impact Assessment)] or to modify the permit requirements, as appropriate." *Id.* at 288. Region 1 has reconsidered the pertinent issues regarding cooling tower sound emissions and determined that the Region should reaffirm its prior overall conclusion on these issues. Specifically, Region 1 has determined that BPS can convert entirely to closed-cycle cooling and likely comply with Massachusetts noise control regulations and not cause otherwise unacceptable noise impacts. MassDEP has reviewed the Region's analysis of this issue and concurred with it in writing. As a result of the Region's present determination, no changes to the Region's prior BTA determination or the Permit's intake limits under CWA § 316(b) are necessary or appropriate. Region 1 provides a detailed rationale for its determination in the text below, including responses to the concerns raised by BPS on appeal and by the EAB in its *Remand Order*.

1. Background

a. *Technology-Based and Water Quality-Based Intake Limits*

The Region set the Permit's cooling water intake limits based on a Best Professional Judgment (BPJ) application of the technology standard specified by CWA § 316(b) *and* the application of relevant state water quality standards from both Massachusetts and Rhode Island. In general, NPDES permit limits must satisfy both technology-based and water quality-based requirements, with the more stringent of the two determining the limits for each particular permit parameter. The technology standard in CWA § 316(b) requires that the design, capacity, location and construction of a facility's cooling water intake structures (CWIS) reflect the Best Technology Available for minimizing adverse environmental impacts (BTA).

In this case, the Region determined that converting BPS's open-cycle cooling system to a closed-cycle, recirculating system using mechanical draft, wet cooling towers constituted the BTA. The Region then set technology-based permit limits restricting cooling water withdrawal volumes (i.e., restricting CWIS "capacity") to a level consistent with this technological approach.[28] In addition, the Region concluded that the Permit's cooling water intake limits could not be made less stringent without causing violations of both Massachusetts and Rhode Island water quality standards. *See Remand Order* at 178-81. Thus, the limits were also based on water quality requirements. *Id.* At 185.

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[28] The Permit also allows an additional 6.847 billion gallons *per year* for temporary open-cycle cooling operations, but due to public comments and Rhode Island water quality standards, the Permit prohibits cooling water intake capacity reflecting once-through cooling operations during the winter flounder spawning season (February through May). *See* RTC at 1-4 to 1-5.

While the EAB remanded a specific technical issue related to the Region's *technology-based* determination of the Permit's intake limits – specifically, the consideration of cooling tower sound emissions – the Board upheld the Region's *water quality-based* determination of intake limits. Therefore, regardless of how Region 1 resolves the intake technology issues, the Permit's intake limits *cannot be relaxed* because doing so would violate state water quality requirements. *See Remand Order* at 196, 204. Although this might seem to limit the import of the technology-based determinations on remand, resolving the technology-based issues remains necessary because the permittee can still challenge the water quality-based requirements in federal court and if such a challenge led to these requirements being relaxed, then the intake limits could end up resting on the technology-based requirements. As a result, it remains necessary to finalize the technology-based requirements.

While the Permit's intake limits are based on mechanical draft, wet cooling towers constituting the BTA at BPS, the Permit does not *require* the power plant to use this specific technology or any type of closed-cycle cooling at all. Instead, the Permit's intake volume limits are performance standards that BPS is free to meet in any way that it chooses. *See, e.g.*, DPDD at 7-26, 8-4. The intake volume limits (as well as the thermal discharge limits) have been characterized as "requiring" closed-cycle cooling with mechanical draft, wet cooling towers only because all parties have agreed that this technology would be the least costly way of meeting the Permit's limits.

BPS could also choose to meet the intake flow limits simply by shutting down generating units for extended periods in order to eliminate the need for the facility's huge cooling water withdrawals. The revenue losses associated with this approach, however, would make it far more expensive than the cooling system conversion that Region 1 identified as the BTA. *See* DPDD at 7-64 to 7-65. Another alternative approach for meeting the Permit's limits would be for BPS to use a cooling tower technology other than mechanical draft wet cooling towers, such as *natural* draft, wet cooling towers or *dry* cooling towers.[29] Region 1and BPS both considered these options and dropped them, however, in favor of the mechanical draft, wet cooling tower option.[30]

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[29] Both natural draft wet cooling towers and dry cooling towers, like mechanical draft wet cooling towers, are compatible with closed-cycle cooling. *See* DPDD at 7-35 to 7-37.

[30] Natural draft wet cooling towers were considered in the evaluation of alternative technologies but screened out prior to the detailed final evaluation. In its permit application materials, BPS evaluated natural draft wet cooling towers and urged that, although they could achieve equivalent flow reductions to mechanical draft towers, they should be screened out from further evaluation because they would be more expensive than mechanical draft towers and would result in greater adverse visual impacts because of their greater height. Region 1 agreed that natural draft towers should be dropped from detailed evaluation in favor of mechanical draft towers because the former would be more expensive and cause greater visual effects while achieving the same flow reduction performance as the latter. Region 1 also noted that mechanical draft cooling towers would likely be noisier and impose greater operational costs and

Thus, all parties have agreed that converting the open-cycle cooling system to a closed-cycle system using mechanical draft, wet cooling towers is the preferred approach for meeting the Permit's limits because it would be the cheapest, practicable method and would allow BPS to generate nearly the same amount of electricity (with a small energy penalty, *see* DPDD at 7-53 to 7-55). In addition, by reducing thermal discharges that otherwise require curtailed electrical generation in order to avoid permit violations, this approach would actually enable the facility to generate *more* electricity during summer peak demand periods. RTC at IV-34, IV-40 and IV-122; DPDD at 7-55, 7-179.

b. *Considering Noise in Setting Intake Limits Under CWA § 316(b)*

In setting the permit's technology-based intake limits under CWA § 316(b), the Region assessed the environmental effects of BPS's existing cooling water intake operations as well as myriad issues related to the technological options being considered as the possible BTA for BPS. This assessment included a site-specific, BPJ evaluation of the biological, water quality, engineering, economic, energy, and non-water environmental (e.g., air and noise pollution) ramifications of the different BTA options. It also included a variety of legal and policy determinations under CWA § 316(b). The EAB upheld the Region's determinations in all material respects except one – the assessment of noise impacts. The Board remanded the noise issue to the Region for further consideration.

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energy needs – all as a result of the need to use fans with mechanical draft towers – but concluded that noise from mechanical draft cooling towers could be mitigated or controlled to meet applicable noise standards, that the energy use differences were insignificant, and that operational cost differences would be offset by capital cost differences. DPDD at 7-37.

Dry cooling towers were also considered but screened out before the full, detailed technology alternatives evaluation. In its permit application materials, BPS proposed ruling out dry cooling because it would exact stiffer energy penalties and be more expensive and noisier. BPS also argued that conversion to dry cooling would be infeasible due to space constraints and the risk of "operating failure" given the absence of any example of an existing plant converting from open-cycle cooling to dry cooling. DPDD 7-35. Region 1 agreed that it made sense to drop this technology from further detailed consideration because dry cooling would provide only a small marginal improvement in intake flow reduction over the mechanical draft wet cooling tower option under evaluation, but dry cooling would cost substantially more (including the energy penalties). Region 1's decision was also based on the fact that although converting the cooling system to dry cooling had not been demonstrated to be infeasible, there was, nevertheless, substantial uncertainty about its feasibility at BPS, especially for all four generating units, given that no example of such a conversion had been identified. *Id.* at 7-35 to 7-36.

Although the CWA is focused on the protection of the Nation's waters,[31] the statute expressly provides that non-water environmental effects (including energy effects) should be considered in setting technology-based national effluent limitation guidelines. 33 U.S.C. §§ 1314(b)(1)(B), (b)(2)(B) and (B)(4)(B) (factors to be taken into account in setting BPT, BAT and BCT effluent limitation guidelines). *See also* 40 C.F.R. §§ 125.3(d)(1)(vi), (d)(2)(vii) and (d)(3)(vi). Similarly, although CWA § 316(b) is also focused on protection of the Nation's waters,[32] EPA has deemed it appropriate to consider non-water environmental effects (including energy effects) in setting technology-based intake limits under the BTA standard of § 316(b). *See, e.g.*, 66 Fed. Reg. 65282-84, 65306 (December 18, 2001) (Final Phase I CWA § 316(b) Rule) (consideration of energy and air quality effects of BTA options). Neither the statute nor regulations, however, dictate how noise effects should be evaluated or weighed under CWA § 316(b), and there is no EPA guidance suggesting how to do this. Thus, EPA has considerable discretion in how it carries out this task. EPA's view that non-water environmental effects (including energy effects) may be considered in setting standards under CWA § 316(b) has been upheld by the United States Court of Appeals for the Second Circuit. *See Riverkeeper, Inc. v. United States Environmental Protection Agency*, 358 F.3d 174, 185-86, 195-96 (2d Cir. 2004) (EPA permitted to consider energy and non-water environmental effects in determining the BTA under § 316(b) because such factors can be considered in setting effluent limitations under §§ 301 and 306 and § 316(b) makes clear that intake limits under 316(b) are also set pursuant to §§ 301 and 306). In so holding, the Second Circuit explained that as long as the factors being considered are appropriate, the courts give considerable deference to the manner in which EPA weighs multiple, diverse environmental considerations. *Id.* at 195-96 (*citing, BP Exploration & Oil, Inc. v. EPA*, 66 F.3d 784, 802 (6th Cir. 1995); *Weyerhaeuser Co. v. Costle*, 590 F.2d 1011, 1045-52 (D.C. Cir. 1978)).

In the *Remand Order*, at 285, the EAB states that:

> . . . the Region considers noise impacts to ensure that the technology is indeed "available" within the meaning of BTA; presumably, if a technology cannot legally be used because of its noise impacts, this could render said technology "unavailable."

The Region agrees with the Board that a technology could possibly be found to be "unavailable" – and, therefore, not the BTA – if its use would plainly be illegal and that this is one reason to consider non-water environmental effects. The Agency does not, however, believe that its discretionary consideration of non-water environmental impacts is limited to cases involving a

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[31] CWA § 101(a) states that the statute's objective "is to restore and maintain the chemical, physical, and biological integrity of the Nation's waters."

[32] CWA § 316(b) specifies that effluent limits established 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."

technological option's illegality. For example, the Agency has deemed it proper to consider and weigh possible energy and air pollution effects as part of determining the BTA under CWA 316(b), even when these effects do not raise questions of illegality. *See, e.g.*, 66 Fed. Reg. 65255, 65283-84 (Dec. 18, 2001) (Final Rule, Phase I CWA § 316(b) Regulations). *See also* 33 U.S.C. § 304(b) (factors for consideration in developing national effluent guidelines under the BPT, BAT and BCT standards). EPA may consider these non-water environmental factors in making policy judgments about whether a particular technology constitutes BTA or its costs are or are not wholly disproportionate to its benefits.

Region 1 also wants to be clear that in rendering its BTA determination under § 316(b), it is neither the Region's responsibility, nor would it be possible at this time, to fully establish that the cooling towers will be permitted by the MassDEP under the state's "plan approval" requirements for noise and other issues, or to obtain the state approval for the installation of cooling towers at BPS. State review of the cooling tower noise issue will occur at a later time in a separate state regulatory process in which BPS will need to seek approvals from the MassDEP. This is discussed further below. *See Remand Order* at 250 n. 305. *See also* 310 CMR 7.02(1) (MassDEP plan approval process regulations). What is required of Region 1 at this stage is that it conduct a reasonable consideration of the noise issues in the context of rendering a BTA determination under § 316(b).

In the *Remand Order*, the Board found that "the record lacks sufficient information to indicate whether or not BPS, if converted to closed-cycle cooling, will *likely* violate Massachusetts' noise regulations." *Remand Order* at 287 (emphasis supplied). Thus, the Board recognizes that Region 1 does not have to establish that the cooling towers will comply with the state requirements in some final or definitive sense. Indeed, as stated above, that would not be possible. Instead, the Region must make a reasonable assessment of the likelihood that such compliance will or will not be achieved so that it can be reasonably factored into the final BTA determination. As also stated above, if it is unlikely that such compliance can be achieved, it might mean that the technology should be regarded as "unavailable" because state authorization is unlikely to be obtainable.[33]

c. *Consideration of Noise Issues Prior to the Permit Appeal*

The permit application materials filed by BPS with Region 1 included an evaluation of technological options for reducing cooling water withdrawals. *See* AR 555 (316(a) & (b) Demonstration in Support of NPDES Renewal, NPDES Permit No. MA0003654, USGen New

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[33] It should also be recognized, however, that it would be possible to have a situation in which the use of new equipment (such as cooling towers) would result in exceedances of state noise standards, but state approval could nevertheless be obtained, and compliance achieved, by implementing offsetting reductions in sound emissions from other sources. In such a case, compliance would be achieved despite what initially appeared to be excessive noise levels from the new equipment.

