STATE OF VERMONT
ENVIRONMENTAL COURT

In Re: Entergy Nuclear Vermont Yankee Discharge Permit Permit Number: 3-1199	**)**	**DOCKET NO. 89-4-06 Vtec**

CONNECTICUT RIVER WATERSHED COUNCIL et al.'s
POST TRIAL MEMORANDUM OF LAW

Appellants Connecticut River Watershed Council, Trout Unlimited (Deerfield/Millers 349 Chapter), and Citizens Awareness Network (Massachusetts Chapter) (collectively "CRWC" or "Appellants") respectfully submit this post-trial Memorandum of Law, and accompanying Request for Findings.

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Dated: October 9, 2007

INTRODUCTION

In this de novo proceeding, Entergy Nuclear Vermont Yankee, LLC ("Entergy") must prove, by a preponderance of the evidence, and "to the satisfaction of" this Court acting as the Secretary of the Agency of Natural Resources ("ANR"), that Entergy qualifies for a thermal variance under the strict requirements of § 316(a) of the Clean Water Act ("CWA" or the "Act") and applicable state laws and regulations including the Vermont Water Quality Standards. The burden of proof is stringent, the exception created by § 316(a) is narrow, and any doubt about whether the statutory and regulatory criteria have been met must be resolved in favor of maintaining the existing temperature standard. To prevail, Entergy must prove (1) that the existing standard is "more stringent than necessary" to protect a "balanced, indigenous population" of fish and other aquatic life (the "BIP" or "biological community") in the Connecticut River, and (2) that the proposed alternative standard (i.e., an additional 1°F increase in the summer period) will "assure protection and propagation" of the BIP. 33 U.S.C. § 1326(a) (2000) (emphasis added).

Entergy seeks to demonstrate compliance with § 316(a) in two ways. First, using a "retrospective analysis," Entergy attempts to show that there has been no "prior appreciable harm" to the BIP as a result of the existing discharge. Second, using a "predictive analysis," Entergy attempts to show that the proposed discharge will assure protection and propagation of the BIP. Neither demonstration passes muster under § 316(a). Each suffers from a number of fatal methodological flaws, including the failure to consider the cumulative and synergistic effects of the discharge on the entire length of river affected, that render their conclusions scientifically invalid and legally unsupportable. Further, the weight of the evidence does not support Entergy's claim that there has been "no appreciable harm" to the BIP as a result of the

existing discharge, or that the proposed discharge will insure protection and propagation of the BIP into the future, particularly given the inevitable effects of climate change on river temperatures and flow conditions.

To the contrary, and as CRWC's experts have testified, the available evidence strongly suggests that existing discharge is adversely affecting salmon, shad and other coldwater and coolwater species throughout their life cycle in the river, and especially during the critical summer period when juvenile fish are most vulnerable. A further increase of 1°F during the critical summer period will only exacerbate the decline of these species and frustrate the effort to restore them to their historic range, and will also continue the process of transforming the indigenous biological community of the Connecticut River from a coldwater to a warmwater habitat, in direct contravention of the Vermont Water Quality Standards.

A procedural history of Vermont Yankee's operational and permitting history relevant to this determination is found in Part II of Appellants' accompanying Request for Findings.

ARGUMENT

I. STANDARD OF REVIEW

As this Court has ruled several times, the standard of review is straightforward de novo:

> Unlike federal judicial review of agency action, no presumption is afforded the fact that the permit amendment was issued. The Court is not charged with determining whether the ANR's decision is supported by substantial evidence in the record as a whole; rather, it is charged with considering the application de novo, applying the same substantive standards that the ANR is required to apply.

Am. Decision and Order on Motion for Stay of Permit Amendment Pending Appeal, at 3 (Sept. 1, 2006).[1] The language of the governing statute is clear and the intent is unmistakable: "The

[1] See also Decision and Order on Pending Motions, at 15-16 (Jan. 9, 2007); Decision and Order on Pending Motions Other than Motion for Renewed Stay, at 5 n.4 (June 6, 2007); Decision and Order on Renewed Motion for

environmental court, applying the substantive standards that were applicable before the tribunal appealed from, shall hold a de novo hearing on those issues which have been appealed . . . . " 10 V.S.A. § 8504(h) (2007); see also V.R.E.C.P. 5(g). Since this appeal involves an application for an amendment of an NPDES permit and a variance under § 316(a) of the CWA, the de novo standard of review means that the Court must not only adjudicate the facts and apply the appropriate legal standards, but also requires consideration of the statutory purposes and policies that arise under the applicable state and federal laws.

In particular, § 316(a) places the burden of proof on the permit applicant to demonstrate "to the satisfaction of" the permit authority that the requirements for a variance have been met. 33 U.S.C. § 1326(a). Thus, the usual constraints on the scope of judicial review of agency action do not apply here, and the Court can and should exercise the discretion afforded by the CWA to determine whether, taking all of the facts, laws, and the policies into account, Entergy has made a convincing case for the variance it seeks based solely on biological considerations.

II. STATUTORY AND REGULATORY FRAMEWORK

A. The Clean Water Act

The objective of the CWA is "to restore and maintain the chemical, physical and biological integrity of the nations' waters." 33 U.S.C. § 1251(a). The U.S. Supreme Court has repeatedly emphasized the importance of this statutory purpose in the interpretation and application of all of the provisions of the Act. See, e.g., EPA v. California, 426 U.S. 200, 204-05 (1976) ("[T]he [1972] Amendments are aimed at achieving maximum 'effluent limitations' on 'point sources,' as well as achieving acceptable water quality standards."); Arkansas v. Oklahoma, 503 U.S. 91, 105 (1992) (noting that "an NPDES permit shall not be issued [w]hen

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Stay, at 3-4 (June 6, 2007); and Decision and Order on Motions for Interlocutory Appeal as to Standard of Review and as to Issuance of Stay Pending Appeal, at 2-3 (June 19, 2007).

the imposition of conditions cannot ensure compliance with the applicable water quality requirements of all affected States"); PUD No. 1 of Jefferson County v. Washington Dept. of Ecology, 511 U.S. 700, 714-15 (1994) (noting that states are authorized to condition federal licenses on compliance with water quality standards to protect designated uses such as salmon habitat); United States v. Riverside Bayview Homes, Inc. 474 U.S. 121, 132 (1985) (noting that the purpose of the CWA is "to restore and maintain the chemical, physical, and biological integrity of the Nation's waters"); Rapanos v United States, -- U.S. --, 126 S.Ct. 2208, 2223 (2006) (Congress recognizes the importance of preserving, and protecting "the primary responsibilities and rights of the States to prevent, reduce, and eliminate pollution, and to plan the development and use (including restoration, preservation, and enhancement) of land and water resources . . . . "); S.D. Warren Co. v. Maine Bd. of Envtl. Prot., -- U.S. --, 126 S.Ct. 1853, 1853 (2006) (noting that "[§ 401] certifications are essential to the scheme to preserve state authority to address the broad range of pollution"). This case squarely presents the question whether the thermal variance sought by Entergy is consistent with the objective of "restoring and maintaining the chemical, physical and biological integrity"[2] of the Connecticut River.

The goal of the CWA is to eliminate discharges of pollutants wherever feasible. 33 U.S.C. § 1251(a)(1); cf. Hooker Chems. & Plastics Corp. v. Train, 537 F.2d 620, 623 (2d Cir. 1976) (noting the "sweeping and praiseworthy" congressional goal of eliminating discharges by 1985). The CWA makes it unlawful for any person to discharge any pollutant into the waters of the United States from any point source, except in compliance with an NPDES permit issued under section 402. 33 U.S.C. § 1342(a). NPDES permits must contain discharge limitations and

[2] The U.S. Supreme Court recognized that this objective incorporates "a broad, systemic view of the goal of maintaining and improving water quality," and that the word "integrity," as intended by Congress in the Act's statement of purpose, "refers to a condition in which the natural structure and function of ecosystems [are] maintained." Riverside Bayview Homes, Inc., 474 U.S. at 132 (quoting H.R. REP. NO. 92-911, at 76 (1972)).

establish related monitoring and reporting requirements. 33 U.S.C. § 1311(a)-(b). Discharge limitations are typically derived from standards issued under either § 301 or § 306. 33 U.S.C. §§ 1311, 1306. Standards established under § 301 generally apply to existing sources, such as Vermont Yankee, whereas § 306 standards apply to new sources. See Riverkeeper, Inc. v. EPA, 358 F.3d 174, 185 (2d Cir. 2004).

Pursuant to § 301, EPA establishes effluent limitations for categories or classes of point sources based on either "the best available technology economically achievable" or "the best conventional pollutant control technology," depending on the type of pollutant in question. 33 U.S.C. § 1311(b)(2)(A), (E); Riverkeeper, 358 F.3d at 185. All existing point sources were required to meet these effluent limitations by 1989. 33 U.S.C. § 1311(b); Riverkeeper, 358 F.3d at 185.

The term "pollutant" under the CWA includes "heat"; thus, discharges of heated wastewater (i.e., thermal discharges) are regulated under the CWA. Seacoast Anti-Pollution League v. Costle, 572 F.2d 872, 874 (1st Cir. 1978), superseded on other grounds, Dominion Energy Brayton Point, LLC v. Johnson, 443 F.3d 12, 18 (1st Cir. 2006). "Heat" is considered a nonconventional and nontoxic pollutant. See 40 C.F.R. § 401.15-16; Am. Petroleum Inst. v. EPA, 787 F.2d 965, 970 n.5 (5th Cir. 1986) (explaining that pollutants not classified as conventional or toxic are generally referred to as "nonconventional/nontoxic" pollutants). Consequently, CWA § 301(b)(1)(C) and 301(b)(2)(A) – which generally apply to such nonconventional, nontoxic pollutants – govern the establishment of appropriate "baseline" effluent standards for heat. 33 U.S.C. § 1311(b)(1)(C), (b)(2)(A).

The latter of these provisions, CWA § 301(b)(2)(A), contains the basic technology-based standard and requires application of "the best available technology economically achievable,"

otherwise known as "BAT." 33 U.S.C. § 1311(b)(2)(A); see also 40 C.F.R. § 125.3(a) ("Technology-based treatment requirements under section 301(b) of the Act represent the minimum level of control that must be imposed in a permit issued under section 402 of the Act."). The other provision, CWA § 301(b)(1)(C), requires application of "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 § 510. 33 U.S.C. § 1311(b)(1)(C).

Courts have interpreted this provision to require application of state water quality standards ("WQS") or other state legal or regulatory requirements if these are more stringent than the technology-based limitations required by section 301(b)(2)(A). U.S. Steel Corp. v. Train, 556 F.2d 822, 838 (7th Cir. 1977); see also 40 C.F.R. §§ 122.4(d), 122.44(d)(1), (3), (5) (requiring NPDES permits to include conditions necessary to achieve state WQS more stringent than promulgated effluent limitations guidelines or standards).

States are authorized to administer the NPDES permit programs under delegation agreements with EPA. 33 U.S.C. 1342(b); 40 C.F.R. Part 123. Vermont received authorization to administer the NPDES program in 1974.[3] ANR is the authorized permit authority in Vermont. State programs must be administered in accord with all requirements of the CWA and EPA regulations. See 33 U.S.C. § 1342(c)(2) ("Any state permit program under this section shall at all times be in accordance with this section and guidelines promulgated" under the Act); see also Save the Valley, Inc. v. EPA, 223 F. Supp. 2d 997, 1006 (S.D. Ind. 2002) (noting that EPA has a mandatory duty to insure that state permit program meets federal standards).

[3] See EPA, Specific State Program Status, at http://cfpub.epa.gov/npdes/statestats.cfm?program_id=45&view=specific (last visited Oct. 5, 2007).

B. Section 316(a) and Its Legislative History

The CWA also contains a provision that specifically focuses on point sources with thermal discharges and their related cooling water intake structures ("CWIS"). 33 U.S.C. § 1326. Section 316(a) applies to the thermal discharges and allows EPA or a state, for a specific point source discharger, to impose less stringent effluent limitations on the thermal discharges than might otherwise be required under § 301 (or § 306 for new sources) when the owner or operator:

> can demonstrate to the satisfaction of the Administrator . . . that any effluent 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 [protection] 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 . . . .