England, Inc., BPS, Somerset MA, dated December 6, 2001). This evaluation included an assessment of mechanical draft, wet cooling towers. BPS's assessment made only general comments about the possible noise effects from cooling towers. BPS stated that cooling towers can emit sound and that extent of these emissions would generally depend on cooling tower size and the number and configuration of the cooling tower cells. *Id.* at Vol. IV, pp. 1-14, 3.3-25, 3.3-27, and 4-2. BPS also stated generally that "[i]f noise . . . issues arise in the permit scoping process," then the options involving relatively fewer cooling tower cells were likely to have greater "public acceptance" and "permitability" than the options with relatively more cells. *Id.* at 1-17 (emphasis added). *Accord Id.* at 3.3-29. Furthermore, BPS wrote that noise emissions from mechanical draft towers would "vary depending on site location and ambient conditions," that "low-noise fans can reduce noise" but would increase cost, and that the "need for noise controls can only be determined if noise criteria are already established and existing noise sources and ambient conditions are known." *Id.* at 3-3.

While BPS ultimately concluded that the option of a complete cooling system conversion to closed-cycle cooling should be eliminated from consideration, it did not specify noise effects as one of the reasons for this conclusion. *See Id.* at 4-1. *See also Id.* at Vol. I, Executive Summary at p. 8 n. 7 (not mentioning noise among reasons BPS proposed dropping the option of a complete conversion to closed-cycle cooling). Thus, BPS neither stated that noise would necessarily be a serious problem nor indicated that it could not be managed if it was a problem. Rather, the permittee indicated that future analysis would be required to characterize any noise problem and determine what sort of mitigation might be needed and how much it would cost.

For the Draft Permit, Region 1's analysis of the noise issue was more detailed. The Region began by stating that cooling tower sound emissions were a "non-water" environmental effect to be considered in determining the BTA. DPDD at 7-34. Consistent with BPS's general discussion, the Region explained that mechanical draft cooling towers emit sound from their fans, and from water falling within the towers, and that, in general, a higher capacity cooling tower array would be expected to emit more sound. *Id.* at 7-43. The Region also assessed the site geography at BPS and determined the approximate distance from the likely location of the cooling towers to the nearest sensitive receptors (*e.g.*, residences) in various directions. *Id.* In addition, the Region explained and provided references for findings that cooling towers are a widely used technology, that their sound emissions do not typically pose an environmental problem, and that various methods exist for effectively mitigating their sound emissions. *Id.*[34] While acknowledging that

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[34] For example, in its DPDD, at 7-43, Region 1 cited to EPA's "Technical Development Document for the Final Regulations Addressing Cooling Water Intake Structures for New Facilities" (EPA-821-R-01-036) (November 2001), p. 3-35, AR 2048, which states the following, and which references the Nuclear Regulatory Commission's Generic Environmental Impact Statement regarding nuclear power plant relicensing:

> . . . power plant sites generally do not result in off-site levels more than 10 dB(A) above background (NUREG-1437 Vol. 1). Noise

noise mitigation measures could increase costs, the Region concluded that any such increases would not be particularly significant. *Id.* Based on the site-specific information regarding the distance from the expected location of the cooling towers to the nearest receptors, and the general information regarding the typical nature of cooling tower noise and the available noise mitigation techniques, Region 1 concluded that cooling system conversion at BPS should be achievable without violating any applicable noise standards. *Id. See also Id.* at 7-37 and 7-169.

The Region also explained, however, that while there are no applicable federal legal requirements governing noise emissions, cooling towers could not be installed and operated at BPS until the facility prepared noise analyses suitable for demonstrating compliance with *state* noise standards. *Id.* In making this point, Region 1 intended to convey that it was not for the Region to "determine" what was ultimately required to meet state standards – since that was a matter to be resolved by the state in response to a plan submitted by the power plant – but that although it was too early to specify the exact steps needed to achieve compliance with those standards, such compliance would ultimately be ensured by the future state regulatory process. Region 1 concluded that this was an adequate analysis in light of the reasonably available information and considering that the purpose of the analysis was to support a BTA determination for a draft NPDES permit prior to final design and siting of the cooling towers and prior to the

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> abatement features are an integral component of modern cooling tower designs, and as such are reflected in the capital costs of this rule, which were empirically verified against real-life, turn-key costs of recently installed cooling towers. A very small fraction of recently constructed cooling towers also further install noise abatement features associated with low noise fans. The Agency collected data on recently constructed cooling tower projects from cooling tower vendors. The Agency obtained detailed project descriptions for these 20 projects and none utilize low noise fans. In addition, the cost contribution of low noise fans, in the rare case in which they may be installed at a new facility, would comprise a very small portion of the total installed capital cost of the cooling system. As such, the Agency is confident that the issue of noise abatement is not critical to the evaluation of the environmental side-effects of cooling towers. In addition, this issue is primarily in terms of adverse public reactions to the noise and not environmental or human health (i.e., hearing) impacts. The NRC adds further, "Natural-draft and mechanical-draft cooling towers emit noise of a broadband nature...Because of the broadband character of the cooling towers, the noise associated with them is largely indistinguishable and less obtrusive than transformer noise or loudspeaker noise."

state's formal regulatory review.[35] The Region's analysis also was not, it should be noted, fundamentally inconsistent with BPS's statements about noise impacts in its permit application materials.

In its comments on the Draft Permit, BPS strongly disputed the Region's conclusions. AR 3263 (Vol. II, Tab 13, p. 3 (TRC Report, Oct. 3, 2002)). BPS stated that "studies around the plant have confirmed that *ambient* nighttime noise levels are low (on the order of 36-37 dBA)" (emphasis added).[36] *Id.* BPS also stated that the "MassDEP *guidance* for acceptable noise impacts" limited sound level increases to less than 10 dBA, and that EPA guidance limited outside residential sound level exposures to less than 51 dBA. *Id.* (emphasis added). BPS then opined that it "appears" that the cooling tower array suggested by Region 1 would exceed the MassDEP guidance and that "it is likely that" EPA's guidance would not be met. *Id.* BPS further claimed that the 72-cell cooling tower array that would be needed to convert the entire power plant to closed-cycle cooling would generate 3.5 times as much noise energy as the company's proposed 20-cell cooling tower array (to convert roughly one third of the plant to closed-cycle cooling) and that this would "correlate to an increase of at least 14 to 16 dBA over *ambient* sound levels . . .." *Id.* (emphasis added).[37] In addition, BPS stated that "it is very doubtful that sufficient additional noise mitigation could practically be added." *Id.* BPS did not provide a technical report or any data to document its assertions regarding the specific sound levels prevailing at the power plant or expected from the implementation of cooling towers.

In response to these comments, Region 1 undertook a more detailed, more site-specific analysis. To support this effort, the Region hired an expert consultant, Hatch, Inc. (Hatch), to further evaluate the cooling tower noise issue. Hatch produced a report that the Region issued as Appendix L to the Region's RTC. *See* RTC at IV-84, Appendix L (Report by Hatch, Inc.,

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[35] In the *Remand Order*, at 285 n. 343, the EAB stated that "it is not clear that the Region performed a detailed analysis of BPS's [noise] impacts at the time it issued the Draft Permit." While the Region's analysis of noise issues took into account both specific information about the site and experience with cooling towers and sound emissions and mitigation at other power plants, this analysis was, as intimated by the Board, somewhat general. Yet, the Region deemed its analysis adequate in light of the nature of the issue and the information available at the time of the Draft Permit. Of course, the Region proceeded to conduct a significantly more detailed analysis in response to comments received on the Draft Permit, which raised more specific, albeit undocumented, concerns about possible noise.

[36] The "ambient" levels referred to in these comments by BPS appear to *include* existing sound emissions by the power plant. This appearance is confirmed by data obtained later by EPA showing that the company's measurements, *including* power plant noise, in the quietest receptor locations ranged from 36 to 38 dBA. *See* RTC, App. L at 2; AR 4007 at 5-4, Table 3.

[37] Presumably, the term "ambient" used in this comment again refers to sound levels *including* the existing emissions by the power plant.

Prepared for: U.S. Environmental Protection Agency, Region 1 Office, and Tetra Tech, Inc., "Brayton Point Power Station Cooling Towers—Noise Impact Assessment" (September 10, 2003)) (Noise Impact Assessment or NIA). As part of this work, Hatch reviewed BPS's comments, took limited sound measurements in the neighborhood around the facility, reviewed regulatory standards used by Massachusetts and other jurisdictions, reviewed EPA's general "guidance" concerning noise emissions, and gathered specific information from vendors about cooling tower sound emissions and methods for mitigating these emissions that could be applied at BPS.

In addition, Region 1 and Hatch consulted with MassDEP regarding the applicable state noise requirements and how to assess whether a cooling tower installation at BPS would be likely to meet those requirements. As part of this consultation, MassDEP provided EPA and Hatch with a noise analysis prepared by BPS, and accepted by MassDEP, as part of the facility's successful effort to obtain MassDEP approval that sound emissions from new air pollution control equipment proposed for installation at BPS would be acceptable.[38] As suggested by MassDEP, Hatch used the same analytical construct in the NIA as was used in BPS's analysis. EPA and Hatch then discussed Hatch's analysis with MassDEP and the state verbally indicated its concurrence with the NIA's analytical approach and conclusions.[39] Of course, the formal state regulatory process (known as the "plan review" process) will occur at later stage in the regulatory

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[38] The MassDEP first verbally described, and then on September 3, 2003, provided Region 1 with a package of material (AR 2007) containing copies of what it regarded to be the pertinent pages from (a) BPS's "310 CMR 7.02 Plan Approval Application" (Revision 2 – April, 2003; With Revision 3 – May, 2003 Replacement Pages), including Appendix H ("Noise Assessment Study"), prepared for BPS by its consultant TRC (AR 4009), and (b) the MassDEP's Conditional Approval of BPS's Plan Approval Application (June 27, 2003) (AR 4008). Region 1 did not assign this package of material a separate administrative record number at the time of permit issuance, but the information is referred to in Hatch's NIA. *See* RTC, App. L at p. 2. BPS, of course, was fully aware of all this material since it both submitted the report to the MassDEP and received the state's conditional approval in response. Region 1 is now assigning the complete package of material provided to the Region by the MassDEP administrative record number AR 4007. For ease of reference, Region 1 is also assigning separate AR numbers to both the BPS material referred to in item (a) immediately above (AR 4009), and the MassDEP material referred to in item (b) immediately above (AR 4008). MassDEP also issued a Revised Conditional Approval to BPS for the air pollution control equipment on August 22, 2005, AR 4006, but nothing changed with respect to the evaluation of sound emissions. *Id.* at 17-18 of 27.

[39] In verbally indicating its concurrence with the Region 1/Hatch analysis up to that point, MassDEP, of course, retained the full scope of its authority to review the issues at the appropriate time in the future state plan review process. In other words, the state appropriately provided its views solely in the context of considering the cooling tower noise issue as part of the development of NPDES permit limits, but this does not guarantee or constitute a state approval in the plan review process or in any way prejudge the results of that process.

process in response to BPS's submission of a plan approval application to the state.[40] *See* AR 4008, 4009. *See also Remand Order* at 250 n. 305.

Region 1 explained in the RTC that based on the NIA, the Region concluded that sound emissions from the cooling towers could be properly managed and controlled and that BPS had overstated the potential adverse effects of cooling tower operations. RTC at IV-12, IV-40, IV-83, IV-87, IV-111. Region 1 again emphasized that noise would "also be further addressed in the state permitting process to ensure that applicable standards are satisfied." *Id.* at IV-40. *See also Id.* at IV-44 (noise would be further addressed in future state permitting process and more detailed design work), IV-111. Region 1 explained that:

> DEP's air quality permit review will include application of the DEP noise guidance relating to the proposed cooling technology. As part of this evaluation, DEP will require BPS to assess the potential noise impacts in comparison to existing background noise levels. The review will examine the source of additional noise; ways to minimize noise; and whether or not the noise impacts can be addressed beyond the property boundary of the noise source, if the impacts were to exceed the applicable guidelines. Until the DEP's noise review and related approvals are issued it is unclear what, if any, noise mitigation will be needed for a cooling tower installation at BPS.