33 U.S.C. § 1326(a); see also Appalachian Power Co. v. Train, 545 F.2d 1351, 1371-72 (4th Cir. 1976). In such cases, an authorized state such as Vermont may grant a variance for the thermal component of the discharge that "assur[es] the protection and propagation of [the BIP]." 33 U.S.C. § 1326(a). These § 316(a) "variances" are also referred to as "alternative effluent limitations." See 40 C.F.R. § 125.71(a) ("'Alternative effluent limitations' means all effluent limitations or standards of performance for the control of the thermal component of any discharge which are established under section 316(a) and this subpart.").

The legislative history of the CWA makes it clear that Congress intended § 316(a) to be a narrow exception to the central requirement of the Act that the nation's waters, including the Connecticut River, were no longer to be used as waste treatment systems, and discharges of pollutants, including heat, would be eliminated through the application of available technology such as cooling towers. As stated in the 1972 Conference Report:

> It is not the intent of this provision to permit modification of effluent limits required pursuant to Section 301 or Section 306 where existing or past pollution has eliminated or altered what would otherwise be an indigenous fish, shellfish and wildlife population. The owner or operator must show, to the satisfaction of the Administrator, that a "balanced indigenous population of fish, shellfish and wildlife" could exist even with a modified 301 or 306 effluent limit. Additionally, such owner or operator would have to show that elements of the aquatic ecosystems which are essential to support a "balanced indigenous population of fish, shellfish and wildlife" would be protected.

Congressional Research Service, A Legislative History of the Water Pollution Control Act Amendments of 1972, Vol. 1, 93d Cong., 1st Sess., at 175, Senate Consideration of the Report of the Conference Committee (Oct. 4, 1972) ("1972 Legislative History") (emphasis added).

Further, in the legislative history of the CWA Amendments of 1977, Senator Muskie[4] reinforced the narrow scope of § 316(a) waivers:

> Congress intended that there be a very limited waiver for those major sources of thermal effluents which could establish beyond any question the lack of relationship between federally established effluent limitations and that water quality which assures the protection of public water supplies and the protection and propagation of a balanced, indigenous population of fish, shellfish, and wildlife, and allows recreational activities, in and on the water.

S. REP No. 95-370, at 642 (1977) (Conf. Rep.) (emphasis added). This point was driven home even more forcefully in the Senate Report, which was highly critical of the overbroad interpretation EPA had given to the waiver provision:

> The committee does not want a repetition of the kind of interpretation that was placed on the 1972 Act and the kind of result that has occurred from implementation of the 1972 Act with respect to thermal discharges. There is nothing in these new provisions which in any way preempts the rights of States to have more stringent water quality standards or associated effluent limitations; there was nothing in the 1972 Act that caused that result, any interpretation by the Administrator to the contrary notwithstanding. More important, the limited waiver for thermal effluent limitations was not intended to be a major loophole. And yet

[4] Senator Muskie's comments from the legislative history have been given great weight by the courts in interpreting the CWA because he was the "principal Senate sponsor of the Act ." EPA v. National Crushed Stone Ass'n, 449 U.S. 64, 71 n.10 (1980); accord, e.g., Natural Res. Def. Council v. Costle, 568 F.2d 1369, 1374 (D.C. Cir. 1977); Am. Iron and Steel Ass'n v. EPA, 526 F. 2d 1027, 1041 (3d Cir. 1975); Am. Meat Inst. v. EPA, 526 F.2d 442, 451 (7th Cir. 1975).

> the result of administrative interpretation has caused a virtual elimination of control requirements applicable to powerplant and other major industry thermal discharges. What was intended to be a very narrow opportunity to prove that federally promulgated effluent limitations for heat discharges might be more stringent than necessary to provide for the protection of a balanced indigenous population of fish, shellfish and wildlife has become a process for wholesale exemption from the act. This is an unacceptable result, the effect of which has been to eliminate the requirements of best practicable treatment for heat discharges.

SEN. REP. NO. 95-370, at 43 (1977), as reprinted in 1977 U.S.C.C.A.N. 4326, 4368.

In applying CWA § 316(a), cost or economic issues are not relevant. The plain language of § 316(a) makes clear that variance decisions are to be based on a determination of the limits needed to ensure the protection and propagation of the BIP. The statute makes no mention of cost or other economic considerations. The legislative history lends further support to this narrow reading of § 316(a). 1972 Legislative History, at 175. Similarly, EPA's regulations clearly do not provide for costs to be a consideration in making a § 316(a) variance determination. See 40 C.F.R. § 125.73

EPA has also interpreted § 316(a) in this manner in practice. See In the Matter of: Public Service Company of Indiana, Inc., Wabash River Generating Station, 1979 EPA App. LEXIS 4, at **41-43, 1 E.A.D. 590 (Nov. 29, 1979) ("Wabash") (finding that "cost considerations should not be read into § 316(a)"). Thus, while costs are to be considered to a certain degree in developing technology-based standards for thermal discharges, which are to be based on the "BAT" standard under §§ 301(b)(2) and 304(b)(2), costs are not considered in determining whether or not to grant a variance from such limits under § 316(a).

C. EPA Regulations

EPA first promulgated regulations implementing § 316(a) in 1974. 39 Fed. Reg. 36, 176, 36,178 (Oct. 8, 1974) (Thermal Discharges). The regulations, which are now codified at 40

C.F.R. Part 125, subpart H, include provisions describing the criteria and standards that are used by authorized states to determine whether alternative effluent limitations may be imposed pursuant to § 316(a). 40 C.F.R. § 125.72-73. Not only do these regulations explicitly require – as does the statute – that the permit applicant demonstrate that the otherwise applicable thermal discharge effluent limitations or standards are "more stringent than necessary" to assure the protection and propagation of the BIP, but they also specifically require the applicant to:

> 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.

Id. § 125.73(a).

Thus, reading CWA §§ 301 and 316(a) together, the statute and regulations in effect establish a three (and sometimes four) step framework for obtaining a variance: (1) EPA or the state must determine what the applicable technology and water-quality based limitations should be for a given permit;[5] (2) the applicant must demonstrate that these otherwise applicable effluent limitations are more stringent than necessary to assure the protection and propagation of the BIP; (3) the applicant must demonstrate that its proposed variance will assure the protection and propagation of the BIP; and (4) in those cases where the applicant meets step 2 but not step 3, EPA or the state may impose a variance it concludes does assure the protection and propagation of the BIP.

The regulations and guidance provide for several different types of § 316(a) demonstrations. For existing discharges like Vermont Yankee, EPA regulations and guidelines

[5] For Vermont Yankee, the technology based effluent limitation (i.e., BAT) would be the cooling towers that were required to be installed in the early 1970s under the plant's initial operating license. The water-quality based limitations would, in the absence of a variance, be based on the temperature limits for the Connecticut River (i.e., coldwater habitat) found at VWQS § 3-01(B).

prescribe two types of demonstrations. See 40 C.F.R. § 125.73(c)(1) ("Existing dischargers may base their demonstration upon the absence of prior appreciable harm in lieu of predictive studies."); see generally ANR Ex. 13, Interagency 316(a) Technical Guidance Manual and Guide for Thermal Effects Sections of Nuclear Facilities Environmental Impact Statements Manual by the Environmental Protection Agency, Office of Water Enforcement, Permits Division, Industrial Permits Branch (draft May 1, 1977) (the "1977 Guidance"); Wabash, 1979 EPA App. LEXIS 4, at **14-15 (describing retrospective and prospective analyses). An existing discharger may attempt to base its demonstration on a showing that there has been no "appreciable harm" to the BIP from "the normal component of the discharge taking into account the interaction of such thermal component [of the discharge] with other pollutants and the additive effect of other thermal sources." 40 C.F.R. § 125.73(c)(1)(i).

The regulations further require that "[i]n determining whether or not prior appreciable harm has occurred, the Director shall consider the length of time in which the applicant has been discharging and the nature of the discharge." Id. § 125.73(c)(2). As discussed below, this is a critical requirement that was not followed by either Entergy or ANR.

Alternatively, an existing discharger can attempt to show "[t]hat despite the occurrence of such previous harm, the desired alternative effluent limitations (or appropriate modifications thereof) will nevertheless assure the protection and propagation of . . . [the BIP]." 40 C.F.R. § 125.73(c)(1)(ii).[6] With respect to the appreciable harm test, EPA has explained that proposed thermal discharge limitations fail the § 316(a) variance test if those limitations would, taking into account other stresses upon the BIP, cause appreciable harm to the BIP in the future. Wabash, 1979 EPA App. LEXIS 4, at **16-17.

[6] Despite the clear sequential approach prescribed by the regulations, Entergy opted to do both types of demonstrations using the same basic methodology. As discussed below, this led to critical flaws in the 2004 demonstration that render it legally deficient.

In addition, where there is evidence of prior appreciable harm to the BIP, the regulations require that the applicant either modify the discharge to prevent future harm or demonstrate that circumstances have changed such that appreciable harm will not occur in the future. Id. at **17-19. As explained below, Entergy did neither.

D. Vermont Water Quality Standards

One of Congress' principal goals in enacting the CWA was to "recognize, preserve, and protect the primary responsibilities and rights of States to prevent, reduce, and eliminate pollution, [and] to plan the development and use (including restoration, preservation, and enhancement) of land and water resources." 33 U.S.C. § 1251(b); see also District of Columbia v. Schramm, 631 F.2d 854, 860 (D.C. Cir. 1980) ("The course of the [CWA] through Congress demonstrates the emphasis Congress placed on giving responsibility to the states and letting the Agency exercise discretion in supervising the NPDES program."). The primacy of the state role is particularly evident with respect to the setting of water quality standards ("WQS") and water quality based effluent limitations ("WQBEL").

In § 510, Congress expressly authorized states to set "any standard or limitation respecting discharges of pollutants" that are more stringent than federal standards. 33 U.S.C. § 1370. See EPA v. California, 426 U.S. 200, 220 (1976) (noting "that . . . federal dischargers . . . are nevertheless . . . required to make a State's 'more stringent limitation(s),' . . . part of the conditions of the permits it must issue."); U.S. Steel Corp. v. Train, 556 F.2d at 835 ("Section 510 preserves the right of any state to impose limitations more stringent than the federal limitations under the Act."); Int'l Paper Co. v. Ouellette, 479 U.S. 481, 481 (1987) ("The [Clean Water] Act also allows the State in which the point source is located (the 'source State') to impose more stringent discharge limitations than the federal ones . . . . ").

Once approved by EPA, state water quality standards become "part of the federal law of pollution control." Arkansas, 503 U.S. at 110. Further, EPA's NPDES regulations specify, without exception, that discharge permits must meet state water quality standards and other requirements: "No permit may be issued: . . . [w]hen the imposition of conditions cannot ensure compliance with the applicable water quality requirements of all affected States." 40 C.F.R § 122.4(d). Specific limitations include the requirement to meet more stringent state standards necessary to "[a]chieve water quality standards established under section 303 of the CWA, including State narrative criteria for water quality." 40 C.F.R § 122.44(d)(1) (emphasis added); see also Northwest Envtl. Advocates v. City of Portland, 56 F.3d 979, 987 (9th Cir. 1995) (noting that "the Supreme Court [has] held that the Clean Water Act allows States to enforce the broad narrative criteria contained in water quality standards"). Further, these "[l]imitations must control all pollutants or pollutant parameters (either conventional, non-conventional, or toxic pollutants) . . . which will cause, have the reasonable potential to cause, or contribute to an excursion above any State water quality standard, including State narrative criteria for water quality." 40 C.F.R. § 122.44(d)(1)(i).

The CWA specifies that "the term water quality standards includes thermal water quality standards." 33 U.S.C. § 1313(h). EPA has consistently interpreted the CWA to require consideration of WQS in the context of § 316(a) determinations. In the preamble to the original thermal discharge rules published in 1974, EPA explicitly stated:

> [W]ater quality standards compliance alone does not constitute a sufficient showing of entitlement to alternative effluent limitations under section 316(a). However, the regulations provide that such compliance is one element to be considered in the 316(a) proceeding, since such standards do represent a serious Federal/State effort to describe appropriate water quality limits.

39 Fed. Reg. at 36,177 (emphasis added).

Significantly, EPA made this statement in response to comments on the proposed regulations urging it to adopt a presumption that compliance with state water quality standards would satisfy § 316(a) standards. In rejecting this comment, EPA explained that water quality standards apply to entire water bodies and, "may fail to take account of the site specific requirements particularly relevant under § 316(a)." Id. at 36,177. Thus, EPA concluded that compliance with water quality standards was a relevant but not necessarily sufficient factor under § 316(a). See also Appalachian Power, 545 F.2d at 1372 (noting the need to protect specific "spawning grounds" in the context of a § 316(a) variance).

Courts elsewhere have looked to applicable WQS when reviewing state-granted variances under § 316(a). In Koch v. Dyson, 448 N.Y.S.2d 698, 711, 714, 85 A.D.2d 346 (2d Dep't 1982), New York's Second Department Appellate Division, reviewing a § 316(a) variance granted to the state Power Authority, looked to the state's water quality laws and regulations and upheld the variance based on the fact that it would not violate any applicable water quality standards.

Moreover, the U.S. Supreme Court has recognized the crucial role that state WQS play under § 401 the CWA. 33 U.S.C. § 1341(a)(4). See PUD No. 1., 511 U.S. at 711 (upholding Washington's authority to enforce narrative water quality standards to protect salmon habitat); S.D. Warren Co., 126 S.Ct. at 1846 n.1 (upholding Maine's authority to certify compliance with its water quality standards in context of a FERC re-licensing). Section 401 authorizes states to veto or condition federal permits and licenses for activities that may result in a discharge unless such activities comply with state water quality standards. 33 U.S.C. § 1341(a)(4). States have exercised this authority to impose strict temperature requirements on federal licenses for hydroelectric dams. See, e.g., City of Klamath Falls v. Envtl. Quality Comm'n, 851 P.2d 602, 605, 119 Or. App. 375 (1993).

This Court has also recognized the significance of this authority:

> Even in a jurisdiction (unlike Vermont) in which EPA is the NPDES permitting authority an applicant must obtain the state's certification that the discharge will comply with the federal act. In that certification, the state 'may impose additional conditions in order to ensure compliance with state law, and those conditions become conditions of the federal permit.'
> . . . .
> In a jurisdiction such as Vermont in which the state is the NPDES permitting authority, the plain language of § 1370 allows the state at least the same level of authority to require compliance with its own statutory and regulatory requirements before issuing a permit, as long as those requirements are not less stringent than those required by the federal act and as long as the permit meets the requirements of the federal act [citing Riverkeeper, 358 F.3d at 201].

Decision and Order on Pending Motions at 13-14 (Jan. 9, 2007).

The Court further noted that:

> The Vermont Water Quality Standards were adopted pursuant to the federal Clean Water Act as well as pursuant to the Vermont Water Pollution Control Act. See In re Clyde River Hydroelectric Project, 2006 VT 11, ¶3. Thus, to the extent they are not less stringent than the requirements in the federal Clean Water Act, and do not otherwise conflict with the federal statute as applied to this proposed amendment, the Vermont Water Quality Standards do apply to the Court's consideration of the proposed amendment.

Id. at 14.

One of the key goals of the Vermont Water Pollution Control Act ("WPCA") is to "assure the maintenance of water quality necessary to sustain existing aquatic communities." 10 V.S.A. § 1250(a). The WPCA further provides that: "It is the policy of the state to seek over the long term to upgrade the quality of waters and to reduce existing risks to water quality." Id. (emphasis added). The Vermont Water Quality Standards ("VWQS") must be interpreted in light of these overarching legislative polices. Following are the key provisions of the VWQS providing the "substantive standards" that this Court must apply.

1. Management of Class B Waters

As a Class B water under § 3-04, the Connecticut River must be managed "to achieve and

maintain a level of quality that fully supports" enumerated uses including "aquatic biota, wildlife and aquatic habitat." Id. (emphasis added). VWQS § 1-01(B)(19) defines "full support of uses" as "the achievement of the level of water quality necessary to consistently maintain and protect existing and designated uses." Section 3-04(A)(1) further provides that full support of the "aquatic biota" in Class B waters requires that "high quality aquatic habitat" be "sustained."

2. Coldwater Habitat Designation

The Connecticut River is designated as a coldwater habitat. Class B "cold water fish habitat." See VWQS, at app. A, Fish Habitat Designation, subsec. B ("All waters not classified specifically as warm water fish habitat by subsection A are hereby designated as cold water fish habitat for purposes of these rules."). Although § 3-05 provides that coldwater designations may be "seasonal," no such limitation has been adopted for the Connecticut River. The temperature standard for coldwater habitat is stated as follows: "The total increase from the ambient temperature due to all discharges and activities shall not exceed 1°F except as provided in paragraph (d) below." VWQS § 3-01(B)(1)(b) (emphasis added). Paragraph (d), entitled Assimilation of Thermal Wastes, provides that the Secretary may, by permit condition, specify permit limits that exceed this limit when it is shown that:

> (1) "The discharge will comply with all other applicable provisions of these rules";
>
> (2) "A mixing zone of 200 feet in length is not adequate to provide for assimilation of the thermal waste"; and
>
> (3) "After taking into account the interaction of thermal effects and other wastes, that change or rate of change in temperature will not result in thermal shock or prevent the full support of uses of the receiving waters."

VWQS § 3-01(B)(1)(d).

3. Mixing Zones

EPA regulations allow consideration of mixing zones in § 316(a) determinations subject to the following limitation:

> The use of mixing zones is adequately supported in the legislative history of the Act, and such zones may be allowed where they are so limited as not to interfere with the assurance of the protection and propagation of a balanced, indigenous aquatic community in the receiving water body segment as a whole.

39 Fed Reg. at 36,178; see also In re Sierra Pacific Power Co., EPA GCO 31, at 372 (Oct. 14, 1975) (EPA Decision of the General Counsel) ("Moreover, the Congress specifically recognized the availability of the mixing zone concept as a mechanism for dealing with thermal discharges pursuant to section 316(a) of the Act.").

This limitation on mixing zones was underscored in the Brayton Point decision, where EPA Region 1 stated: "Of course, to satisfy § 316(a), a mixing zone would need to be designed to ensure the protection and propagation of the B.I.P." See Clean Water Act NPDES Permitting Determinations for Brayton Point Station's Thermal Discharge and Cooling Water Intake in Somerset, MA (NPDES Permit No. MA0003654), at 6-9 (July 22, 2002), available at http://epa.gov/region01/braytonpoint/pdfs/BRAYTONtableofcontents-chapter1.PDF (last visited Oct. 5, 2007) ("Brayton Point Determination") (emphasis added).[7]

In its decision upholding the Region's determination, the Environmental Appeals Board ("EAB") rejected the argument – identical to the one Entergy makes here – that a § 316(a) variance "trumps and replaces otherwise applicable water quality standards for temperature." In re Dominion Energy Brayton Point, L.L.C. (NPDES Appeal No. 03-12), 2006 EPA App. LEXIS 9, at *202 (EAB Feb. 1, 2006) ("Brayton Point EAB").

The VWQS define a "mixing zone" as

[7] All of the Brayton Point permit documents are available online at EPA, Brayton Point Station: Final NPDES Permit, at http://epa.gov/region01/braytonpoint/index.html (last visited Oct. 5, 2007).

> a length or area within the waters of the state required for the dispersion and dilution of waste discharges adequately treated to meet federal and state treatment requirements and within which it is recognized that specific water uses or water quality criteria associated with the assigned classification for such waters may not be realized.

VWQS § 1-01(B)(28). VWQS § 2-04(A)(1) requires that, "in conjunction with the issuance of a permit" in Class B waters, the mixing zone "shall not exceed 200 feet from the point of discharge." Further, VWQS § 2-04(A)(2) requires that permit conditions allowing discharges of waste within a mixing zone shall in part:

> (b) "Not constitute a barrier to the passage or movement of fish or prevent the full support of aquatic biota, wildlife, and aquatic habitat uses in the receiving water outside the mixing zone";
>
> (c) "Not kill organisms passing through the mixing zone"; and
>
> (d) "Protect and maintain the existing uses of the waters."

Id. § 2-04(A)(2)(b)-(d).

4. Anti-Degradation Policy

Section 1-03(A) of the VWQS states that "all waters shall be managed in accordance with these rules to protect, maintain, and improve water quality." Section 1-03(B) further states that "[e]xisting uses of waters and the level of water quality necessary to protect those existing uses shall be maintained and protected." To determine what existing uses should be protected and maintained, "the Secretary shall consider at least the following factors":

> (a) "Aquatic biota and wildlife that utilize or are present in the waters";
>
> (b) "Habitat that supports existing aquatic biota, wildlife, or plant life";
>
> (c) "The use of the waters for recreation or fishing";
>
> (d) "The use of the water for water supply, or commercial activity that depends directly on the preservation of an existing high level of water quality"; and

> (e) "With regard to the factors considered under paragraphs (a) and (b) above, evidence of the use's ecological significance in the functioning of the ecosystem or evidence of the use's rarity."

VWQS § 1-03(B).

5. High Quality Waters

ANR considers the Connecticut River to be a "High Quality Water."[8] Accordingly, the standards set out in the VWQS must be followed:

> Waters the existing quality of which exceeds any applicable water quality criteria provide important environmental, economic, social and other benefits to the people of the state. Except as provided in subsection 2 of this part, such waters shall be managed to maintain and protect the higher water quality and minimize risk to existing and designated uses. In all cases, the level of water quality necessary to maintain and protect all existing uses as well as applicable water quality criteria shall be maintained.

VWQS § 1-03(C)(1) (emphasis added).

III. SECTION 316(A) IMPOSES A STRINGENT BURDEN OF PROOF ON ENTERGY

Contrary to Entergy's contention, the CWA confers broad discretion on the Court in considering this variance request and sets a high evidentiary bar. The text of § 316(a) plainly states that the permitting authority "may" grant a variance where:

> the owner or operator of any such source . . . can demonstrate to the satisfaction of the Administrator (or, if appropriate, the State) that any effluent limitation proposed [under CWA §§ 301 or 306] for the control of the thermal component of any discharge from such source will require effluent limitations more stringent than necessary to assure the [protection] and propagation of [the BIP].

33 U.S.C. § 1326(a) (emphasis added); 40 C.F.R. § 125.73(a). Courts view the use of the word "may," especially when used in the context of a requested waiver, as conferring considerable discretion on the regulatory agency. See United States v. Mass. Water Res. Auth., 256 F.3d 36, 51 (1st Cir. 2001) ("It is 'eminently reasonable' to presume that the choice of verbiage is a

[8] Jt. Ex. 89, Ltr. from C. Gjessing to E. Zoli (July 11, 2005) (explaining ANR's position that the anti-degradation policy applies, including § 1-03(C)); see also Jt. Ex. 1, 2006 Amended Discharge Permit, at 8; Jt. Ex. 110, ANR Responsiveness Summary, at 11-12.

deliberate one, and that, in the context of [the CWA], 'may' means may."); Appalachian Power Co. v. E.P.A., 135 F.3d 791, 807 (D.C. Cir. 1998) ("We have noted that when a statute uses the permissive 'may' rather than the mandatory 'shall,' 'this choice of language suggests that Congress intends to confer some discretion on the agency, and that courts should accordingly show deference to the agency's determination.'").

The legislative history underlying § 316(a) confirms the plain meaning of the statutory language. The Report of the Conference Committee on the Clean Water Act of 1972 states that "thermal pollutants will be regulated as any other pollutant unless an owner or operator can prove that a modified thermal limit can be applied which will assure 'protection and propagation' of . . . [the BIP]." 1972 Legislative History, at 175 (emphasis added).

EPA's regulations further confirm that the applicant "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." 40 C.F.R. § 125.73(a). Thus, the statute and the regulations clearly require a comprehensive analysis of the effects of the discharge and proof that existing thermal limits are more stringent than necessary to protect the BIP in light of the cumulative stresses on the receiving waters.

Moreover, it is clear that "the burden of proof in a § 316(a) case is a stringent one." In re Seabrook, 1977 EPA App. LEXIS 16, at *31, 11 EAD 332 (Adm'r June 10, 1977) ("Seabrook I"). This conclusion was recently reinforced in the Mirant Kendall decision where EPA Region One, referring to Senator Muskie's statement from the 1977 legislative history quoted above, stated:

> The above material suggests that EPA should take a rigorous and conservative approach to granting and reissuing variances in order to meet the CWA's standard

> of assuring the protection and propagation of the BIP. Such an approach is appropriate in light of the fact that the applicant for a § 316(a) variance is seeking to be excused from otherwise applicable limitations, and in light of the CWA's overarching goals of restoring and maintaining the "biological integrity of the Nation's waters, [and attaining] "water quality which provides for the protection and propagation of fish, shellfish and wildlife." 33 U.S.C. § 1251(a) and (a)(2).