RTC at IV-83. *See also Id.* at IV-84 (discussing state regulatory review process and determination of any necessary mitigation), and IV-111.[41]

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[40] In the *Remand Order*, the EAB stated that it was unclear whether MassDEP had reviewed and approved of the NIA's assessment of noise issues. *See Remand Order* at 286 n. 345. Region 1 did, in fact, obtain MassDEP's review of, and verbal concurrence with, the NIA's analytical approach and conclusions. The Board's comment is understandable, however, because the Region did not obtain that concurrence in writing. Of course, MassDEP was cognizant of the noise issues and issued a state discharge permit to BPS identical to Region 1's NPDES permit. This was indicative of the state's comfort that the noise issues would be manageable. The Region has now, of course, obtained MassDEP's written concurrence with the Region's re-evaluation of the noise issues, *see* AR 4029, and MassDEP has found no reason to change or withdraw its state discharge permit.

[41] It should be noted, as discussed below, that if mitigation of sound emissions from BPS is necessary, the state could require or BPS could propose that overall sound emissions be decreased by reducing sound emissions from components of the power plant other than the cooling towers. Overall sound emissions from the facility will ultimately be evaluated in a holistic way, which makes it doubly impossible *at this time* to be certain what, if any, mitigation may required as a result of the state's later regulatory process.

Region 1 stated its conclusions in the RTC as follows:

> Based on its review of current information, EPA has concluded that although installation of cooling towers could result in noise impacts requiring mitigation, such mitigation can be accomplished and Massachusetts regulations can be satisfied using established technology known to the industry. While noise control measures beyond a simple low noise cooling tower could be needed to accomplish this mitigation, it is impossible at this time to be sure what additional measures, if any, would be called for. Nevertheless, it is clear that a range of suitable measures exists among the state-of-the-art technologies to properly control noise emissions.

RTC at IV-84 to IV-85. *See also Id.* at IV-111 and App. L (NIA) at 7. Region 1 also considered the cost issues associated with possible noise mitigation, *see* RTC IV-84 to IV-85, IV-36 n. 23, IV-43 n. 24, VIII-24, and found that while the need for mitigation was uncertain, and would later be determined by the DEP, the cost of any such mitigation would be acceptable.[42]

Following Region 1 (and MassDEP's) issuance of the Permit, BPS appealed the Permit to the EAB. BPS raised concerns about, among other things, the Region's handling of cooling tower sound emission issues. In its *Remand Order*, the Board remanded certain noise-related issues to the Region for further proceedings. *See Remand Order* at 283-88. The issues presented on remand are detailed below.

2. Cooling Tower Noise Issues Presented on Remand from the EAB

BPS's permit appeal raised several issues regarding Region 1's consideration of cooling tower sound emissions. The EAB considered these issues carefully. Without determining that noise considerations necessarily undermined the Region's BTA determination, and without finding that the Region had made critical errors in its analysis, the Board held that it was necessary to remand the Permit to the Region to further address the noise issues. The EAB explained that:

> [b]ecause of the potential significance of the noise impacts analysis on the determination of the appropriate BTA for BPS, and because we cannot determine whether Petitioner's concerns about the NIA are legitimate given the current state of the record, we conclude that the Final Permit must be remanded to the Region to supplement its response to comments with a rationale that addresses Petitioner's concerns raised on appeal regarding the NIA

[42] The EAB upheld the Region's consideration of the potential costs of noise mitigation. *See Remand Order* at 249-51.

or to modify the permit requirements, as appropriate.

Remand Order at 288.[43]

The Board found that the basic problem requiring remand was that the "record lacks sufficient information to indicate whether or not BPS, if converted to closed-cycle cooling, will likely violate Massachusetts' noise regulations." *Id.* at 287. Citing to the NIA by Region 1's consultant, Hatch, the Board states that:

> . . . [the Massachusetts noise] regulations state that "[a] source of sound will be considered to be violating the Department's noise regulation if the source: (1) increases the broadband sound level by more than 10 dB(A) above ambient." RTC app. L at 3 (quoting Mass. Regulations. Code tit. 310, § 7.10).

Id. at 287. Region 1 must point out, however, that the language quoted above – significantly – does not come from the applicable Massachusetts *regulations*. Instead, it comes from a MassDEP *policy* document that is one of several tools that the state uses to put its noise regulations into practice. The mistaken quote, of course, is not the fault of the EAB. As indicated by the Board's reference, the Region's NIA incorrectly referred to the above-quoted language as coming from the state's regulations, thus leading to the Board's statement. RTC at App. L (NIA) at 3.[44] Region 1 regrets its mistake and any confusion caused by it. The relevant state regulations and policies, and their application to this case, are discussed in detail below.

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[43] The Board explained that the Region did not abuse its discretion in deciding not to reopen the public comment period to solicit comments on the new noise analyses conducted in conjunction with the Final Permit and the RTC. *Remand Order* at 288 n. 347. The Board also explained, however, that having received Petitioner's comments on the Draft Permit and having conducted an extensive re-analysis in response, the Region "ran the risk, as occurred here, that a petitioner could, on appeal, raise significant issues regarding the new information that were not adequately addressed in the existing record." *Id.*

[44] The main text of the Region 1's RTC more accurately stated that MassDEP uses "guidance" in its review of noise issues. RTC at IV-83. Similar to the mistaken reference in the NIA, BPS's plan approval application for its new air pollution control equipment mistakenly stated that the guidelines from the Massachusetts policy document were requirements of "regulation." *See* AR 4009, at 3-3; and n. 38, *supra.* BPS's comments on Region 1's Draft NPDES Permit, however, more accurately refer to the specified standards as being part of a MassDEP "guidance." AR 3263 (Vol. II, Tab 13, p. 3 (TRC Report, Oct. 3, 2002)). As explained further below, however, neither Region 1 nor BPS previously provided a sufficiently detailed or precise explanation of how the state applies its noise requirements and policies. Region 1 remedies this shortcoming here.

In the *Remand Order*, the Board recounted the arguments presented by BPS on appeal and specified various questions to be addressed on remand pertaining to whether the cooling towers were likely to violate state noise regulations. The Board explained that BPS argued that the Region had relied on an incorrect interpretation of Massachusetts noise requirements. BPS maintained that, understood correctly, the state requirements call for sound emissions to be compared to a "true background." By this, the company meant that the evaluation needed to consider not just the addition of sound from the cooling towers, but that it needed to consider the total sound levels produced by the cooling towers *combined with* basic station operations as compared to a baseline without the power plant. *Id.* at 284.

In response to these issues, the EAB stated (emphasis in the original):

> [s]ignificantly, while the NIA considers whether the noise *from the cooling towers* will violate this regulation, it does not appear to address the question Petitioner raises on appeal of whether the entire facility's noise, with the added noise generated by the cooling towers, will likely violate the regulations or how the state determines 'ambient' noise levels.

Id. at 287. Related to this issue, the Board went on to identify the following additional questions to be sorted out on remand:

- In applying the Massachusetts noise standards, is existing facility noise included within the definition of "ambient noise"? Or are "ambient" noise levels considered to be those levels that would exist in the absence of the facility (i.e., BPS's "true background")?

- In estimating new noise levels, did the measurements of existing noise levels include the noise from BPS's existing operations and would those be the same after a conversion to closed-cycle cooling?

- If the entire power plant, including the new cooling towers, is considered to be the new "source of sound" to be compared against the baseline of "ambient" sound levels, would the whole plant be likely to satisfy the state's 10 dBA criterion?

- Should the expected noise from the anticipated new air pollution control equipment to be installed at BPS also be included in the analysis?

Id. at 287 n. 346.

In addition, the Board noted that BPS argued "that the Region 'did not even attempt to demonstrate that the 72 cooling tower [cells] needed for closed-cycle cooling [for the entire power plant], taken together with existing station operations, could be operated within the regulatory limits and therefore has not demonstrated that the state requirements can be met." *Id.*

at 284 (citing BPS's Petition for Review, at 27, Table 2 at 3, 9). The Board further pointed out that BPS argued that the 72-cell cooling tower configuration would result in "over 3.5 times as much noise energy" as Petitioner had estimated for the 20-cell tower proposal, "which would correlate to an increase of at least 14 to 16 dBA (A-weighted decibels) over ambient sound levels." *Id.* at 286.

Furthermore, the EAB states, *id.* at 286 n. 345, that while Region 1 argued that Hatch consulted with MassDEP and followed the state's analytical approach, and Hatch mentioned consulting with the state in obtaining ambient noise levels:

> . . . there is no indication in the report that Massachusetts considered Hatch's analysis and concurred in its entirety. Nor has the Region cited to any document submitted by Massachusetts and placed in the administrative record that would suggest that the state specifically analyzed or addressed Hatch's conclusions.

Thus, the EAB raises the question of what MassDEP's position was regarding Region 1's noise assessment at the time of issuance of the Final Permit, and what the state's position is now after the Region's evaluation on remand.

3. Analysis

In its *Remand Order*, the EAB specified the principal question on remand to be "whether or not BPS, if converted to closed-cycle cooling, will likely violate Massachusetts' noise regulations." *Remand Order* at 287. On remand, Region 1 needs to answer this question and decide whether the answer changes its BTA determination under CWA § 316(b) in any way. Accordingly, Region 1 has answered this question while considering and responding to, among other things, various questions raised by BPS and/or the EAB. As part of this work, Region 1 again contracted with its expert consultant Hatch to prepare an Addendum to its original NIA. AR 4005.

Based on this analysis, the Region concludes that BPS *will* likely be able to convert entirely to closed-cycle cooling using mechanical draft, wet cooling towers *without* violating Massachusetts' noise regulations. In other words, a proposed cooling system conversion is practicable and likely to receive approval from MassDEP under the state's noise control requirements. In addition, without prejudging its later plan review process, MassDEP has indicated in writing, *see* AR 4029, that it concurs with Region 1's conclusions based on the available information. Region 1, therefore, finds no reason to change its earlier determination of BTA technology-based cooling water intake limits for the BPS Permit.

a. *Massachusetts Noise Control Requirements*

In order to determine whether BPS is likely to comply with applicable Massachusetts noise

control regulations if it converts to a closed-cycle cooling system, it is first necessary to correctly understand those regulations. *See* AR 4030. As the EAB's *Remand Order,* at 287 n. 346, indicates, the state noise requirements are not clearly explained in the record to date. Region 1 cures this shortcoming in the record in the present document.

Massachusetts statute provides that MassDEP may adopt regulations to prevent pollution of the atmosphere. Massachusetts General Laws c. 111 § 142A. MassDEP regulations define "air contaminant" to "mean any substance or man-made physical phenomenon in the ambient air space . . ., [including] sound." AR 4030 (310 CMR 7.00 (definition of "Air Contaminant")).[45] The state's regulations also specify that:

> Air Pollution means the presence in ambient air space of one or more air contaminants or combinations thereof in such concentrations and of such duration as to:
>
> (a) cause a nuisance;
> (b) be injurious, or be on the basis of current information, potentially injurious to human or animal life, to vegetation, or to property; or
> © unreasonably interfere with the comfortable enjoyment of life and property or the conduct of business.

AR 4030 (310 CMR 7.00 (definition of "Air Pollution")). MassDEP regulations also define "noise" to be a "... sound of sufficient intensity and/or duration as to cause or contribute to a condition of air pollution." AR 4030 (310 CMR 7.00 (definition of "Noise")). Thus, because sound is an "air contaminant," sound levels that cause a nuisance, are injurious or potentially injurious, or unreasonably interfere with the comfortable enjoyment of life and property or the conduct of business, would be considered to cause a condition of "air pollution" and to constitute "noise."

Keeping the above definitions in mind, the MassDEP regulations go on to impose only a single limitation on emissions of noise.[46] Specifically, the regulations provide that:

> [n]o person owning, leasing, or controlling a source of sound shall willfully, negligently, or through failure to provide necessary

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[45] MassDEP regulations also define "sound" to mean "the phenomenon of alternative increases and decreases in the pressure of the atmosphere . . . that elicits a physiologic response by the human sense of hearing." AR 4030 (310 CMR 7.00 (definition of "Sound")).

[46] According to 310 CMR 7.10(2), AR 4030, the limitations on noise set forth in 310 CMR 7.10(1) "pertain to suppressible and preventable industrial and commercial sources of sound, and other man-made sounds that cause noise."

> equipment, service, or maintenance or to take necessary precautions cause, suffer, allow, or permit unnecessary emissions from said source of sound that may cause noise.

AR 4030 (310 CMR 7.10(1) ("Noise")).[47] Stated differently, since "noise" is defined as sound that causes or contributes to a condition of air pollution, the MassDEP regulations prohibit "unnecessary emissions" of sound that may cause or contribute to a condition of air pollution.

The state regulations, therefore, neither prohibit the emission of sound nor set any specific numeric standards limiting sound emissions. Rather, the regulations create an effects-based standard: sound emissions must cause a nuisance, unreasonably interfere with the enjoyment of life and property or the conduct of business, or cause or potentially cause injury in order to be considered to be causing or contributing to "air pollution" and, in turn, to constitute "noise." The state's regulations prohibit "unnecessary emissions of sound that may cause noise," if those sound emissions occur "willfully, negligently, or through failure to provide necessary equipment, service, or maintenance or to take necessary precautions."

To help put this general regulatory limit on noise into practice, MassDEP applies certain policies, both written and otherwise. The MassDEP has developed a *written* policy identifying certain guidelines for use in determining when sound emissions may be considered to cause or contribute to a condition of air pollution and, therefore, to constitute "noise" in violation of the state regulation. Specifically, the MassDEP's "Division of Air Quality Control Policy" (DAQC Policy 90-001, February 1, 1990), AR 4004, states the following:

> DIVISION OF AIR QUALITY CONTROL POLICY
>
> This policy is adopted by the Division of Air Quality Control. The Department's existing guideline for enforcing its noise regulation (310 CMR 7.10) is being reaffirmed.
>
> POLICY

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[47] MassDEP regulations also state that:

> [n]o person owning, leasing, or controlling the operation of any air contamination source shall willfully, negligently, or through failure to provide necessary equipment or to take necessary precautions, permit any emission from said air contamination source or sources of such quantities of air contaminants which will cause, by themselves or in conjunction with other air contaminants, a condition of air pollution.

AR 4030 (310 CMR 7.01(1) ("General Regulations to Prevent Air Pollution")).

> A source of sound will be considered to be violating the Department's noise regulation (310 CMR 7.10) if the source:
>
> 1. Increases the broadband sound level by more than 10 dB(A) above ambient, or
>
> 2. Produces a "pure tone" condition – when any octave band center frequency sound pressure level exceeds the two adjacent center frequency sound pressure levels by 3 decibels or more.
>
> These criteria are measured both at the property line and at the nearest inhabited residence. Ambient is defined as the background A-weighted sound level that is exceeded 90% of the time measured during equipment operating hours. The ambient may also be established by other means with the consent of the Department.

Thus, the "10 dB(A) above ambient" guideline is a creature of state *policy* rather than regulation. Indeed, in its Conditional Approval of BPS's new air pollution control equipment, MassDEP explained that it uses DAQC Policy 90-001 as a "guideline for enforcing the noise regulation ...." AR4008, at 17 of 26. *See also* AR 4006. As befits a policy or guideline, MassDEP applies this policy with reasoned flexibility. The state has also written certain Fact Sheets and guidance documents, or other written materials, that discuss the state regulations and DAQC Policy 90-001, but none of these materials address how to evaluate proposals to add new sources of sound emissions to longstanding existing facilities. *See* AR 4031. MassDEP does, however, have certain operational practices that it consistently uses to assess such situations.

Put simply, Region 1 did not fully understand the state's approach to the application of its noise regulations and policies at the time of Permit issuance and briefing of the permit appeal to the EAB. While the Region's conclusion that BPS could be converted to closed-cycle cooling and likely comply with the state's noise regulations was correct, Region 1 did not fully understand or adequately explain *why* this is so. On remand, Region 1's further consultation and coordination with MassDEP has clarified these issues, as discussed below.

The state policy quoted above has two essential elements. Item 1 addresses *relative sound emissions*, comparing sound from a new source to some baseline condition. Item 2 addresses "pure tone conditions."

There is and has been no question that BPS can convert to closed-cycle cooling while satisfying the pure tone condition guideline. As discussed in Hatch's Initial NIA, RTC, App. L at 5-6, and the Addendum to the NIA, AR 4005, octave band data provided by the cooling tower manufacturers showed no indication that a pure tone condition would be created by installing

cooling towers. No concerns have been raised in this regard by the state, BPS or any other party.[48]

The more difficult question has been how to apply the policy's relative sound level guideline. Item 1 states, in pertinent part, that a source of sound will be considered to be violating the DEP noise regulations if it "increases the broadband sound level by more than 10 dB (A) above ambient." Unfortunately, the text is ambiguous with regard to how the guideline should be applied to a case involving a proposal to add a new source of sound to an existing source of sound (e.g., adding additional equipment to an existing facility). Furthermore, as Region 1 has learned from MassDEP, the text also does not describe the state's practice regarding the assessment of relative sound levels in the context of proposals to add new sound emitting equipment to an existing facility. These two points will be addressed, in turn, below.

As the EAB indicated in the *Remand Order*, at 287 n. 346, it is unclear how to understand the term "ambient" as used in the policy when evaluating additions to an existing facility. On the one hand, "ambient" could refer to the background level of sound emissions, *including* those from the existing source of sound. On the other hand, it could refer to a (hypothetical) background level of sound *without* the sound from the existing facility. In the former case, the policy would be applied by comparing a baseline of local sound levels that *includes* the existing source to the new total sound level that would result from the combination of the existing facility and the new source of sound. In the latter case, the policy would be applied by comparing a baseline of local sound levels *excluding* the existing source to the total sound emissions from the existing facility and the new source of sound.

The state's written policy states that "[a]mbient is defined as the background A-weighted sound level that is exceeded 90% of the time measured during equipment operating hours," but this instruction does not clarify matters. It leaves unclear whether the "ambient" sound to be measured "during equipment operating hours" should *include* that emitted by the existing equipment (hence the reference to measuring ambient levels during "equipment operating hours") or should *exclude* sound from an existing facility (in which case the reference to "equipment operating hours" is only intended to specify that ambient levels should be quantified for the time period during which the new (and existing) sound-emitting equipment will operate).

At the time of permit issuance, Region 1 had understood "ambient," as used in the MassDEP policy, to *include* the sound emissions from the existing BPS facility. Since the EAB's remand, however, the Region learned from the state that "ambient" as used in its written policy is

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[48] Consistent with this, in its comments on Region 1's Draft Permit, BPS, through its consultant, TRC, stated that ". . . cooling towers typically add noise that can be subsumed into the background noise (i.e., the sound level is relatively constant, with no significant tones)." AR 3263 (Vol. II, Tab 13 at 3 (TRC Report, Oct. 3, 2002)).

intended to *exclude* existing facility sound emissions, but also that MassDEP does not strictly apply the written policy in all cases. For example, it would not do so in a case involving the addition of new sources of sound to longstanding existing facilities. The state has particular practices for addressing such situations. Accordingly, as further described below, the correction regarding the written policy does not undermine or lead to any alteration in the Region's original overall conclusions on the noise issue.

As mentioned in the Region's original NIA, RTC App. L, and discussed in more detail below and in Hatch's Addendum to the NIA, AR 4005, BPS itself previously assessed the sound emissions that would result from new air pollution control equipment that it was proposing to add to the existing facility. The additional sound emissions from this proposed new equipment are also subject to review under the state's noise regulations and related policies. Thus, BPS faced a review under the state regulatory regime exactly paralleling the scenario posed by the proposal to add cooling towers to the power plant. Indeed, MassDEP advised Region 1 to use BPS's analysis, *see* § IV.B.1.c, n. 38, *supra*, for the air pollution control equipment as a template for the Region's assessment of cooling tower sound emissions.

For its analysis, BPS seemed to evaluate the issue based on "ambient" sound levels *including* sound from the existing facility. The company measured and reported sound emissions data *including* the sound emitted from the existing power plant and referred to it as "ambient" sound data. *See* AR 4009, App. H at 5-4 (including legend for Table 3), 5-1 (stating that the "existing noise environment" was "characterized through ambient noise monitoring ..."). [49] BPS's report also variously refers to these results (i.e., to sound levels including sound from the existing facility) as providing "background" sound levels ("background noise monitoring . . . [was conducted] with the existing plant in operation"), "baseline" sound levels, "current" sound levels, and "existing" sound levels. AR 4009, App. H at 1-1, 3-1, 5-1, 5-3, 6-1, 6-3, 7-1. Furthermore, consistent with interpreting "ambient" to refer to existing sound levels including sound from the existing facility, BPS's analysis presented such levels as the baseline and then estimated the increase over those levels that would result from adding the new air pollution control equipment. At the same time, the company presented its results not in terms of whether the new sound emissions would be less than the 10 dBA over ambient guideline in the state's written policy, but rather whether they would satisfy the company's self-described "protocol" limiting sound increases to no more than 5 dBA above baseline levels that included sound from the existing facility. AR 4009, App. H at 3-1, 6-3, 7-1. *See also* AR 4005 at 4.

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[49] In its comments on EPA's Draft NPDES Permit, BPS's consultant, TRC, states that "ambient noise studies around the plant have confirmed that ambient nighttime noise levels are low (on the order of 36-37 dBA)." AR 3263 (Vol. II, Tab 13 at 3 (TRC Report, Oct. 3, 2002)). The data in BPS's report on the air pollution control equipment shows low values of 36-37 dBA *including* sound from the power plant. *See* AR 4009, App. H at 5-4, 6-1. Thus, TRC appears to assume that "ambient" *includes* sound from the existing power plant.

Without commenting expressly on BPS's protocol, MassDEP accepted the company's analysis and, following public hearing and public comment, approved the addition of the air pollution control equipment. (MassDEP also informed Region 1 that it received no public comments regarding sound emissions from the facility and the new air pollution control equipment.) On the basis of the findings from the above analysis comparing sound levels that would result from the addition of the new air pollution control equipment to baseline sound levels including the existing facility, MassDEP concluded that "[s]ound impacts proposed in the pending application meet the requirements contained in 310 CMR 7.10 (Noise) and will not cause or contribute to a condition of air pollution." AR 4008 at p. 18 of 26.[50] *See also* 4006.

Moreover, as stated above, MassDEP advised EPA to use BPS's analysis as a template for how to approach the issue in EPA's assessment of sound from the cooling towers. As a result, the Region's NIA by Hatch in support of the final NPDES Permit took the same approach and considered the relevant baseline (*i.e.*, "ambient" conditions) to include sound from the existing facility and sought to compare that to the combined sound level that would result from the existing plant and the new cooling towers. Like BPS, EPA and Hatch did not provide an analysis specifically identifying an "ambient" or baseline sound level *not* including existing facility sounds, and did not identify the increase over such a baseline that would result from adding

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[50] MassDEP's analysis noted the following:

> 1. Sound monitoring[, including sound from the existing plant,] at five nearby receptor locations was performed during March and May, 2002.
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> 2. Predicted impacts reveal that four of the five receptor locations will result in an increase [over levels including sound from the existing facility] of 1 dB(A) or less for a total impact between 39-47 dB(A). The fifth receptor will result in an increase [over levels including sound from the existing facility] of 3 dB(A) for a total impact of 40dB(A).
>
> 3. At the fifth receptor that will realize a 3 dB(A) increase [over levels including sound from the existing facility], the overall sound impact will be 2-7 dB(A) less than three of the four other receptors and 1 dB(A) greater in comparison to the forth [sic] receptor.

AR 4008 at p. 18 of 26. *See also* 4006. Thus, like BPS's analysis, MassDEP's analysis considered sound level increases over a baseline including sound emissions from the existing facility.

cooling towers. Furthermore, on technical grounds, Hatch's analysis did not include as part of the total sound levels the sound from the proposed air pollution equipment, as estimated by Brayton Point Station. *See* RTC, App. L (NIA).

Ultimately, Region 1 provided Hatch's initial NIA to MassDEP for review and the state verbally concurred with the Region that the analysis was acceptable and that it appeared likely that the cooling towers would be able to satisfy state noise requirements. Of course, EPA and MassDEP both understood that the proposed installation of cooling towers at Brayton Point Station would later be subject to formal MassDEP review and approval at which point the state would develop its formal regulatory determinations with respect to noise based on the information available at that time. The fact that a cooling tower installation would be subject to later regulatory review by MassDEP contributed to the Region's judgment that its consideration of the noise issue was reasonable and adequate in the context of its determination of technology-based intake limits under CWA 316(b) because the Region knew that further analysis would be done by the state at the appropriate time to ensure that applicable state requirements are met.

In light of the above, Region 1 did not agree with, and was frankly puzzled by, BPS's argument on appeal that "ambient" levels under MassDEP's written policy should exclude sound from the existing power plant. Following the remand of the NPDES permit by the EAB, Region 1 further consulted with MassDEP on the noise issues and the state clarified for the Region that BPS was correct on this specific point – *i.e.,* that "ambient" sound levels under MassDEP's written policy would exclude sound emissions from the existing power plant. In other words, in the area around BPS, ambient sound levels under the written policy would mean background sound levels in the area (e.g., *including* sound from highway traffic, etc.) *without* the power plant in operation.