See Clean Water Act NPDES Permitting Determinations for Thermal Discharge and Cooling Water Intake from Mirant Kendall Station in Cambridge, MA (NPDES Permit No. MA0004898), at 34 (June 8, 2004) ("Mirant Kendall Determination"), available at http://www.epa.gov/region1/ npdes/mirantkendall/assets/pdfs/draftpermit/Kendall_Determin-Doc_06_08_04.pdf (last visited Oct. 5, 2007) (emphasis added).

Although "absolute certainty" is not required, EPA has stated that "[t]he greater the risk, the greater the degree of certainty that should be required." Seabrook I, 1977 EPA App. LEXIS 16, at *31. In Seabrook I, addressing the question of "how much" evidence was required to support a variance request, EPA explained that: "No hard and fast rule can be made as to the amount of data that must be furnished. Much depends on the circumstances of the particular discharge and receiving waters." Id. In Mirant Kendall Determination, Region One further noted: "At the same time, information requirements are likely to increase to the extent that there is greater reason for concern over the protection and propagation of the BIP." Mirant Kendall Determination, supra, at 35. Moreover, the fact that previous variances have been granted does not necessarily mean that additional variances are warranted. As EPA stated in the preamble to the current § 316(a)-related regulations in 40 C.F.R. Part 125, subpart H:

> Section 125.72 accordingly gives the Director the flexibility to require substantially less information in the case of renewal requests. This does not mean, however, that the Director may not require a full demonstration for a renewal in cases where he has reason to believe that circumstances have changed, that the initial variance may have been improperly granted, or that some adjustment in the terms of the initial variance may be warranted.

44 Fed. Reg. 32,854, 32,894 (June 7, 1979) (Criteria for Determination of Alternative Thermal effluent Limitations Section 316(a)).

Further, while acknowledging that it "must make decisions on the basis of the best information reasonably attainable," EPA has also explained that it "may not speculate as to matters for which evidence is lacking;" and, that if "deficiencies in information are so critical as to preclude reasonable assurance, then alternative effluent limitations should be denied." Seabrook I, 1977 EPA App. LEXIS 16, at **31-33; see also Wabash, 1979 EPA App. LEXIS 4, at *40 (remanding the case after finding that "it is not unreasonable to infer that the discharges might have a substantial adverse effect on the aquatic community . . . causing a larger number of species to be adversely affected and for longer periods of time).

IV. ENTERGY FAILS TO MEET THIS STRINGENT BURDEN OF PROOF

This Court correctly framed the burden of proof issues in its Decision and Order on Pending Motions (Jan. 9, 2007):

> Under § 316(a), Entergy Nuclear must meet its burden in seeking a waiver of the thermal effluent limitations by one of two methods: Either by making a retrospective demonstration that there has been no "prior appreciable harm" or by making a prospective demonstration that, despite the occurrence of previous harm, the desired alternate effluent limitations will assure the propagation of a balanced indigenous community of shellfish, fish and wildlife. 40 C.F.R. §.125.73 [citing Brayton Point]. The occurrence of previous harm is an element of this second approach, as is the demonstration that the proposed alterative limitation will nevertheless have the desired ecological result. All evidentiary issues in the proceedings will be tested against these criteria.

Decision and Order on Pending Motions, Jan. 9, 2007, at 19 (citations omitted).

EPA regulations prescribe that "[i]n determining whether or not prior appreciable harm has occurred, the Director shall consider the length of time in which the applicant has been discharging and the nature of the discharge." 40 C.F.R. § 125.73(c) (emphasis added). Further,

regardless of which type of demonstration is performed (i.e., retrospective or predictive, or both) EPA regulations mandate as follows:

> This demonstration must show that the alternative effluent limitation desired by the discharger, considering the cumulative impact of its thermal discharge together with all other significant impacts on the species affected, will assure the protection and propagation of a balanced indigenous community of shellfish, fish and wildlife in and on the body of water into which the discharge is to be made.

Id. at § 125.73(a) (emphasis added).

Here, Entergy opted to do both a retrospective analysis to demonstrate no prior appreciable harm from the existing discharge, and a predictive analysis to show that the proposed discharge would assure protection and propagation of the BIP. This unorthodox approach does not comport with the sequential demonstration process spelled out in EPA's regulations,[9] and is apparently based on a misreading of the 1977 Guidance, which provides for a hybrid "Type III" demonstration that combines a Type I (retrospective) and Type II (predictive) in certain situations. See Jt. Ex. 3, 2004 Demonstration, at 5. In any event, as shown below, both of Entergy's attempted demonstrations fall far short of what is required for a § 316(a) variance.

A. Entergy's Methodology Is Fatally Flawed

From the outset, Entergy's application for a variance was doomed by the numerous flaws in its 2004 Demonstration. The following is a description of each flaw, any one of which could be considered fatal to the variance application.

[9] EPA regulations clearly specify that the retrospective analysis of no prior appreciable harm is to be done "in lieu of" a predictive analysis. 40 C.F.R. § 125.73(c)(1)(A). The rules further provide that a predictive analysis is appropriate only where: "despite the occurrence of such previous harm, the desired alternative effluent limitations (or appropriate modifications thereof) will nevertheless assure the protection and propagation of" the BIP. Id. § 125.73(c)(1)(B) (emphasis added). The difference between these two types of demonstrations, and the added burden that must be borne where a predictive analysis is undertaken, was clearly explained in Wabash, where EPA Administrator Costle ruled that a variance could not be granted under paragraph (B) unless the applicant made a showing either that circumstances had changed such that the prior harm would not be repeated or that steps had been undertaken to mitigate the harm through modifying the discharge. Wabash, 1979 EPA App. LEXIS 4, at **17-19.

1. Entergy Uses a Flawed Definition of the Affected "Body of Water"

The first step in evaluating the effect of a requested variance on the BIP is to properly define "the body of water into which the discharge is made" and within which the BIP exists. 33 U.S.C. § 1326(a). Usually, the problem is that applicants for a variance tend to define the body of water too broadly, in which case the more localized impacts of the discharge are obscured. See Appalachian Power, 545 F.2d at 1372 (upholding EPA's rationale that § 316(a) was intended to protect a "particular spawning ground located just below the plant's discharge"); see also Seabrook I, 1977 EPA App. LEXIS 16, at **35-36 (stating that it would be inappropriate to define the receiving water for a coastal discharge as "the Atlantic Ocean").

Here we have the opposite problem: a crabbed definition of the water body segment that does not take into account the full impact of the discharge on the biological community, which includes anadromous species that use substantial portions of the entire watershed. Entergy focused its analysis on Lower Vernon Pool and the tailrace immediately below Vernon Dam. R.F. ¶¶ 142-148, 155-159, 175-176. In other words, Entergy focused on the immediate effects of the discharge on just a few miles of the river instead of extending the analysis downstream as far as the evidence shows the thermal plume extends. Id.; R.F. ¶¶ 165-174, 201-203, 217-224.

The 1977 Guidance defines "water body segment" as "a portion of a basin the surface of which have a common hydrologic characteristics (or flow regulation patterns); common natural physical, chemical and biological processes, and which have common reactions to external stress, e.g. discharge of pollutants." ANR Ex. 13, 1977 Guidance, at 79. This manual acknowledges that, "in large water bodies such as . . . major river systems having no definable and reasonably sized physical boundaries, the selection of the water body segment may pose a difficult problem." Id. at 69. Significantly, however, the 1977 Guidance directs applicants to

consider the "seasonal movements of important species of aquatic life . . . when defining a water body segment." Id. The 1977 Guidance further notes:

> [T]he spawning sites, nursery sites, and adult habitat sites of many freshwater and marine species . . . may be widely separated and include physically different water bodies. Seemingly slight impacts in the different areas used by such species may result in effects, which if considered cumulatively, would be intolerable.

Id. at 69.

Applying these principles, Entergy's focus on such a small segment of the Connecticut River contravened the 1977 Guidance and was wholly inadequate to gauge the full ecological effects of the temperature increases on the Connecticut River.

The Brayton Point case illustrates the proper way to define the affected body of water. See generally Brayton Point EAB, 2006 EPA App. LEXIS 9, at *204. There, EPA developed an "area-impacted" analytical approach that identified likely adverse biological effects associated with critical water temperatures, and used that to minimize temperature increases in important habitat areas to assure protection and propagation of the BIP. Id. In other words, EPA determined the geographic boundaries of the body of water by tracing the effects of the proposed temperature changes. By contrast, Entergy chose to artificially limit the scope of the affected body of water to a fraction of the area actually affected and thereby to render the analysis of impacts on the BIP inadequate.

2. Entergy Uses a Flawed Concept of the BIP

The CWA does not define the terms "balanced," "indigenous," or "BIP." However, the legislative history sheds considerable light on what Congress had in mind. As mentioned above, the 1972 Conference Report states that:

> It is not the intent of this provision [i.e., § 316(a)] to permit modification of effluent limits required pursuant to Section 301 or Section 306 where existing or past pollution has eliminated or altered what would otherwise be an indigenous fish, shellfish, and wildlife population. The owner or operator must show, to the

> satisfaction of the Administrator, that a "balanced indigenous population of fish, shellfish, and wildlife" could exist even with a modified 301 or 306 effluent limit.

1972 Legislative History, at 175 (emphasis added).

Further, in the legislative history accompanying the 1977 amendments, Senator Muskie explained what was meant by the phrase "balanced indigenous population of fish, shellfish and wildlife":

> As in 1972, it was intended that the interim water quality standard be that condition of aquatic life which existed in the absence of pollution. There is no question that man's activities have radically altered receiving water ecosystems in this country and that alteration is continuing at an accelerated pace in many areas. Restoration of aquatic ecosystems which existed prior to the introduction of pollution from man's activities is an important element of the restoration and maintenance of the biological, physical, and chemical integrity of receiving waters. It is an essential aspect of assuring that future generations will have an adequate supply of basic life support resources. The concept of indigenous does not anticipate the removal of structures from waterways. It does not anticipate the existence of ecosystems which existed in the absence of those structures. But it does fully anticipate the analysis of aquatic populations in terms of man's activities prior to, and subsequent to, pollution.

S. REP No. 98-830, at 448 (1977) (Conf. Rep.).

This legislative history makes clear that Congress did not intend that a thermal discharger would be able to "take advantage" of prior pollution-induced harm that eliminated the BIP to justify alternative thermal discharge limitations under § 316(a) that would themselves be insufficient to protect the BIP. It also makes clear that Congress intended that <u>all</u> elements of the aquatic ecosystem necessary to support the protection and propagation of the BIP would also be protected under § 316(a).

True to this expression of legislative intent, EPA regulations provide a broad, ecological definition of the term "balanced indigenous community":[10]

[10] Even though "BIC" would be the more appropriate acronym, we will use the more familiar "BIP" throughout this argument.

> The term "balanced, indigenous community" is synonymous with the term "balanced, indigenous population" in the Act and means a biotic community typically characterized by diversity, the capacity to sustain itself through cyclic seasonal changes, presence of necessary food chain species and by a lack of domination by pollution tolerant species. Such a community may include historically non-native species introduced in connection with a program of wildlife management and species whose presence or abundance results from substantial, irreversible environmental modifications. 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) (emphasis added).

This definition clearly envisions consideration of more than the population of organisms currently inhabiting the water body. In this vein, although it permits inclusion of certain "historically non-native species" that are currently present, it explicitly excludes certain currently present species whose presence or abundance is attributable to avoidable pollution or previously-granted § 316(a) variances. Other regulatory provisions governing § 316(a) determinations also support this interpretation. For example, the fact that the regulations allow existing dischargers to meet their § 316(a) burden by showing that "no appreciable harm has resulted from the normal component of the discharge" (and other sources of pollutants) to the BIP in and on the body of water into which the discharge has been made" is a clear indication that a comparison between past and current populations of organisms is appropriate. Id. § 125.73(c)(1)(i) (emphasis added).