MassDEP also explained, however, that its written policy is only just that, a *policy*. It is not applied with the legally binding force of a regulation or statute. Moreover, MassDEP explained that the written policy does not by itself cover or apply to all cases subject to the state's noise regulations, and that the state maintains authority to apply its regulation using informed judgment on a case-by-case basis.[51] More specifically, MassDEP explained to Region 1 that when reviewing proposals to add new sources of sound to longstanding, *existing* facilities, MassDEP does not apply its regulations through a strict application of the 10 dBA-above-ambient guideline from its written policy. Rather, it applies the regulations by taking a more flexible, case-by-case approach that takes certain key considerations into account. These considerations include factors

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[51] In explaining this point from the perspective of state law, the MassDEP pointed to, among other things, *Town of Brookline v. Comm'r of the Dept. of Environmental Quality Engineering*, 387 Mass. 372 (1982) (in discussing air pollutant emissions regulatory regime, Massachusetts Supreme Judicial Court held that "[l]ike any administrative agency, the DEQE [(the predecessor agency to MassDEP)] may, at its discretion, announce and apply new rules and standards in an adjudicatory proceeding" (citations omitted)).

such as whether the *existing* sound emissions are or may *already* be causing a condition of air pollution, the extent to which the new sources of sound would increase existing sound levels, the overall sound levels that would result from the new source of sound, the nature of the sound receptors in the area, the importance of the new sources of sound from a public policy standpoint, sound modulation characteristics, duration of sound and whether there may be ways to mitigate overall sound emissions from the facility if the new sound sources are permitted to go forward.

The MassDEP further indicated that it would apply the state's noise regulations to the estimated sound emissions from the cooling towers at Brayton Point Station under this case-by-case approach, given that Brayton Point Station began operation in 1963 and has been a continuous source of sound emissions in the area since that time. Indeed, the state explained that this is the rubric it used in its consideration of sound emissions from both the new air pollution control equipment proposed by BPS and in reviewing the Region's analysis of the new cooling towers contemplated by the Region's NPDES Permit. Presumably, this is why BPS's noise analysis in support of the air pollution control equipment compared sound levels from the new equipment against a baseline of sound levels including the existing plant. This also helps to explain why MassDEP approved the company's submission for that equipment.

Finally, Region 1 also sought guidance from MassDEP regarding whether the consideration of cooling tower sound emissions ought to include consideration of sound emissions from the new air pollution control equipment. Although MassDEP had not directed the Region to include potential sound emissions from the planned air pollution equipment at the time the Region was conducting its analysis in support of the Final Permit in 2003, the state now recommended that the Region's further analysis on remand account for these sound emissions given the progress toward installation of that equipment since Region 1 issued the Permit in October 2003.

b. *Technical Analysis and Finding of Likely Compliance with Massachusetts Noise Regulations*

Region 1 then proceeded to update its consideration of noise issues in light of the above clarifications from MassDEP regarding the state's noise requirements. Region 1 charged its expert contractor, Hatch, to prepare a supplement to the initial NIA that would examine cooling tower sound emissions in light of these clarifications. Thus, Hatch prepared the Addendum to the NIA, and Region 1 and Hatch conclude on the basis of this analysis that BPS can convert to closed-cycle cooling using mechanical draft, wet cooling towers and *likely comply with Massachusetts noise control regulations.* AR 4005 at 2, 9, 11. Hatch notes that while sound control measures in addition to low noise fans may be necessary to achieve compliance, such measures are well within the current state of the art. AR 4005 at 2.

Hatch found that the *combined* sound emissions from the existing power plant, the new air pollution control equipment, and the cooling towers would be unlikely to cause or contribute to a condition of air pollution (i.e., cause a nuisance, unreasonably interfere with the enjoyment of life

and property or the conduct of business, or cause or potentially cause injury). *Id.* at 2, 9, 11. Furthermore, Hatch reasonably estimated that sound level increases from adding the air pollution control equipment and the cooling towers to baseline levels *including* the power plant would be 5 dBA or less at the five pertinent sensitive receptors. *Id.* at 8, Table 4. At three of the sites, the increase would be 3 dBA or less, *id.*, and an increase of 2-3 dB in a sound is barely noticeable to most people. *Id.*. Moreover, at the two other receptor sites where the predicted increases are as much as 5.0 dBA, the predicted overall sound levels are the quietest of all the receptor sites, significantly quieter than the other receptor sites. *Id.* Furthermore, at the two quietest sites, Hatch notes that the ambient (without the plant) would have to be 31 dBA or lower – which would be low for a suburban residential area[52] – for the overall sound level to have increased more than 10 dBA above that ambient. *Id.* The above findings evidence, among other things, consistency with state's approach to assessing new sources of sound to be added to longstanding existing facilities. As Hatch summed up:

> Thus, due to either a small increase or a low final value, as well as the absence of any problematic pure tones, the effect of adding both the air pollution control equipment and the proposed cooling towers should not unreasonably interfere with the comfortable enjoyment of life and property for the residents and thus sound emissions from such a plant should not be considered by the DEP to cause a condition of air pollution.

Id. at 9.

While Hatch's primary analysis used the quieter (and therefore more conservative), colder weather baseline measurements originally collected by BPS, Hatch also evaluated sound level increases using the louder, summer baseline measurements that it had taken in September 2003. The latter may be more representative of conditions when people are most likely to have windows open or be outside and notice noise. Furthermore, Hatch was able to conservatively calculate an estimated baseline for this time period that *excluded* sound from the existing power plant. Against this "summer" baseline *without existing facility noise*, Hatch's analysis found that the total sound level increases from the combination of the existing power plant, the new air pollution control equipment, and the cooling towers would be 2.5 dB or less at all the receptor sites. Such increases would have no significance, given that increases of up to 3 dB are barely

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[52] Region 1 also notes that in BPS's report regarding the sound emissions from the new air pollution control equipment, the company cited various "common sound levels" to provide a point of reference, which included 35 dBA for "Quiet Suburban nighttime." AR 4009, App. H at 2-1. Moreover, in its comments on Region 1's Draft Permit, BPS's consultant TRC stated that "ambient noise studies around the plant have confirmed that ambient nighttime noise levels [(including the plant)] are low (on the order of 36-37 dBA)." AR 3263 (Vol. II, Tab 13 at 3 (TRC Report, Oct. 3, 2002)).

noticeable. The increases would be even less measured against a background that included sound levels from the existing plant.

Region 1 requested that MassDEP review the Region's and Hatch's analyses and the state has indicated in writing that it concurs with the Region's conclusion that BPS can be converted to closed-cycle cooling while likely complying with the Massachusetts noise regulations. AR 4029. Of course, any cooling tower installation at BPS will be subject to later regulatory review by the state in the plan approval process. *Id.* The state's review of Region 1's analysis in the context of this NPDES permit development in no way prejudges the state's later regulatory review. *Id.* Moreover, if the state ultimately approves a particular installation of equipment, follow-up monitoring will be required to ensure that sound levels are acceptable or whether additional mitigation may be needed. *Id. See also* AR 4008 at p. 18 of 26; AR 4006.

c. *EPA Noise Levels Information Document*

As stated previously, there are no federal noise control laws or regulations governing the acceptability of sound emissions from cooling towers at BPS. There is, however, an EPA information document that discusses appropriate noise levels that is well known in the field of noise assessment and that has received some mention in the record for the BPS Permit. BPS did not raise issues related to this EPA document up on appeal, however, and the EAB's *Remand Order* does not require that it be addressed on remand. Nevertheless, since these EPA-identified levels are still commonly referenced in the field of noise analysis, and since the BPS permit record touches on them, Region 1 deems it worthwhile to discuss them here.

In March 1974, EPA's then extant Office of Noise Abatement and Control issued an information document entitled, "Information On Levels Of Environmental Noise Requisite To Protect Public Health And Welfare With An Adequate Margin Of Safety" (EPA 550/9-74-004). AR 4001 (EPA's Noise Levels Document). In this document, EPA attempted to collect and summarize, as the title indicates, "information on the levels of noise requisite to protect public health and welfare with an adequate margin of safety." *Id.* at Foreword - 1. In providing information regarding such protective sound levels, EPA stated clearly and repeatedly that the identified levels should not be regarded or used as federal noise standards or regulations. EPA explained:

> There was a great deal of concern during the preparation of this document that the levels identified would be mistakenly interpreted as Federal noise standards. The information contained in this document should not be so interpreted. The general purpose of this document is rather to discuss environmental noise levels requisite for the protection of public health and welfare without consideration of those elements necessary to an actual rule-making. Those elements not considered in this document include economic and technological feasibility and attitudes about the desirability of undertaking an activity which produces interference effects.

> Instead, the levels identified here will provide State and local governments as well as the Federal Government and the private sector with an informational point of departure for the purpose of decision-making.

Id. at 8. *See also Id.* at Title Page, Foreword-2, 4, 7. Nevertheless, the levels identified in EPA's 1974 document are still often used as reference points to include in a noise assessment.

EPA's Noise Levels Document, at 4, also states that "undue interference with activity and annoyance will not occur if outdoor [sound] levels are maintained at an energy equivalent of 55 dB." *See also id.* at 3, Table 1 (a sound level of L_{DN}=< 55 dB will prevent undue annoyance or interference with activities "outdoors in residential areas and farms and other outdoor areas where people spend widely varying amounts of time and other places in which quiet is a basis for use"). In its comments on the Draft Permit, BPS's consultant TRC wrote that for a 72-cell cooling tower array at BPS, "it is likely that EPA's guidance limiting outside residential sound level exposure to less than 51 dBA would . . . not be met." AR 3263 (Vol. II, Tab 13, p. 3 (TRC Report, Oct. 3, 2002)). TRC provided no reference, however, to identify what EPA guidance it was referring to. In the absence of such a reference, EPA and Hatch had to assume TRC was referring to the commonly referenced EPA Noise Levels Document. Of course, as indicated above, the EPA Noise Levels Document identifies that a level of "L_{DN} =< 55 dB will prevent undue annoyance or interference with activities "outdoors in residential areas." As Hatch explains in the Addendum to the NIA, AR 4005 at 9, an L_{DN} of 55 dBA is equivalent to a level of 49 dBA at night for a steady sound. Thus, it is not clear to Region 1 what TRC is referring to when it points to a level of 51 dBA.

In any event, for the Final Permit, Region 1 considered and discussed the EPA Noise Levels Document values and concluded that the relevant L_{DN} value of 55 dB would not be exceeded as a result of the cooling towers and the power plant. *See* RTC, App. L (NIA) at 3, 5. This assessment did not, however, include predicted sound emissions from the air pollution control equipment. BPS raised no issues regarding the EPA Noise Levels Document on appeal to the EAB. On remand, Region 1 and Hatch have again considered the L_{DN} of 55 dB identified by EPA, this time including predicted sound emissions from the air pollution control equipment along with that from the existing power plant and the cooling towers. Again, Region 1 and Hatch found that this level would not be exceeded. *See* AR 4005 at 9.

d. Miscellaneous Noise Issues

Although BPS did not raise this issue, the EAB asks whether, in considering overall sound levels from a conversion to closed-cycle cooling using cooling towers, sound levels from BPS's existing operations would change as a result of closed-cycle operations. If so, the Board asks

whether such changes were accounted for. Region 1 does not believe that sound levels from BPS's basic, existing operations are likely to increase as a result of closed-cycle operation. The Region notes that in its analyses in support of the Phase I CWA § 316(b) rulemaking, EPA evaluated the noise issues associated with converting an open-cycle cooling system to a closed-cycle cooling system and identified no increases in noise from basic power plant operations that would result from a cooling system conversion. AR 2048 at 3-35 (EPA's "Technical Development Document for the Final Regulations Addressing Cooling Water Intake Structures for New Facilities" (EPA-821-R-01-036) (November 2001)). Similarly, BPS did not raise any concern regarding noise increases from existing power plant operations in a closed-cycle mode. This suggests that there is no reason to expect any significant increases in sound emissions resulting from basic closed-cycle operations.

Region 1 expects, in fact, that converting to closed-cycle cooling may result in some reductions in sound emissions from basic power plant operations. The cooling towers might provide some shielding from sound emissions from other parts of the power plant for certain receptors, depending on the relative location of the receptors and the sources of sound. In addition, some sound emission reductions could result from alternative pump operations associated with closed-cycle cooling. Having said all this, Region 1 did not actually attempt to estimate any such sound reductions that might occur or include them in our analysis because (1) even without accounting for these expected reductions, the Region found that BPS would likely comply with Massachusetts noise control regulations after BPS converted to closed-cycle cooling, and (2) it was not clear how to develop a reasonably accurate estimate of such reductions based on existing information.