By requiring a showing that the BIP has not been harmed by the applicant's prior discharges, in combination with other sources of pollution, this provision means that the population under consideration is not just the population currently inhabiting the water body but a population that may have been present "but for" the prior appreciable harm. See Wabash, 1979 EPA App. LEXIS 4, at **19-31 (comparing the abundance and diversity of fish species in the

river before and after operation of the plant in question); see also Brayton Point EAB, 2006 EPA App. LEXIS 9, at *173.

It is clear under this definition that a satisfactory BIP under § 316(a) need not in all circumstances match some sort of estimated aboriginal assemblage of organisms. At the same time, however, the BIP must satisfy the listed indicia of an ecologically healthy community of organisms, including that it cannot be dominated by pollution tolerant species or species whose presence or abundance is attributable to § 316(a)-variance based permit limitations, or pollutant discharges that will be eliminated pursuant to technology-based effluent limitations under § 301(b)(2). See 44 Fed. Reg. at 32,894 (preamble to revised 40 C.F.R. Part 125, subpart H); see also 39 Fed. Reg. at 36,178.

Further, in the Wabash decision, EPA made it clear that in assessing the BIP, the responsible agency must look not only at the community as a whole but also at the effects on individual species of fish that should make up the BIP. See Wabash, 1979 EPA App. LEXIS 4, at *21 ("[I]t is clear that both individual [species] and community considerations are relevant."). EPA explained that "in attempting to judge whether the effects of a particular thermal discharge are causing the system to become imbalanced, it is necessary to focus on the magnitude of the changes in the community as a whole and in individual species; i.e., whether the changes are "appreciable." Id. at *22. Finally, as EPA made clear in Wabash it is not acceptable that a particular discharge will allow the propagation of some community of fish with a certain degree of diversity and abundance; rather the thermal discharge limits must be sufficient to protect the BIP as defined in the regulations:

> Section 316(a) must, like any other provision of the Act, be read in a manner which is consistent with the Act's general purposes. Consequently, § 316(a) cannot be read to mean that a balanced indigenous population is maintained where the species composition, for example, shifts from a riverine to a lake community

> or, as in this case, from thermally sensitive to thermally tolerant species. Such shifts are at war with the notion of "restoring" and "maintaining" the biological integrity of the Nations' waters. Thus, even though it may be difficult or even impossible to define what the precise balanced indigenous population would be in the absence of heat, it is generally sufficient, as the regulations provide that it "will not include species whose presence or abundance is attributable to the introduction of pollutants," such as heat, and that it should be characterized by "non-domination of pollution tolerant species.

Id. at **28-29.

These statements clearly indicate that the BIP refers to the indigenous community that existed prior to the impacts of pollutants (including increased heat resulting from previous § 316(a) variances) not solely the current community of organisms. This interpretation is also consistent with the statutory objective "to restore and maintain the chemical, physical, and biological integrity of the Nation's waters." 33 U.S.C. § 1251(a) (emphasis added). In Brayton Point , EPA Region One rejected the permit applicant's argument that the BIP is whatever is present in the water body receiving the discharge. In upholding the Region's position, the EAB stated:

> [A] discharger who obtains a section 316(a) variance that substantially (by itself or with other pollutants and stressors) alters the "initial" populations of shellfish, fish, and wildlife in a water body can, five years later in a subsequent permit renewal, rely on information demonstrating that its second variance will maintain the new, but significantly degraded, populations of shellfish, fish, and wildlife to obtain the second variance. It is clear from the legislative history quoted above [referring to the Muskie quote from the 1977 legislative history] that such a scenario is the very situation in which a section 316(a) variance was not intended to be applicable. Such an interpretation and the resultant scenario would undermine the purpose of the Act. Instead of restoring or maintaining the Nation's waters, this interpretation would lead to their degradation.

Brayton Point EAB, 2006 EPA App. LEXIS 9, at **176-77.

This is the same interpretation that Entergy is urging this Court to adopt – simply accept the fact that the Connecticut River no longer supports a robust population of coldwater and coolwater species, ignore the fact that previous variances have played a role in changing the

thermal regime in the river, disregard the goals of the anadromous fish restoration program, and allow still more heat to promote the expansion of heat-tolerant species at the expense of the thermally sensitive native species such as salmon and shad.

3. Entergy Uses a Flawed RIS to Measure Impacts on the BIP

EPA defines the term "representative important species," or RIS, to mean "species which are representative, in terms of their biological needs, of a balanced, indigenous community of shellfish, fish and wildlife in the body of water into which a discharge of heat is made." ANR Ex. 13, 1977 Guidance, at 78; 40 C.F.R. § 125.71(b). The 1977 Guidance provides that in developing the RIS, "the most thermally sensitive species (and species groups) should be identified and their importance should be given special consideration." Id. at 37. Contrary to this clear directive, Entergy gave no "special consideration" to the Atlantic salmon or American shad, other than simply including them on the RIS along with a number of warm water species. R.F. ¶¶ 59-62.

By contrast, in Mirant Kendall EPA Region One selected the most sensitive species, and the most sensitive portions of their life cycles, in developing the RIS. Mirant Kendall Determination, supra, at 55. The temperature values and time periods identified were used for comparison between the species of interest to determine which resident species appeared to have the lowest threshold to water temperature. The protective temperature limits and time periods ultimately developed were based on a number of sources and discussed fully in Section 5.6.3 of the Determination. Id. at 55-74. Further review and evaluation determined that yellow perch was the resident fish species most sensitive to temperature for all of its life stages in the Charles River. This species was identified as an indicator species in this site-specific investigation. The rationale used in this case to protect the BIP is that if the species most sensitive to temperature is

protected in a thermally influenced aquatic habitat, other species and life stages that occur in the habitat will be protected as well.

Similarly in Brayton Point, Region One compared the "critical threshold temperatures" for various species – essentially the temperature above which a species demonstrates a certain level of adverse effects – with predicted temperatures in the thermal discharge plume based on different operating scenarios. See Brayton Point Determination, supra, at 6-38 - 6-39, available at http://epa.gov/ region01/ braytonpoint/pdfs/BRAYTONchapter6.PDF (last visited Oct. 5, 2007).

One of the key factors in determining the appropriate variance was the selection of the ultimate threshold temperatures. This led the Region to select temperatures based on the most sensitive species present at each location in the water column during each season and were based on "reasonable, yet protective temperature values for the most sensitive life stage of the most sensitive species." Brayton Point Determination**,** supra, at 6-36**.** The "critical" temperature for a species was derived from various scientific field and laboratory studies, literature reviews, and/or personal communications from experts on the species. Id. at 6-37 - 6-38. In selecting the critical temperatures, the Region acknowledged that it took a conservative approach and outlined its reasons for doing so. Id. at 6-36 - 6-37 ("EPA chose threshold temperatures that represented an acceptable level of impact but did not represent a zero impact temperature."); see also Brayton Point EAB, 2006 EPA App. LEXIS 9, at *217 (selecting threshold temperatures based on the most sensitive species present).

Here, Entergy selected a RIS that is heavily weighted towards heat tolerant species. Four of the nine species are warmwater species and three of those are predators of juvenile salmon and shad. R.F. ¶¶ 18, 53-62, 78-100. The RIS does not include the brook trout, a native coldwater

species.[11] R.F. ¶¶ 53, 57, 106-123. The RIS does not include the American eel which is a native predator species. R.F. ¶¶ 53, 124-126. The RIS does not include the tessellated darter, a host species for the dwarf wedge mussel a federally-listed endangered species once native to the Connecticut that is the subject of a recovery effort under the Endangered Species Act. R.F. ¶¶ 127-133. The RIS does not include any macroinvertebrates, R.F. ¶¶ 134-141, despite the fact that the 1977 Guidance expressly recommends their inclusion. ANR Ex. 13, 1977 Guidance, at 59.

To make matters worse, the largemouth bass was added to the RIS, at ANR's insistence, for purposes of the 2004 Demonstration. R.F. ¶ 53-54. The largemouth has the highest thermal tolerance of any species in the Connecticut, and is a major predator of juvenile salmon and shad. R.F. ¶¶ 78-79, 81-82, 90-98. Thus, instead of adjusting the RIS in the 2004 Demonstration to better reflect the most thermally sensitive species, Entergy and ANR drove the analysis further towards the most tolerant species.

4. Entergy Uses a Flawed Hydrothermal Model that Fails to Measure the Full Impact of the Proposed Discharge

The hydrothermal model developed by Dr. Swanson purports to simulate how the heat from the proposed discharge is assimilated within Lower Vernon Pool. R.F. ¶¶ 142-148, 155-159, 175-176. As such, the model provides no useful information on the effects of the discharge below Vernon Dam. Id. Further the temperatures predicted by the model are also simulations, based on a mathematical formula called the "Delta-T." R.F. ¶¶ 143, 197. There is no ongoing

[11] Entergy makes much of the fact that only a few brook trout have been collected in the Connecticut River over the many years of sampling. Of course, the same could be said of Atlantic salmon, which was included in the RIS. Moreover, as Dr. McCullough points out, absence of evidence is not necessarily evidence of absence. R.F. ¶ 116. Given the inhospitable temperature conditions that exist in Vernon reach, it is not surprising that a native coldwater species would not be found in large numbers. Again, however, Entergy is not entitled to rely on degraded conditions as an excuse to add further degradation. The undisputed fact is that brook trout have been found in the river after 1975 and that means they are an "existing use" under VWQS § 1-02(18), and must be "maintained and protected" under § 1-03(B)(1).

monitoring of actual temperatures within Lower Vernon Pool or downstream. R.F. ¶¶ 143-149, 185, 190. Consequently, the true impact of the discharge on river temperatures at different flows, at different times of the year, and at different locations (i.e., downstream) is not known. R.F. ¶¶ 143-176, 201-203, 217-224.

In contrast to the artificial construct of the Swanson model, the evidence shows that the thermal plume from the Vermont Yankee discharge extends at least as far as Holyoke Dam, which is over fifty miles downstream from Vernon Dam. R.F. ¶ 165, 219-220. The most comprehensive analysis of the downstream effects of the discharge was performed in connection with the initial 1978 Demonstration. R.F. ¶¶ 165-173. This demonstration employed a dye study to trace how far and how fast an actual body of water moved downstream from the point of discharge. The study was conducted from May to June 1977 and illustrated that thermal discharges released from the Vermont Yankee facility took four days to travel fifty miles downstream of the Vernon Dam. R.F. ¶¶ 168-171. Because these demonstrations are legal documents prepared in compliance with regulatory requirements, their findings cannot be easily dismissed.

The 1990 Demonstration reaffirmed the conclusion of the 1978 Demonstration that the effects of the discharge extended the entire distance to Holyoke Dam. R.F. ¶ 174. Entergy seeks to have it both ways by arguing on the one hand that the Court should rely upon the "30 years of monitoring and data gathering" that has been compiled while on the other hand disregarding portions of that same data base that do not align with its current position. This kind of "cherry picking" the available information is not acceptable.

In his rebuttal testimony, Dr. Mattson, who admits that he is not an expert at hydrothermal modeling, attempts to discount the findings of the previous demonstration reports

and offers his own back-of-the-envelope calculation on the downstream effects of the discharge. R.F. ¶ 184. Mattson's opinion is based on a limited set of data submitted after trial that purports to compare temperatures at Station 7 above Vernon Dam with temperatures at Turners Falls Dam located over 20 miles downstream during periods when Vermont Yankee was operating and not operating in a single month. R.F. ¶¶ 195-197.

As Dr. Jones explains in his rebuttal testimony, this analysis is deeply flawed and completely unreliable as a basis for concluding that the discharge has "no effect" (Mattson's conclusion) beyond four miles below Vernon Dam. R.F. ¶ 203. Common sense suggests that the heat from the discharge must go somewhere. If it is not staying in Lower Vernon Pool, as Dr. Swanson's model projects, R.F. ¶ 144, then it must be going downstream. And if, as Dr. Mattson claims, there is a net atmospheric warming as the water moves downstream, then the heat must be staying in the river. One need not be an expert at hydrothermal modeling to conclude that Entergy has not adequately explained where the heat from its discharge supposedly goes once it leaves Lower Vernon Pool.

As further explained below, the fate of this heat transfer has significant implications for the health and productivity of the indigenous biological community of the river and in particular the Atlantic salmon and American shad. It is Entergy's burden to prove, "beyond any question," that its proposed discharge will not adversely affect any life stage of these species anywhere within the portion of the Connecticut River affected by the discharge. Any doubt about the downstream extent of the thermal plume must therefore be resolved against granting the variance.

5. Entergy's "Retrospective Analysis" Fails to Consider the History and Nature of the Discharge as Required by EPA Regulations

As Dr. Mattson – the author of the 2004 Demonstration – testified, the entire § 316(a) analysis was limited to the period 1991-2002. Jt. Ex. 3, 2004 Demonstration, at 24-26. When asked why the analysis did not include the entire operational history of Vermont Yankee, which goes back to the early 70's, Dr. Mattson explained that he chose 1991 as the starting point because that was the date of the last variance. R.F. ¶ 279. He further explained that he interpreted the 1977 Guidance to sanction this approach to doing a Type I (i.e., retrospective) analysis. A close reading of the 1977 Guidance, however, reveals nothing to support this narrow interpretation that there should be some kind of artificial cut-off date for a Type I demonstration.

Indeed, the 1977 Guidance makes clear in a number of places that the scope and timeline for each demonstration should be developed on a case by basis that reflects the particular circumstances and history of each discharge. See, e.g., ANR Ex. 13, 1977 Guidance, at 8-9 (noting that the 1977 Guidance is a "starting point" for discussions between the applicant and the permit authority; and, that the states are not "rigidly bound" by it contents).

Nowhere does the 1977 Guidance suggest that it would be appropriate to confine a retrospective analysis to the period dating from the last variance a facility may have received. In fact, without establishing a proper thermal baseline (i.e., one that does not already include the effect of Vermont Yankee's discharge) it is impossible to measure what effect the existing discharge has had on the biological community. And without that kind of historical perspective it is not possible to say with any confidence that there has been "no prior appreciable harm," especially in light of the evidence, discussed below, of the substantial decline in the shad population that has occurred.

Moreover, regardless of how the Guidance is interpreted, EPA regulations, which are controlling, explicitly require that, for purposes of determining whether or not prior appreciable harm has occurred, this Court, acting as the permit authority "shall consider the length of time in which the applicant has been discharging and the nature of the discharge." 40 C.F.R. § 125.73(c)(2). Thus, Entergy's demonstration was based on a flawed premise that it only had to consider the effect of the 1°F increase in light of the fact that river temperatures had already been increased well above that level as a result of the previous variances in 1978 and 1991.

Indeed, all of Entergy's experts (Drs. Swanson, Mattson, Barnthouse, and Coutant) based their opinions that the 1°F increase is "de minimis" on the fact that it appears small in relation to the previous variances (i.e., the 5°F summer period increase authorized in 1991 and the 13.4°F increase for the winter period authorized in 1978). R.F. ¶¶ 11, 28. By this logic an endless series of variances could be justified on the basis that each is smaller than previous ones. This kind of boot-strapping makes a mockery of the cumulative effect analysis required by EPA's regulations, which clearly contemplate consideration of the entire "history and nature" of the discharge.

Had a long term trend analysis been done, using a complete data set, appropriate indicator species (see argument below) and more reliable analytical tools, R.F. ¶¶ 62-72, 236-262, 274-284, it undoubtedly would have revealed a more accurate picture of the effect of the existing discharge than the truncated analysis Entergy chose to perform. Again, it is Entergy's burden to justify, if it can, its failure to follow clear instructions. It is not sufficient to argue, post hoc, that there is no reason to believe a longer term analysis would have shown anything different. The point is that such an analysis is required by law. Further, it is impossible to know what such an analysis might have shown, and this Court cannot assume that it would have made no difference.

As EPA stated in Seabrook: "[W]here deficiencies in information are so critical as to preclude reasonable assurance, then alternative effluent limitations should be denied." Seabrook I, 1977 EPA App. LEXIS 16, at *33 (citing 1977 Guidance). This is also consistent with the "rigorous and conservative approach" followed by EPA in Brayton Point. Brayton Point EAB, 2006 EPA App. LEXIS 9, at *217.

6. Entergy's "Predictive Analysis" Fails to Consider the Cumulative and Synergistic Effects of the Proposed Discharge

The statute and regulations are also clear that applicants for a § 316(a) variance must take account of the cumulative and synergistic effects of the proposed discharge in combination with other discharges of pollutants, other sources of heat and other stresses on the biological community. First, CWA § 316(a) states that in considering variance applications the permit authority must take into account "the interaction of such thermal component with other pollutants" to assure the protection and propagation of the BIP. 33 U.S.C. § 1326(a).

Second, EPA regulations state that a discharger's request for a § 316(a) variance "must show that the alternative effluent limitations desired by the discharger, considering the cumulative impact of its thermal discharge together with all other significant impacts on the species affected, will assure the protection and propagation of" the BIP. 40 C.F.R. § 125.73(a) (emphasis added). Although the regulations do not define the scope of cumulative effects that must be considered, it is reasonable to assume that the term would include all past, present and reasonably foreseeable effects. Cf. 50 C.F.R. § 1500.7 (defining "cumulative impact" to mean "the impact on the environment which results from the incremental impact of the action when added to other past, present and reasonably foreseeable actions") (Regulations of the Council on Environmental Quality).

The requirement to consider cumulative effects in the context of a § 316(a) demonstration has been settled law since the first Seabrook decision in 1977 where the Administrator ruled:

> The RA [Regional Administrator] ruled that a determination of the effect of the thermal discharge cannot be made without considering all other effects on the environment, including the effects of the intake (i.e., entrainment and entrapment); the applicant must persuade the RA that the incremental effects of the thermal discharge will not cause the aggregate of all relevant stresses (including entrainment and entrapment by the intake structure) to exceed the 316(a) threshold. I believe this is the correct interpretation of Section 316(a). The effect of the discharge must be determined not by considering its impact on some hypothetical unstressed environment, but by considering its impact on the environment into which the discharge will be made; this environment will necessarily be impacted by the intake. When Congress has so clearly set the requirement that the discharge not interfere with a balanced indigenous population, it would be wrong for the Agency to put blinders on and ignore the effect of the intake in determining whether the discharge would comply with that requirement.

Seabrook I, 1977 EPA App. at *19.

EPA codified this interpretation in the 1979 revisions to the thermal discharge rules. 44 Fed. Reg. at 32,854. As EPA explained in the preamble:

> Several commenters argued that applicants should not be required to analyze cumulative effects of thermal discharges together with other sources of impact upon the affected species as required by proposed [125.72(a)]. This issue was addressed in the Administrator's first Seabrook decision which concluded that analysis of cumulative effects is required.

Id.

There are a number of cumulative impacts missing from Entergy's analysis. First, drawing on the Seabrook precedent, Entergy fails to take account of the impingement and entrainment impact its CWIS is having on the primary species of concern, namely juvenile salmon and shad. Entergy's own data shows that juvenile salmon and shad are entrained and impinged by Vermont Yankee's intake. Jt. Ex. 3, 2004 Demonstration, at 115. This is a source of mortality and stress on the BIP that must be factored into the analysis. The number of fish

actually killed may be small in an absolute sense, but given the severely reduced populations of the salmon and shad in this reach of the river, any source of mortality must be presumed significant until proven otherwise. R.F. ¶¶ 286, 371, 539.

Second, there are a number of discharges to the Connecticut River upstream of the Vermont Yankee discharge. Jt. Ex. 104, CRWC Comments, at 13. These discharges were never considered by Entergy, or by ANR, despite the fact that CRWC included a list of sources in its comments on the draft permit. These sources add to the stress on the aquatic biota and should have been part of the cumulative impact analysis. Again, it is Entergy's responsibility to identify and evaluate these discharges. CRWC does not bear the burden to conduct the analysis to determine the significance of these sources.

Third, predation is another source of mortality for juvenile salmon and shad that Entergy failed to consider. Ironically, Entergy tries to point to predation by striped bass in the lower Connecticut as a potential cause of the decline in shad — a hypothetical in search of facts, as discussed below — but completely ignores the very real threat of predation from largemouth bass, smallmouth bass and walleye, which are increasing in both Lower Vernon Pool and downstream of Vernon Dam. R.F. ¶¶ 90-100. Cold winter temperatures limit the ability of smallmouth and largemouth bass to dominate water bodies and prey on salmon smolts. Id. Because Vermont Yankee discharges large volumes of hot water during the winter, the bass population has unlimited opportunity to prey on salmon smolts downstream of the facility. R.F. ¶¶ 93-97.

Fourth, cumulative analysis also requires looking ahead, and that means taking climate change into account. There is no longer any doubt that climate change is happening and that anthropogenic sources of greenhouse gases are a substantial cause. See generally CLIMATE

CHANGE 2007, THE FOURTH ASSESSMENT: REPORT OF THE UNITED NATIONS INTERGOVERNMENTAL PANEL ON CLIMATE CHANGE (2007); see also R.F. ¶¶ 262-276, 287-296. Indeed there was a solid scientific consensus about this even before Entergy undertook its 2004 Demonstration.[12] There is also no question that neither Entergy nor ANR gave any consideration to climate change in the context of this variance. Yet there is already evidence that climate change is having an impact on atmospheric temperatures in the Northeast including the Connecticut River Basin. See e.g., UNION OF CONCERNED SCIENTISTS, CLIMATE CHANGE IN THE U.S. NORTHEAST: A REPORT OF THE NORTHEAST CLIMATE IMPACTS ASSESSMENT 11 (Oct. 2006), available at http://www.climatechoices.org/assets/documents/climatechoices/NECIA_climate_report_final.pdf (last visited Oct. 5, 2007) ("[U]nder a lower-emissions scenario, end-of-century temperatures are projected to rise on average by 5.8°F in winter and 5.1°F in summer . . . .").

Climate models are projecting increased temperatures, shorter winters, extended droughts and lower river flows over the next two decades on the basis of atmospheric loadings already in place (it takes over a century for carbon to cycle through the atmosphere). The only questions are how fast and by how much will temperatures increase and how severe will the negative consequences be. All of this has direct and substantial bearing on this proceeding. By ignoring the effects of climate change in its analysis, Entergy makes the faulty assumption that the past is prologue when it comes to the temperature regime for the Connecticut River. In fact it will become even more important to reduce heat inputs to the river as the atmospheric temperatures continue to climb. R.F. ¶¶ 257, 276, 291.

[12] To its credit, Entergy has been ahead of the curve on climate change for some time and broke ranks with its peers in the energy field when it filed an amicus brief on the side of Petitioners in Massachusetts v EPA, 549 U.S. __ (2007) urging the government to regulate CO_2 emissions to combat global warming. Unfortunately, Entergy has yet to make the connection between climate change and the variance it seeks in this proceeding.

7. Entergy Uses Flawed Thermal Temperature Tolerances that Fail to Account for the Effects of the Proposed Discharge on all Life Stages of Salmon, Shad, and Other Key Species

As Dr. Mattson testified, Entergy chose two temperature standards to measure the impact of the proposed discharge on Lower Vernon Pool, based on the projections of the Swanson model. R.F. ¶ 175-176. One standard, usually referred to as Upper Incipient Lethal Temperature ("UILT"), measures acute lethality for different species. The other, termed the "avoidance standard," measures the behavioral response of certain species to temperature increases to which they are exposed. For American shad, Dr. Mattson chose a "UILT" value of 90.5°F based on a 1974 laboratory study done by Moss et al. R.F. ¶¶ 418-423.

For the avoidance temperature for shad, the value of 86°F was chosen based on an outdated field experiment done by Marcy et al. in connection with the Connecticut Yankee Nuclear Power Plant. R.F. ¶¶ 441-442, 451. As pointed out by CRWC's experts, Drs. Jones and McCullough, there are serious flaws in the way Entergy uses these studies, and even more fundamental problems with using these extreme temperature standards, which overlook potentially serious chronic, sub-lethal effects on different life stages of the shad and salmon and other species. R.F. ¶¶ 415-509.