In the *Remand Order*, the EAB noted that BPS argued "that the Region 'did not even attempt to demonstrate that the 72 cooling tower [cells] needed for closed-cycle cooling [for the entire power plant], taken together with existing station operations, could be operated within the regulatory limits and therefore has not demonstrated that the state requirements can be met." *Id.* at 284 (citing BPS's Petition for Review, at 27, Table 2 at 3, 9).[53] Region 1 disagrees with the fundamental premise of this argument. As the Region explained in its RTC, at IV-85 to IV-88,

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[53] The Board also noted that in its comments on the draft permit, BPS stated that the 72-cell cooling tower configuration would result in "over 3.5 times as much noise energy" as Petitioner had estimated for the 20-cell tower proposal, "which would correlate to an increase of at least 14 to 16 dBA (A-weighted decibels] over ambient sound levels." *Id.* at 286. Region 1 concurs that, all other things being equal, it is fair to suggest that 72 cooling tower cells would result in "[just] over 3.5 times as much noise energy" as 20 of the same cooling tower cells. Region 1 is unable to discern the basis for BPS's claim regarding a 14-16 dBA increase over "ambient" levels, much less be sure what the company meant by the term "ambient" in this comment. Regardless, the Region relies on its own, more specific assessment of sound emissions from the cooling towers as presented in the Addendum to the NIA.

Region 1 concluded that significantly fewer than 72 cooling tower cells will be required to convert BPS to closed-cycle cooling and that using 72 cells, as BPS argued was necessary, would likely overstate the sound levels that would result from converting BPS to closed-cycle cooling. Therefore, the Region's assessment was based on the sound emissions from the number of cooling tower cells that the vendors contacted by Hatch actually indicated would be needed to convert BPS to closed-cycle cooling. Region 1 believes this was a reasonable and appropriate approach to the analysis.[54]

e. *Conclusion*

Region 1 has reconsidered the pertinent issues regarding cooling tower sound emissions and determined that the Region should reaffirm its prior overall conclusion on these issues. Specifically, Region 1 has determined that BPS can convert entirely to closed-cycle cooling and likely comply with Massachusetts noise control regulations and not cause otherwise unacceptable noise impacts. As a result of the Region's present determination, no changes to the Region's prior BTA determination or the Permit's intake limits under CWA § 316(b) are necessary or appropriate.

4. Procedure

In the *Remand Order*, the EAB concluded that the"Final Permit must be remanded to the Region to supplement its response to comments with a rationale that addresses Petitioner's concerns raised on appeal regarding the NIA [(*i.e.*, the Noise Impact Assessment)] or to modify the permit requirements, as appropriate." *Remand Order* at 288 (citations omitted). The EAB also stated that "[i]f the Region modifies the permit requirements, the Region may have to reopen the record for additional public comment in accordance with 40 C.F.R. § 124.14." *Id.*

The Region concludes that it should not exercise its discretion under 40 C.F.R. § 124.14 to reopen the record for additional public comment on the remanded noise issues. (*See* discussion of the relevant legal principles as explained by the EAB in § IV.A.5, *supra.*) Region 1's analysis on remand responds to the issues raised by BPS and the EAB regarding the Region's consideration of cooling tower sound emissions in support of the Final Permit. Thus, the Region's analysis on remand is in the nature of a response to the comments offered by BPS

[54] Region 1 notes that this conclusion is not contradicted by the Region's decision to use the 72 cooling tower cells posited by BPS in the Region's cost estimates. By using the larger, albeit excessive, number of cooling tower cells proposed by BPS, the Region's costs estimates were rendered more conservative. This has no bearing, however, on the specific technical reasons for the Region's conclusion that using 72 cells for the noise analysis would be unreasonable.

regarding these issues. Based on this analysis, the Region has decided that no change to its earlier BTA determination or the Permit's intake limits is necessary or appropriate. In addition, the Region's analysis does not raise substantial new questions. Rather, it addresses the same questions that were raised and discussed previously. Certainly, the Region has revised and improved its earlier analysis of the sound emission issues, but it has not addressed substantial new questions. Moreover, the analysis on remand has not involved the collection of new technical data. Rather, it has involved a reassessment of the existing data. In deciding not to reopen the record for additional public comment, Region 1 has also considered the long delay thus far in putting the new BPS NPDES Permit into effect and concluded that the additional time that would be needed to hold a public comment period and then respond to comments received counsels against the Region exercising its discretion to reopen the proceeding for additional public comment.

On February 17, 2006, not long after the EAB issued the *Remand Order*, Dominion-BPS sent Region 1 a letter requesting that the Region "re-open the record and accept public comment" on the cooling tower sound emission issues "[b]ecause the EAB concluded that the record is inadequate on [this issue] . . . and because of the importance of . . . [the issue] to the final permit." AR 4023. On April 3, 2006, Region 1 sent a reply letter to Dominion-BPS indicating that the Region had "not yet decided whether or not to re-open the record for additional public comment." AR 4024. The Region also indicated that the company's request was noted and would be taken into account in the Region's decision-making. The Region has, in fact, considered Dominion-BPS's request but decided that this request should be denied. Dominion-BPS is correct that the EAB found certain inadequacies in the record on the cooling tower noise issues, but just as deficiencies in the record supporting a draft permit can be cured by responses to comments, this Determination on Remand by Region 1 cures the inadequacies in the record identified by the Board. The Region also recognizes that its assessment of cooling tower sound emissions played a role in its BTA determination under CWA § 316(b) and the development of technology-based intake limits. The fact remains, however, that the present reconsideration of these issues does not raise substantial new issues or questions. Certainly, the company's letter requesting additional public comment does not identify any substantial new issues or questions.

In its letter of February 17, 2006, letter, Dominion-BPS also requested that the Region 1 "hold an evidentiary hearing" on the cooling tower sound emissions issues. AR 4023. Region 1's reply letter of April 3, 2006, noted the company's request. AR 4024. In response, Region 1 declines to hold an evidentiary hearing on these issues. As discussed above, EPA regulations do not provide for evidentiary hearings in connection with NPDES permit proceedings and the EAB previously denied BPS's request for an evidentiary hearing in the instant permit proceeding. *See supra* at n. 4 (citing *In re Dominion Energy Brayton Point, L.L.C. (Formerly USGen New England, Inc.), Brayton Point Station*, 11 E.A.D. 525 (EAB 2004)), and § IV.A.5. Furthermore, since Dominion-BPS's letter of February 17, 2006, the First Circuit on March 30, 2006, issued its decision in *Dominion Energy Brayton Point, LLC v. Johnson*, 443 F.3d 12 (1st Cir. 2006). *See supra* at n. 4. In this decision, the court ruled that EPA does not have a non-discretionary duty to

provide an evidentiary hearing in the BPS NPDES permit proceeding and that EPA's regulations not providing for an evidentiary hearing are a reasonable interpretation of the Clean Water Act entitled to judicial deference. *Id.* at 16-19. Dominion-BPS has identified no reason why an evidentiary hearing should be provided in this case contrary to the regulations or the above decisions.

Finally, the EAB states in the *Remand Order*, at 288, that BPS "or any person who participates in the remand process is not satisfied with this revised explanation or permit terms, it may challenge the Region's approach by way of an appeal to the Board." The EAB also indicates that such an appeal, filed under 40 C.F.R. § 124.19, will be required to exhaust administrative remedies under 40 C.F.R. § 124.19(f)(1)(iii). *Remand Order* at 294.

V. Conclusion

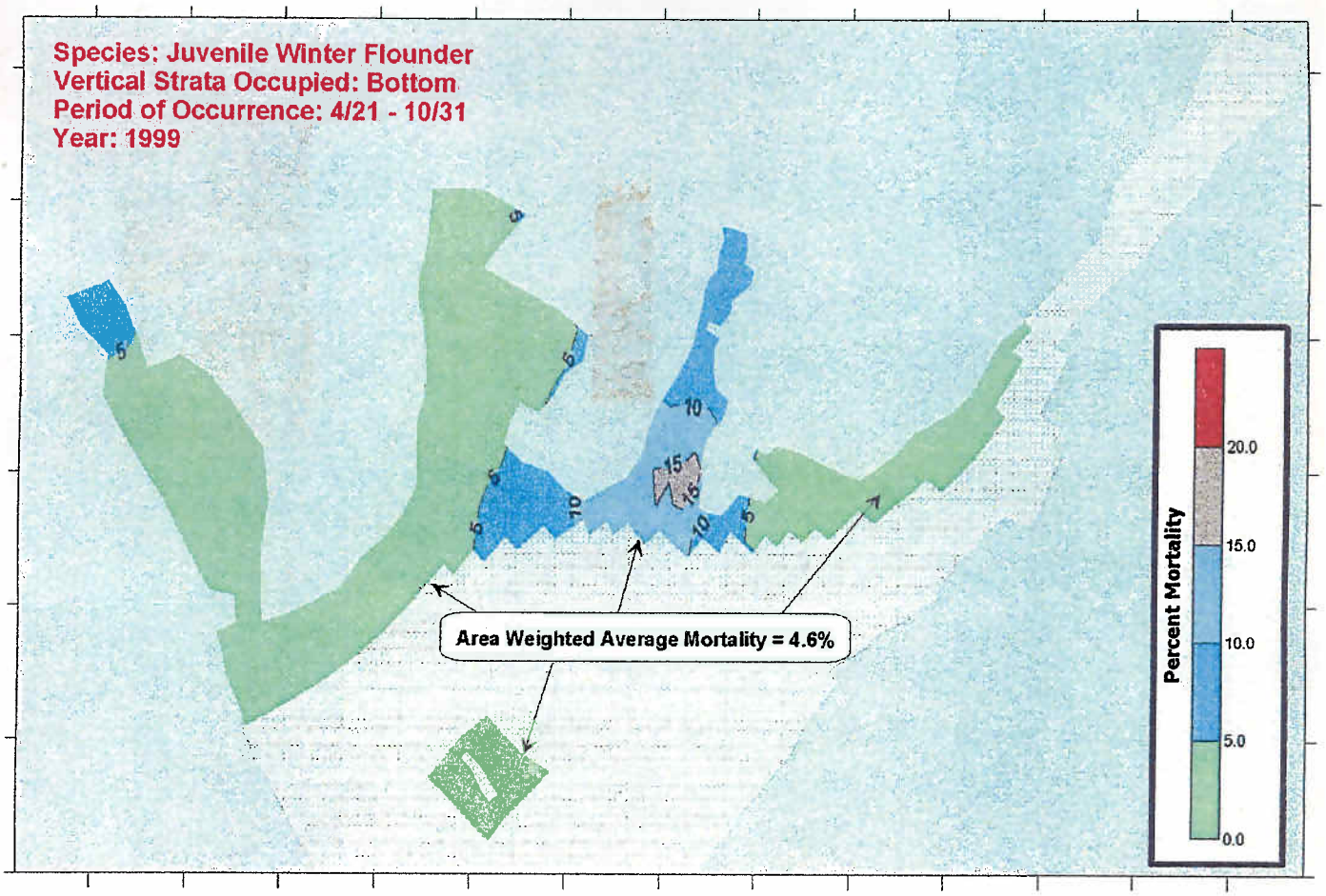
This document presents Region 1's determinations regarding the issues remanded by the EAB to the Region in the *Remand Order*. For the reasons set forth above, Region 1 has determined that its earlier decisions should be reaffirmed and that no changes to the Permit's limits are necessary or appropriate. As a result of BPS's appeal of the Permit to the EAB, the contested conditions of the Permit have been stayed during the pendency of the appeal and the remand proceedings. *See* AR 4000 (Region 1 letter delineating the contested and uncontested conditions of the Permit). The EAB's *Remand Order* indicates that BPS or any other participant in the remand proceeding may appeal the Region's decisions on the remanded issues to the Board pursuant to 40 C.F.R. § 124.19. *Remand Order* at 294. The Board also orders that such an appeal will be required to exhaust administrative remedies under 40 C.F.R. § 124.19(f)(1)(iii). Any appeal under 124.19(a) must be filed with the EAB within 30 days from the date of receipt of this Determination on Remand. Therefore, the current stay of the Permit's contested conditions will be lifted, and these conditions will go into effect, if no appeal of the Region's decisions on the remanded issues is filed with the EAB by that date. If such an appeal is filed, those conditions which are contested by the appeal, or are uncontested but not severable from the contested conditions, shall continue to be stayed, while any other currently stayed conditions will go into effect following appropriate notification.