First, the Moss study simply does not support the use of 90.5°F as a UILT for shad. Entergy seizes on a single sentence in the introduction to the Moss article in which the author refers to a "preliminary and unpublished" observation that the test subjects experienced "rapid death" when exposed to a rapid increase of temperatures to 90.5°F. R.F. ¶ 421. Moreover, although Moss does not provide any information on the level of acute mortality, it appears from his brief description that it was 100%. R.F. ¶ 424. If that were true, then the 90.5°F temperature would be well above a UILT standard (and closer to an Ultimate Upper Incipient Lethal Temperature, or UUILT) because UILT standards are based on "LD50" where only 50% of test

subjects die. R.F. ¶ 415. In any event, the real point is that the Moss study simply does not provide an adequate scientific foundation for establishing an acute lethality standard for shad, even if one assumes that such a standard is proper for a § 316(a) variance determination which, as discussed below, it is not.

Second, Dr. Mattson's reliance on the Marcy study to derive an avoidance temperature for shad suffers from a number of errors. Marcy performed a field experiment at the Connecticut Yankee site in which he collected fish from an area of the river not affected by the discharge, put them in a cage, dropped them directly into the thermal plume, and recorded their reactions. R.F. ¶¶ 452-465. Marcy reported that the fish began to show signs of avoidance when temperatures reached 86°F. R.F. ¶ 441. However, because Marcy did not allow the fish any time to acclimate to higher temperatures his results do not measure how shad might react to river conditions with chronic high temperatures, i.e., above preferred temperatures for life stages, which are more like what fish actually encounter near the Vermont Yankee discharge. R.F. ¶¶ 194-199, 319, 549-551.

More significantly, the results from the Marcy study at the Connecticut River site simply cannot be extrapolated to the Vermont Yankee site. The only thing the two plants have in common is that they are (or were in the case of Connecticut Yankee) located on the Connecticut River. R.F. ¶ 451-454. But from every other perspective--hydrology, ecology, biology — the two locations are completely different. Connecticut Yankee is located only a few miles from the mouth of the river, which means that nearly all of the shad spawning habitat is upstream. The river is tidal at that point; it is also wider, the volume is greater and the flow is faster than it is at Vernon. There is also no dam to impede the flow of water or the dispersion of the thermal plume. In short, there is no scientific basis for concluding that the results of the Marcy study

would be replicated at the Vermont Yankee site. In fact, as CRWC's experts pointed out, R.F. ¶¶ 438-440, the Marcy study is an example of exactly the kind of study that Entergy should have done in connection with the 2004 Demonstration. Instead, Entergy chose to rely on outdated studies that have no bearing on the actual conditions that shad encounter in the reach of river affected by the Vermont Yankee discharge.

Finally, the acute lethality and avoidance standards that Entergy used are not appropriate, at least not by themselves, for the "rigorous and conservative" assessment required for a § 316(a) determination. Instead, as CRWC's experts testified, Entergy should have chosen "optimal" or "preferred" temperatures for each life stage of the RIS, or at the very least for the salmon and shad, which are species of special significance by virtue of the fact that they are (a) indigenous coldwater and coolwater species, as opposed to bass and walleye, for example, which are nonindigenous warmwater species, and (b) species of special interest because they are the subjects of a major federal-state restoration effort.

In his testimony, Dr. McCullough — a well-respected fisheries biologist[13] who has spent the last 17 years studying the effects of temperature on salmonids — lays out a complete protocol for how a proper analysis of temperature effects on coldwater and coolwater species should be conducted. Similarly, Dr. Jones provides valuable insights based on his expertise in the fields of ecology and evolutionary biology. R.F. Parts III.C-D, IV, VII.

Again, Brayton Point provides the appropriate standard to guide this Court's determination. There, EPA Region One concluded that in order to find a variance that would be protective of the BIP, thereby meeting the statutory standard, it was necessary to compare the "critical threshold temperatures" for various species — essentially the temperature above which

[13] Entergy's expert, Dr Coutant, testified that he regarded Dr. McCullough as a "peer" and had served with him on many expert panels around the country.

a species demonstrates a certain level of adverse effects — with predicted temperatures in the thermal discharge plume based on different operating scenarios. Brayton Point EAB, 2006 EPA App. LEXIS 9, at *216. The Region derived the "critical" temperature for a species from various scientific field and laboratory studies, literature reviews, and/or personal communications from experts on the species. Id. In selecting the critical temperatures, the Region acknowledged that it took a conservative approach that "represented an acceptable level of impact but did not represent a zero impact temperature." Brayton Point Determination, supra at 6-36 - 6-37; see also Brayton Point EAB, 2006 EPA App. LEXIS 9, at **216-18. This Court should require no less careful scrutiny of Entergy's variance request.

B. Entergy Fails to Prove That "Existing Effluent Limitations Are More Stringent Than Necessary to Assure the Protection and Propagation of the BIP"

Neither the statute nor EPA regulations define the terms "protection" or "propagation." However, applying the maxim that every word of a statute must be given effect (see Solid Waste Agency v. U.S. Army Corps of Eng'rs, 531 U.S. 159, 172 (2001) (noting that "it is one thing to give a word limited effect and quite another to give it no effect whatever")) it is necessary to distinguish between these two terms. In its Brayton Point Determination, Region One explained these terms as follows:

> The terms "protection" and "propagation" are not defined in the statute or regulations. However, the American Heritage Dictionary (2d College Ed. 1982) defines "protection," in pertinent part, as "[t]he act of protecting . . . [or t]he condition of being protected," while it defines "protect" as "[t]o keep from harm, attack, or injury; guard." In addition, it defines "propagation" as the "[i]ncrease or spread, as by natural reproduction." Thus, thermal discharge limits based on a CWA § 316(a) variance must "assure" that the receiving water's BIP will be safe from harm or injury from the thermal discharge, and that the thermal discharge will not interfere with the BIP's ability to increase or spread naturally within the receiving water.

Brayton Point Determination, supra, at 6-3 - 6-4.

Applying these definitions here, it is obvious that, far from being "too stringent" it is more likely that the existing standards are not stringent enough to assure the protection and propagation of salmon and shad, as described below.

1. Evidence Shows Substantial Decline in American Shad Population Since 1991 Variance

The installation of fish passage facilities at Turners Falls Dam in the early 1980s allowed the American shad to return to its historic spawning grounds all the way to Bellows Falls Dam. R.F. ¶¶ 567-570. Following improvements to the Turners Falls Dam facilities in 1983, the returns to Vernon Dam climbed steadily and reached a peak of 37,197 fish at Vernon Dam in 1991 and 60,089 fish at Turners Falls Dam in 1992. R.F. ¶ 411. Then something happened. R.F. ¶ 400. Starting in 1993, the returns began a gradual decline, with a brief uptick in 1995-96, and then a very steep decline after 1997 that has taken the runs above Vernon Dam down to virtually 0 today. R.F. ¶¶ 380, 400-402, 409, 411. By any measure, this dramatic decline must be viewed as "appreciable harm" to the overall shad population, and a knock-out blow to the effort to restore the runs all the way to Bellows Falls Dam. Similarly, this loss of reproductive capacity is not consistent with "protection and propagation" of the species. These developments beg the question whether Vermont Yankee's discharge could have something to do with what has happened to the shad population. Entergy has the burden to prove that its discharge has not caused or contributed to this decline.

2. Entergy's Explanations for the Shad Decline Are Not Credible

Entergy, of course, vigorously denies that its discharge has anything to do with this decline and posits two hypothetical causes: predation by striped bass in the lower river, and passage problems at Turners Falls Dam. R.F. Parts VIII, IX. Neither of these hypotheticals can survive close scrutiny. The striped bass hypothetical can be quickly disposed of by citing a few

simple facts. First, there is no evidence that "striper" predation is having any significant effect on the shad population in the Connecticut River. R.F. ¶¶ 592-613. Second, even if there was some predation, there are not enough "stripers" above Turners Falls Dam to account for the decline in the shad runs to the upper river. Third, the "Davis study" cited by Entergy's experts actually proves the opposite point, namely that shad do not constitute a significant part of the stripers diet. R.F. ¶ 599. Finally, the biologists at the Conte Lab, who are both knowledgeable and completely independent, discount striper predation as a contributing factor in the shad decline. R.F. ¶ 602; CRWC Ex. 26, Ltr. from S. Garabedien to D. Deen (July 2, 2007), at 3.[14]

The passage issue at Turners Falls Dam is more complex, but in the end Entergy fails to make a convincing case that anything has changed at Turners Falls Dam that could possibly account for the decline in the proportion of shad returning to Vernon Dam relative to the number of shad that are available (i.e., those that make it past Holyoke). No one disputes that passage at Turners Falls Dam is and has been a serious problem for some time. Indeed, it was a problem when the shad runs were increasing between 1983 and 1991; it was a problem when the runs started to decline in 1993; and it remains a problem today, when the runs are virtually gone from the Vernon reach of the river.

But the point is that there is no evidence that any changes were made at Turners Falls Dam during the period of analysis that Entergy chose for the 2004 Demonstration (i.e., 1991-2002) had anything to do with passage. Nor, for that matter is there any evidence that any of the operational changes at Turners Falls Dam that Entergy cites as "proof" of its hypothetical, have had any impact on actual passage at all. R.F. ¶ 570. Dr. Jones has carefully "de-constructed" all

[14] CRWC is mindful of the fact that the Court has ruled that the Conte letter itself is inadmissible, but has allowed Dr. Jones to rely on it in support of his opinions. CRWC respectfully disagrees with this ruling to the extent it does not admit the contents of the letter as evidence, and wishes to preserve its right to assign this as error on appeal if necessary. Accordingly, we proffer it here as evidence that should be part of the record.

of this evidence and explained clearly how passage at Turners Falls Dam cannot account for the shad decline. R.F. ¶¶ 571-579. Importantly, his opinion is unequivocally corroborated by the biologists the Conte Lab in their July 2, 2007 letter (CRWC Ex. 26). Notably, these are the very same biologists that Entergy cites in an effort to claim that changes at Turners Falls Dam have made a difference in shad passage. R.F. ¶¶ 576-577.

Finally, using the methodology endorsed by Entergy's own expert, Dr. Barnthouse, as the proper way to evaluate the effect of the Vermont Yankee discharge on shad, it is clear from the data that there is a strong correlation between the onset of the variance in 1991 and the subsequent decline. Dr. Barnthouse testified that the average age of sexual maturity for shad is five years.[15] Thus, according to Dr Barnthouse, if the 1991 variance was going to have any effect one would expect to see it five years later(i.e., 1996) when the 1991 year class would return as mature adults. Looking at the data supplied by Dr. Mattson in his Exhibit 6, R.F. ¶ 411, it shows, at first glance, what looks like an increase in shad runs in 1995-96 when compared to 1993-94.

When the 1995-96 returns are compared to the peak years of 1991-92, however, the data shows a significant decline in the number of returning adults relative to the size of that year class. Id. The evidence becomes even more compelling when one extends the analysis five years further and compares the "blip" year 1996 with what happened five years later, in 2001, when shad returns plummeted to 2.5%. R.F. ¶ 385. As Dr Barnthouse admitted on cross examination, this is exactly what his methodology would predict if the discharge was having an impact on shad returns. R.F. ¶¶ 412-413.

[15] In fact there is a different range of maturity for males and females. For males it is 4-8 and for females 3-8. Nevertheless, even accepting Dr. Barnthouse's average age the data actually contradicts his conclusion that there is no correlation between the 1991 variance and the subsequent decline in returning shad.

Thus, Entergy has failed to prove that either striped bass predation or passage problems at Turners Falls Dam can account for the shad decline. This leaves open the question whether the Vermont Yankee discharge is at least a potential contributing factor. This is more than mere speculation. CRWC's experts explained how the discharge can affect shad at all life stages—from spawning through egg incubation through juvenile development to juvenile outmigration to repeat spawners, all of which is laid out in the accompanying Request for Findings. Moreover, the opinions of CRWC's experts are corroborated by what the experts at U.S. Fish and Wildlife Service ("USFWS"), the Department of Interior ("DOI"), the U.S. Geological Survey ("USGS"), the Connecticut River Atlantic Salmon Commission ("CRASC"), and the Environmental Advisory Committee ("EAC") have raised all of whom have recommended that further studies are necessary to determine whether the added heat from the Vermont Yankee discharge is having an impact on shad. R.F. ¶¶ 63-67, 372-378.

3. Evidence Shows Adverse Effects on Atlantic Salmon

Entergy and ANR have acknowledged that the existing discharge may be having an adverse impact on the outmigration of salmon smolt. That is what led ANR to include a special condition in the amended permit restricting the proposed 1ºF increase to the period June 15-October 16, and to require further studies to determine how serious the impact may be.[16] However, while the special condition may provide some protection against delayed outmigration for salmon smolt, it does not address the problem of temperature effects on smolt development and their feeding behavior as they migrate downstream. R.F. ¶ 539-555.

Moreover it does not protect adult salmon. As explained by Dr. McCullough, the salmon spawning season extends into the fall sometimes as late as October. R.F. ¶ 558. Adult salmon

[16] Oddly, however, no special provision was made for shad even though similar concerns have been raised with respect to outmigration of juvenile shad, which are in the river until early November.

are more sensitive to temperature changes than smolt. R.F. ¶ 546. Higher temperatures can affect adult salmon in several ways. First, water temperature above 73.4°F inhibits spawning. R.F. ¶ 533. Second, higher temperatures can interfere with gamete development and fecundity. Viability of Atlantic salmon eggs will decrease in the pre-spawning stages if females are subject to high temperatures (i.e., above 78°F). R.F. ¶¶ 534, 556. Third, temperatures above 68°F are known to increase the incidence of warmwater diseases such as furunculosis, which is a threat to Atlantic salmon. R.F. ¶ 545. Fourth, temperatures above 78°F adversely affect feeding behavior. R.F. ¶ 554. Fifth, higher temperatures increase vulnerability to predation. The evidence shows that the proposed discharge will result in temperatures above these thresholds. R.F. ¶¶ 81, 165-174, 194-199, 217-224, 319, 549-551.

4. Evidence Shows Adverse Effects on Other Members of the Indigenous Biological Community

As Dr. McCullough explained, the proposed discharge will also have negative effects on other species in the RIS, notably the yellow perch and fallfish, which are both coolwater species. The optimum growth temperature for yellow perch is between 74°F and 77°F; the mid-range of the reported spawning temperature is about 50°F; and the mid-to upper incubation temperature for egg and larval development is 65°F. R.F. ¶ 57, 101; see also Jt. Ex. 3, 2004 Demonstration, at 184, 210. The temperature-growth curve for perch indicates a very steep decline in growth with increasing temperature. The disease susceptibility of yellow perch increases above a threshold of about 79ºF. R.F. ¶ 105. The fallfish has similar temperature preferences. R.F. ¶ 101. Again, these temperature thresholds are already exceeded under the existing permit and the proposed increase will worsen the negative effects on these indigenous coolwater species.

C. Entergy Fails to Prove that Its Proposed Discharge Will Assure Protection of a the BIP

It follows from what has already been said that Entergy has not shown how its proposed discharge will "assure the protection and propagation" of the BIP in the Connecticut River. Having failed to prove that there has been no prior appreciable harm from the existing discharge, the only way that Entergy could qualify for a variance would be to produce evidence that future harm could be prevented though a modification of the discharge, or perhaps through additional studies that might conclusively show that the discharge is not adversely affecting salmon and shad at any life stage. Contrary to what Entergy may argue, the standard CRWC proposes does not require that it "prove a negative." Rather it requires that Entergy simply do the studies and analyses that have been recommended by CRWC's experts and a number of other experts in the USFWS, USDOI, USGS, CRASC, and the EAC. R.F. ¶¶ 63-67, 372-378.

D. Entergy Fails to Show That Its Proposed Discharge Will Comply With Vermont Water Quality Standards

This Court has several times rejected the argument that 316 (a) "trumps" the VWQS. See Decision and Order on Pending Motions (Jan. 9, 2007), 12-14. In its June 6 Order, the Court neatly summarized the issue as follows:

> Thus, as the January 9 Decision and Order determined, to the extent the VWQS are relevant and are not less stringent than the provisions of the federal Clean Water Act, they apply to this appeal and are not preempted by federal law. See Indiana Dep't of Envtl. Mgmt. v. Twin Eagle LLC, 798 N.E. 2d 839, 842 (Ind. 2003) ("It is clear the federal law does not prevent a state from having a broader or more stringent regulatory program than the [Clean Water Act] imposes.").

Decision and Order on Pending Motions Other than Motion for Renewed Stay (June 6, 2007), at 5-8.

It is black letter law that exceptions to remedial statutes such as the CWA must be narrowly construed so as not to frustrate the legislative purpose. See Spokane & I.E.R. Co. v.

United States, 241 U.S. 344, 350 (1916) (citing to "[t]he elementary rule requiring that exceptions from a general policy which a law embodies should be strictly construed; that is, should be so interpreted as not to destroy the remedial processes intended to be accomplished by the enactment."). The Second Circuit has recognized this rule of construction. Local Union No. 38, Sheet Metal Workers' Intern. Ass'n, AFL-CIO v. Pelella, 350 F.3d 73, 85 (2d Cir. 2003) ("It is an established rule of statutory construction that a proviso states an exception from the general policy which a law embodies, and should be strictly construed and so interpreted as not to destroy the remedial processes intended to be accomplished by the enactment.").

Further, several circuits including the Second Circuit have applied this rule in the context of the CWA. Cf. Northern California River Watch v. City of Healdsburg, -- F.3d ---, 2007 WL 2230186, at *8 (9th Cir. 2007) ("Claims of exemption, from the jurisdiction or permitting requirements, of the CWA's broad pollution prevention mandate must be narrowly construed to achieve the purposes of the CWA."); U. S. v. Akers, 785 F.2d 814, 819 (9th Cir. 1986) (finding that the CWA's normal farming exemptions were not applicable to upland farming activities on wetlands); U. S. v. Huebner, 752 F.2d 1235, 1240-41 (7th Cir. 1985) ("affirm[ing] the district court's narrow interpretation of the [CWA's] agricultural exemptions"); Avoyelles Sportsmen's League, Inc. v. Marsh, 715 F.2d 897, 925 n.44 (5th Cir. 1983) (stating that § 404(f) provides "a narrow exemption for agricultural and silvicultural activities that have little or no adverse effect on the nation's waters"); June v. Town of Westfield, 370 F.3d 255, 257-58 (2d Cir. 2004) (accepting the "observation by other courts that exemptions to the CWA should be construed narrowly").

Finally, EPA regulations make it clear that the Court is authorized to consider the VWQS and other relevant water quality criteria in judging applications for variances under 316(a):

> In determining whether or not the protection and propagation of the affected species will be assured, the Director may consider any information contained or referenced in any applicable thermal water quality criteria and thermal water quality information published by the Administrator under section 304(a) of the Act, or any other information he deems relevant.

40 C.F.R. § 125.73(b).

It is true that EPA has granted variances that did not fully comply with state water quality standards. For example, in Brayton Point, Region One, after rejecting the applicant's request for a broad waiver, developed an alternative effluent limitation that EPA felt was fully protective of the BIP but arguably did not meet the strict requirements of the Massachusetts water quality standards.[17] Brayton Point Demonstration, supra, at 6-58. Because of the need to reconcile two statutory provisions that seem to be pulling in opposite directions (i.e., §§ 316(a) and 510), there is perhaps enough room in the interpretation of the CWA to allow for some departure from state water quality standards in the context of granting a variance. But where the violations of state water quality standards are as egregious as they are in this case, it bends the statute to the breaking point to permit the variance provision to become a device for circumventing water quality goals altogether. In truth, this variance would violate every applicable provision of the VWQS, as follows.

1. The Proposed Discharge Violates the Management Standards for Class B Waters under § 3-04

As mentioned, VWQS require that the Connecticut River, as class B water, must be managed to "fully support . . . aquatic biota, wildlife and aquatic habitat." VWQS § 3-04(A)(1). To "fully support [these] uses" requires "the achievement of level of water quality necessary to consistently maintain and protect existing and designated uses." Id. § 1-01(b)(19). Existing and designated uses in the Connecticut include coldwater habitat for resident species such as the

[17] In fact, the Commonwealth supported EPA's alternative effluent limitations as providing substantially the same level of protection as would the state WQS. Brayton Point EAB, 2006 EPA App. LEXIS, at *340.

brook trout and anadromous species such as the Atlantic salmon, as well as coolwater habitat for the anadromous American shad the resident yellow perch. The evidence shows that the waters affected by Vermont Yankee's discharge do not "fully support" these coldwater and coolwater species throughout their life cycle, and do not "consistently" provide "high quality aquatic habitat." In fact, as a result of the year-round discharge, the receiving waters are virtually always above the preferred temperatures for these species, and may even exceed lethal limits at certain times. However, because actual temperatures are not recorded, there is no way of knowing how hot the water actually gets.

2. The Proposed Discharge Violates the Temperature Standards for Coldwater Habitat under § 3-01

As mentioned, VWQS § 3-01(B)(1)(b) limits the cumulative temperature increases in coldwater habitat to a total of 1°F. Vermont Yankee's existing discharge already exceeds this limit by several orders of magnitude. While this proceeding is limited to the question whether a further 1°F increase should be allowed, the Court cannot ignore the plain fact that the river is not meeting water quality standards now and any further increase will simply exacerbate the problem. If the concept of a coldwater habitat is to have any meaning, and if the temperature standards under the Vermont WQS are to have any effect, the Court must take a "rigorous and conservative approach" and not allow this endless ratcheting up of river temperatures.

3. The Proposed Discharge Cannot Be Justified under § 3-01(B)(1)(d).

CRWC understands that this proceeding is limited to the proposed permit amendment and that the underlying (now expired) permit cannot be challenged here. Nevertheless, to the extent that Entergy or ANR seeks to justify the 1°F increase on the basis that ANR has previously designated a 1.4 mile "mixing zone" under VWQS § 3-01(B)(1)(d) that purports to authorize a further exceedance of the temperature limits set by § 3-01B(1)(b), that rationale must be rejected.

First, federal law does not allow the use of thermal mixing zones to justify a § 316(a) variance where they would "interfere with the assurance of the protection and propagation of a balanced, indigenous aquatic community in the receiving water body segment as a whole." Thermal Discharges, 39 Fed Reg. at 36,176; see also In re Sierra Pacific Power Co., EPA GCO 31, at 372 ("Moreover, the Congress specifically recognized the availability of the mixing zone concept as a mechanism for dealing with thermal discharges pursuant to section 316(a) of the Act.").

Further, VWQS provides that a mixing zone must "[n]ot constitute a barrier to the passage or movement of fish or prevent the full support of aquatic biota, wildlife, and aquatic habitat uses in the receiving water outside the mixing zone." VWQS § 2-04(A)(2). The evidence shows that the proposed discharge may constitute a barrier to passage of shad and salmon, and in particular to the outmigration of juvenile fish, and Entergy has not proven otherwise. The fact that ANR has imposed a further, albeit inadequate (see below), temporal restriction on the proposed discharge (i.e., the June 16 to October 14 condition), and has ordered further studies, confirms that there is some risk to the salmon smolt. Finally, Entergy has not shown that the proposed discharge will fully support coldwater habitat in the receiving waters. Accordingly, the exception under VWQS § 3-01(B)(1)(d) does not apply and the 1°F limit of § 3-01(B)(1)(b) is the controlling standard the Court must apply.

4. The Proposed Discharge Violates the Anti-Degradation Policy under VWQS § 1-03

The cornerstone of Vermont's water quality program is the anti-degradation policy, which states that that "all waters shall be managed in accordance with these rules to protect, maintain, and improve water quality." VWQS § 1-03 A (emphasis added). Plainly, granting the variance will not "improve" the quality of the Connecticut River. In § 1-03 B the policy further mandates that: "Existing uses of waters and the level of water quality necessary to protect those

existing uses shall be maintained and protected." As described above, several existing and designated uses of the Connecticut are not being maintained and protected at present. Another variance will simply compound the problem and move the river further from the desired temperature regime for a coldwater habitat.

5. The Proposed Discharge Violates the Standards for Protecting High Quality Waters under VWQS § 1-03C(1)

From what has already been said, it follows that the variance would also contravene the policy prescription that high quality waters such as the Connecticut "shall be managed to maintain and protect the higher water quality and minimize risk to existing and designated uses." Far from minimizing the risk to salmon and shad, the variance would increase it.

CONCLUSION

For the foregoing reasons the Connecticut River Watershed Council respectfully requests that the Court deny Entergy's application for a variance under § 316(a) of the Clean Water Act.

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South Royalton, Vermont

Respectfully submitted,

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