Date: November 30, 2006

Linda M. Murphy

Linda M. Murphy, Director
Office of Ecosystem Protection
United States Environmental
Protection Agency, Region 1

VI. EXHIBITS



Notes:

1. Since model grid cells vary in size, weighting of results is required. For each species life stage, area-weighted mortality is determined as follows:

   (Sum of mortality percentages for all grid cells in habitat X area occupied by habitat grid cells) / area occupied by habitat grid cells

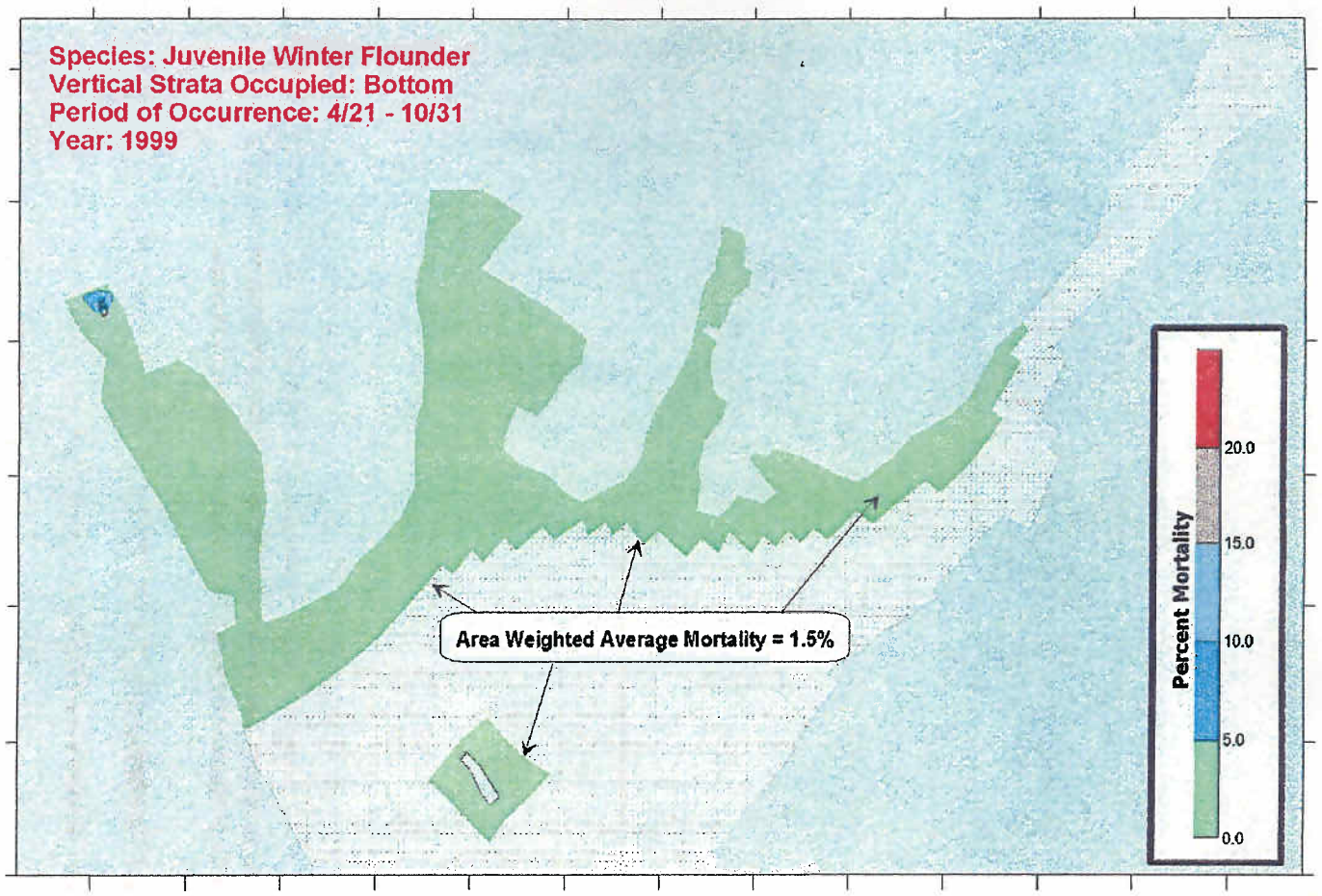
2. Maximum grid-cell mortality found: 16.6%

Figure 2-42. Chronic Mortality Using Predicted Daily Average Temperatures and the Lethal Threshold for a 72-hr Exposure (MOA II Operating Scenario)

Exhibit 1

Exhibit 2

Figure 6.3-4: USGen New England Estimate of Juvenile Winter Flounder Mortality from the Thermal Discharge of the Enhanced Multi-Mode Option (USGenNE, December 2001)



Notes:

1. Since model grid cells vary in size, weighting of results is required. For each species life stage, area-weighted mortality is determined as follows:

   (Sum of mortality percentages for all grid cells in habitat X area occupied by habitat grid cells) / area occupied by habitat grid cells

2. Maximum grid-cell mortality found: 16.6%

Figure 2-49. Chronic Mortality Using Predicted Daily Average Temperatures and the Lethal Threshold for a 72-hr Exposure (Closed—All Units Operating Scenario)

Exhibit 3

Figure 16: "Translation" of Delta T Results to Average Ambient and Total Temperature (Summer 1999, MOA II Scenario)

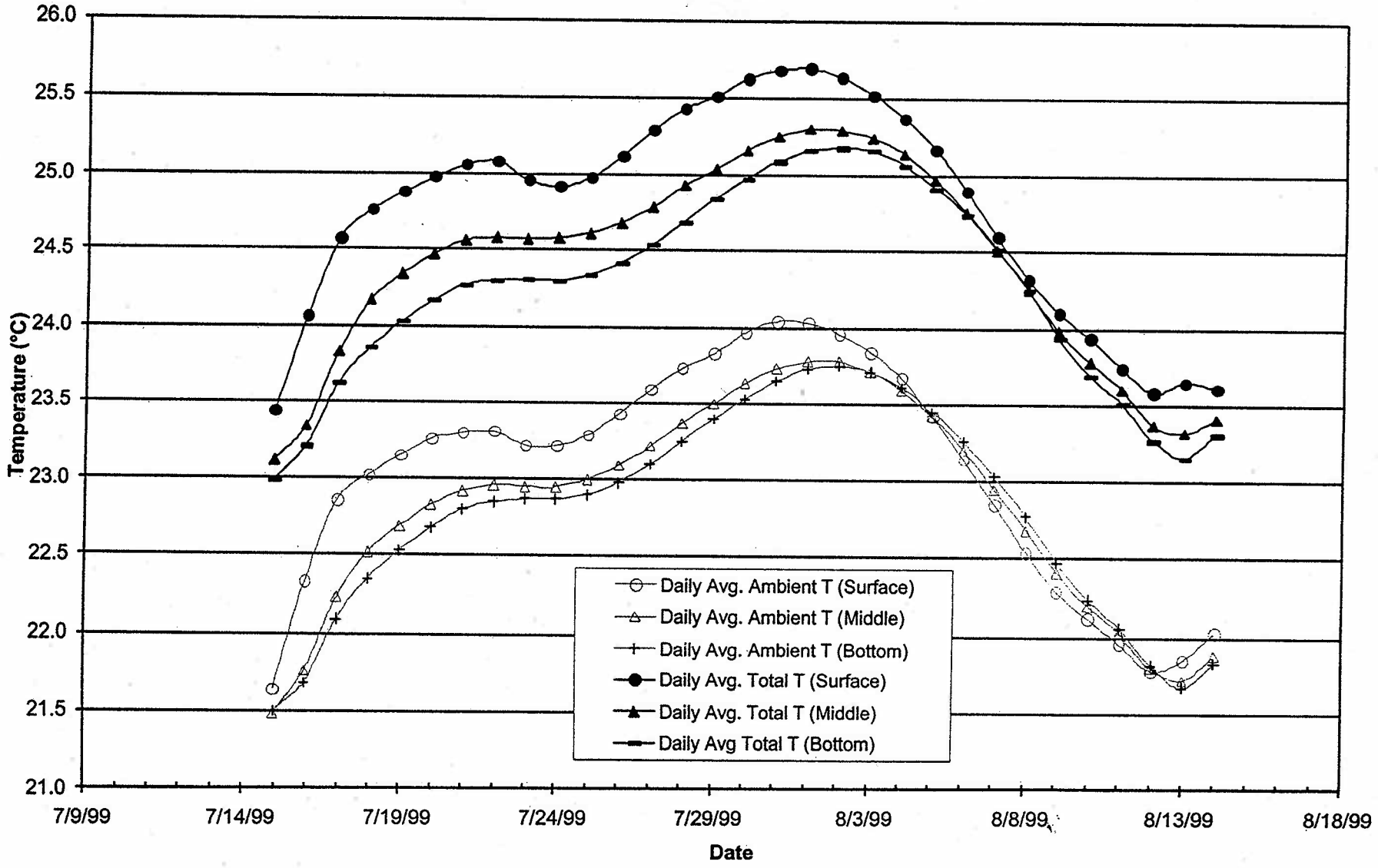


Exhibit 4

Exhibit 5

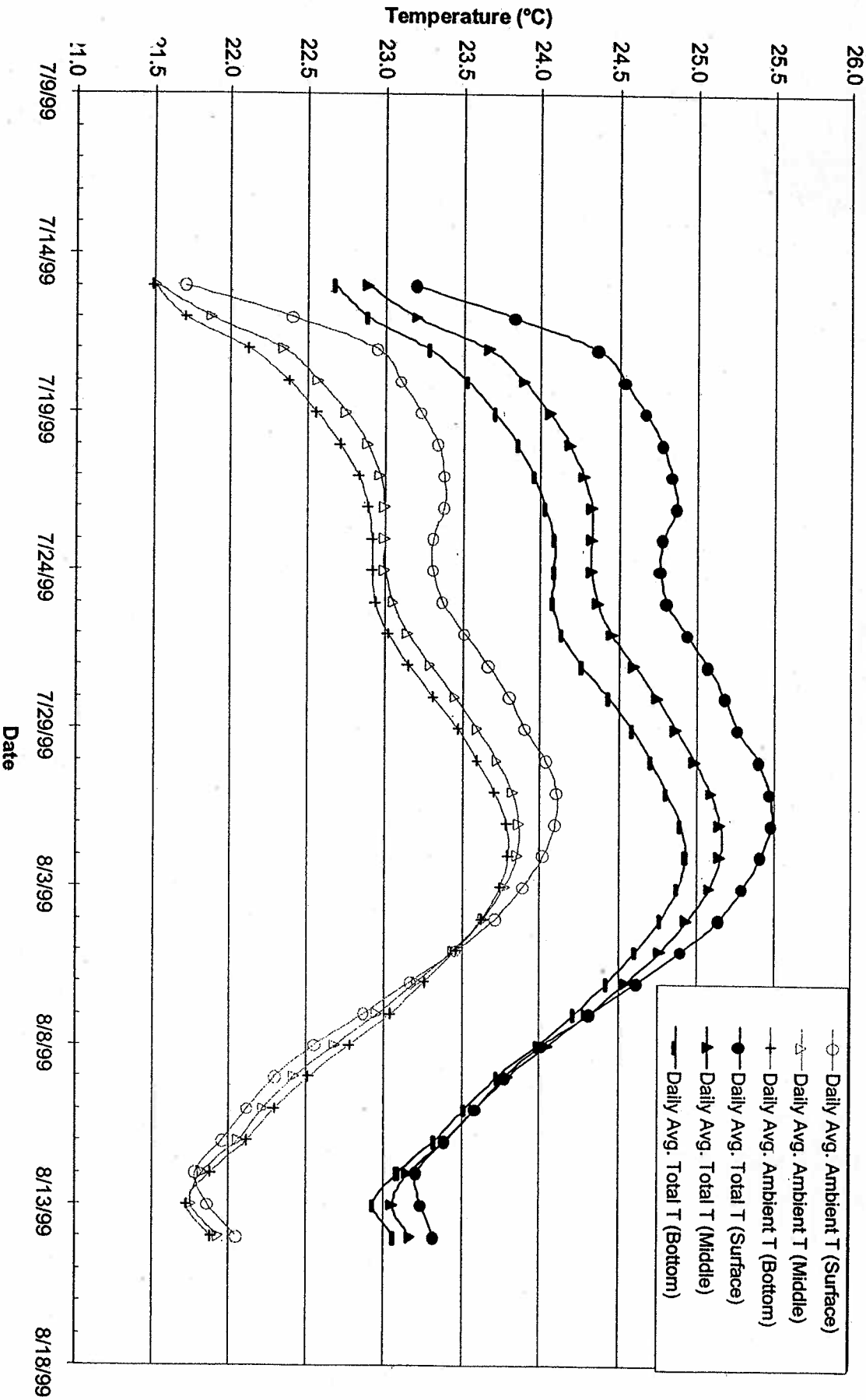


Figure 17: "Translation" of Delta T Results to Average Ambient and Total Temperature (Summer 1999, Enhanced Multi-Mode Scenario)

Figure 18: "Translation" of Delta T Results to Avg.rage Ambient and Total Temperature (Summer 1999, Hypo B Scenario)

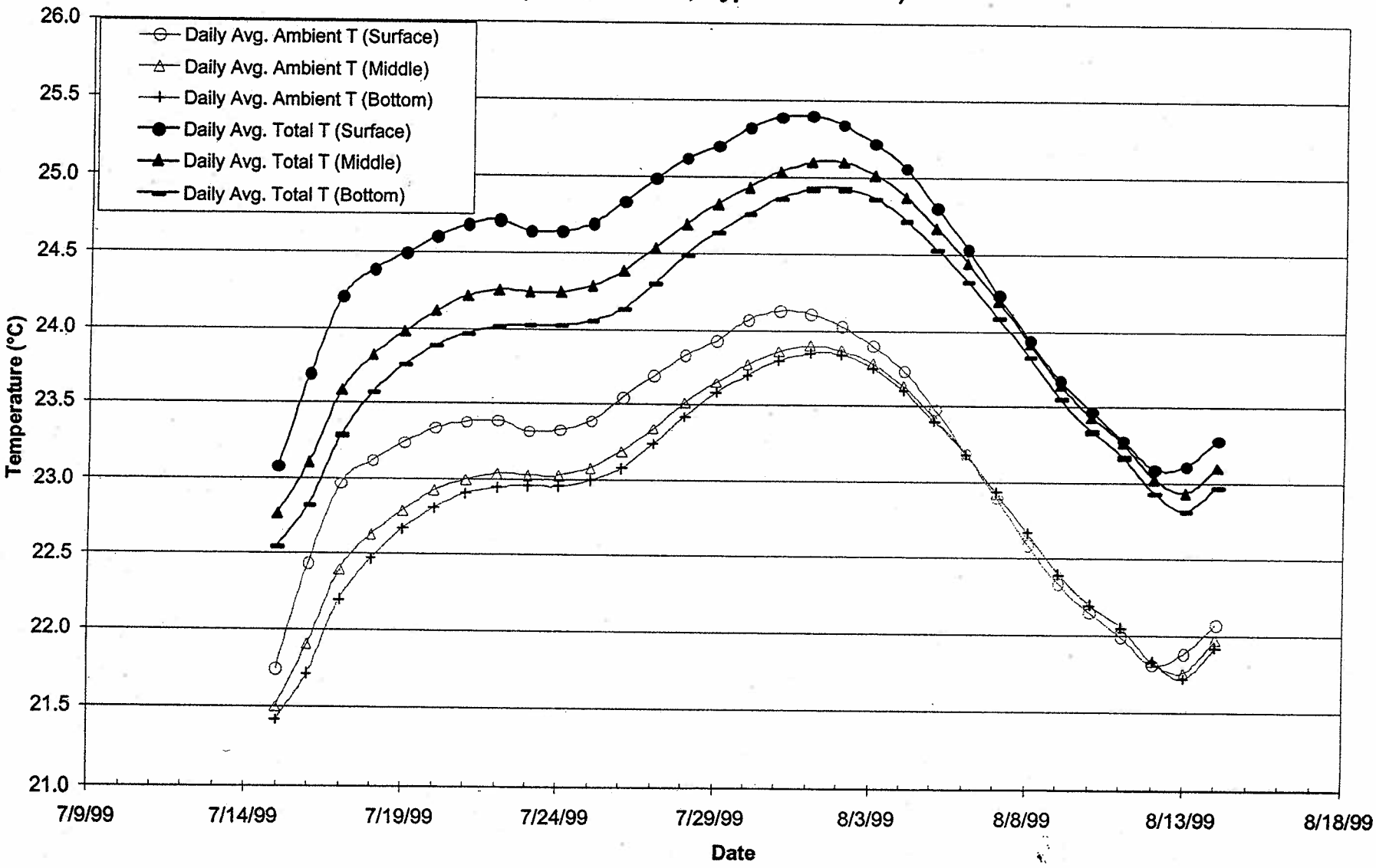


Exhibit 6

Figure 19: "Translation" of Delta T Results to Average Ambient and Total Temperature (Summer 1999, Hypo A Scenario)

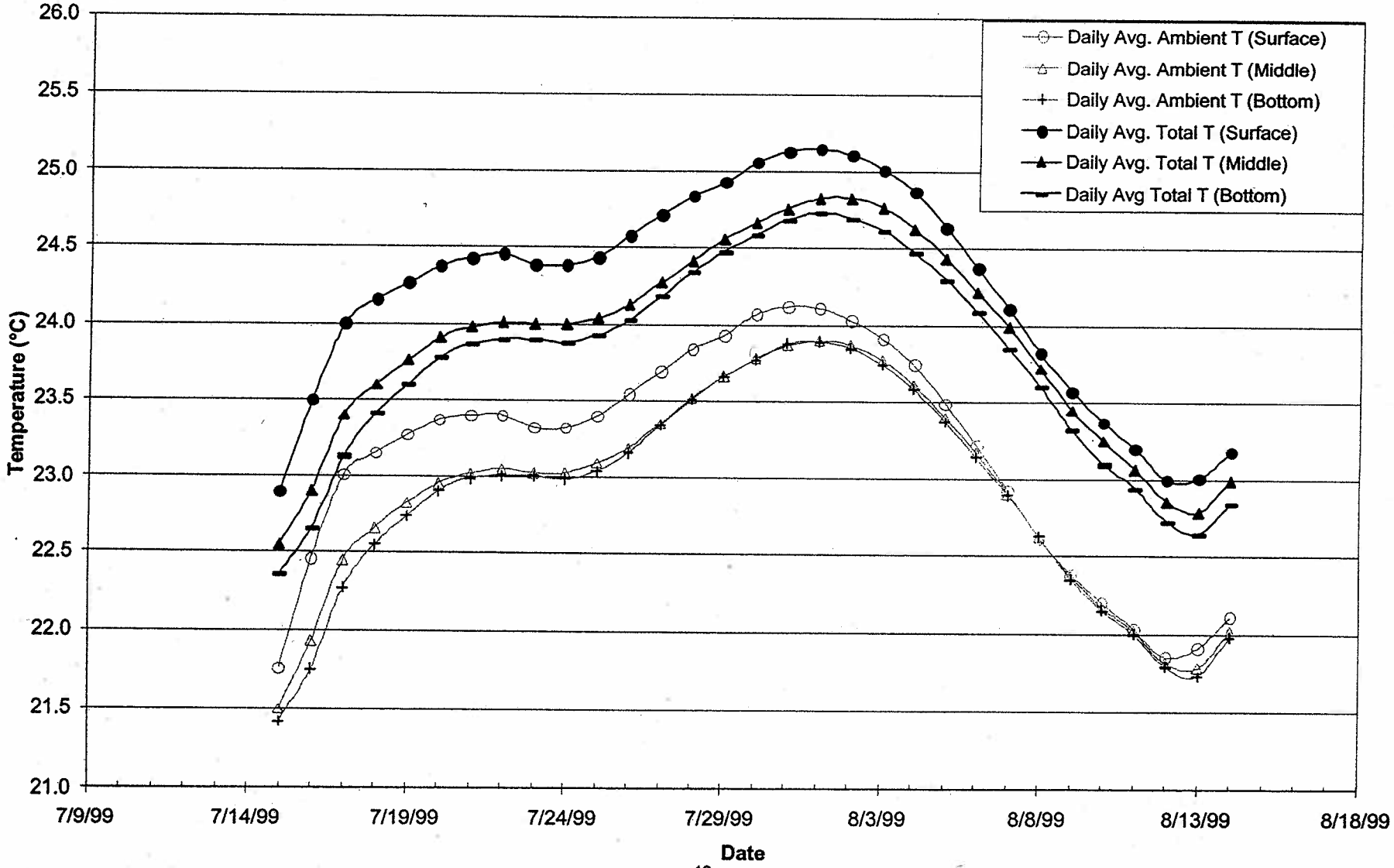


Exhibit 7

Exhibit 8

mature individuals (Klein-McPhee 1978). We have sought to fill important remaining gaps in the knowledge of environmental biology of winter flounder, by measuring the thermoregulatory behavior (preferred and avoided temperatures), diel patterns of locomotor activity and preferred temperature, and the relationship of locomotor activity to temperature in yearling (120–130 mm TL, age 1+) winter flounder, which we here report for the first time.

Materials and methods

Sixteen yearling *P. americanus*, 120–130 mm TL, were captured by otter trawl in Saco Bay, Maine, during September and October, 1979. These were held in the laboratory at 15–17° C for at least 2 weeks prior to testing, in natural sea water of 25–30‰ salinity (corresponding to salinities measured in the bay). The fish were fed various small, live crustaceans and worms ad libitum. Diffuse, indirect natural daylight was provided through windows, with no artificial lighting.

The fish were tested individually, for 3-day periods, in two-chambered versions of Ichthyotron-type electronic shuttleboxes described by Reynolds (1977). These shuttleboxes allow the fish to control water temperatures by means of normal, unconditioned swimming movements, which are monitored by paired light beams and photocells as the fish move along the bottom between chambers. Locomotor activity is quantified as the number of light-beam interruptions per hour, and recorded automatically along with water temperatures. Thus, during the tests the fish are not disturbed by human interference or observation. Pooled data for all the fish were used to construct a relative frequency distribution (Fig. 1) of voluntarily occupied (self-controlled) or preferred temperatures. Mean hourly water temperatures and spontaneous locomotor activity levels were also plotted against time of day to determine the presence of any diel rhythms (Fig. 2), and mean hourly activities were plotted against mean hourly temperatures to determine the interrelationship of activity and temperature (Fig. 3).

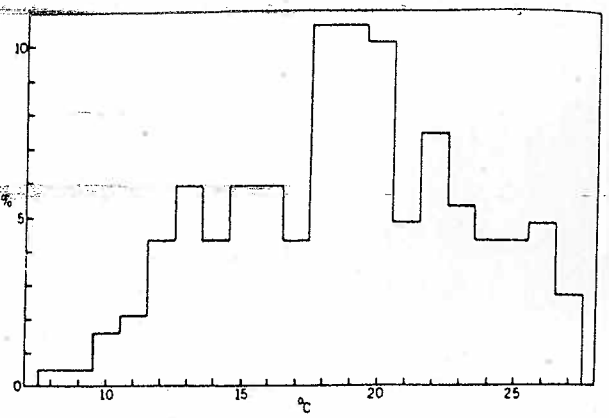


Fig. 1. Relative frequency distribution of temperatures selected by 16 yearling (age 1+, 120–130 mm TL) winter flounder in electronic shuttleboxes. The fish were tested individually for 3 days each.

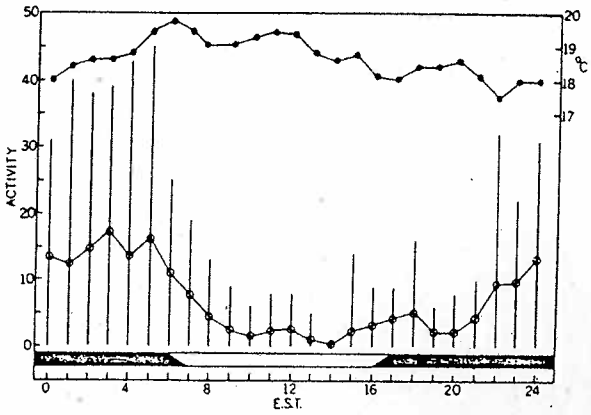


Fig. 2. Diel patterns of locomotor activity (○) and of preferred temperature (●). Hourly means for 16 yearling winter flounder are plotted against time (hours EST, Eastern Standard Time). Vertical lines are ranges of activity quantified as photocell-monitored light-beam interruptions per hour. Horizontal bar shows natural photoperiod (diffuse window light); shaded portion is night or scotophase, unshaded portion is day or photophase, with tapered crepuscular transitions at dawn and dusk.

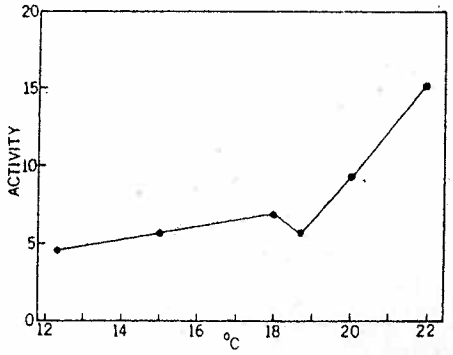


Fig. 3. The relationship of locomotor activity to temperature for 16 yearling winter flounder tested individually for 3 days each in electronic shuttleboxes.