III. CWA § 316(a) Variance-Based Thermal Discharge Limits

Response #:III.1-44	**Document #**: 1218

1. Comment
PG&E-NEG stated that CWA § 316(a) "entitles" a thermal discharger to "alternative" thermal discharge limits if such alternative limits will be adequate to satisfy the biological standard of CWA § 316(a).

Response
EPA **has** based the NPDES permit's thermal discharge limitations on a CWA § 316(a) variance. These limitations are less stringent than would otherwise be required by technology-based and/or water quality-based requirements. Although EPA rejected the "alternative" limits proposed by the permittee because they did not satisfy the biological standard of CWA § 316(a), the Agency then imposed a different set of "alternative" limits that the Agency determined **would** meet that test.

Although the commenter seems to argue that a discharger necessarily has an impregnable right to CWA § 316(a) variance-based thermal discharge limits once the biological standard of that provision has been satisfied, the validity of this argument is not at issue here because EPA **did** grant the permittee a § 316(a) variance. The Agency simply issued different variance-based limits than those requested by the permittee based on the Agency's application of the law to the facts of this case. Because the issue is not joined here, EPA will not resolve the question of whether thermal dischargers have an unassailable "entitlement" to § 316(a) variance-based limits once they meet the biological standard in that provision.

Nevertheless, EPA wishes to note that the validity of such an argument is questionable for a number of reasons, including that the plain language of the statute, the legislative history, and EPA regulations all indicate that CWA § 316(a) **authorizes**, but does not command, EPA (or a State administering the NPDES permit program) to put "alternative" thermal discharge limits in a permit—i.e., alternative to the technology-based and/or water quality-based limits that would otherwise apply under the law—if the biological standard of § 316(a) is satisfied. For example, the statutory and regulatory language states only that EPA "may" set such alternative thermal discharge limits, not that it "shall" or "must" do so. 33 U.S.C. § 1326(a); 40 CFR §§ 125.70, 125.73(a). See also *In the Matter of Public Service Company of New Hampshire (Seabrook Station, Units 1 & 2)*, 10 ERC 1257, n. 7 (U.S. EPA, NPDES Permit Application No. NH 0020338, Case No. 76-7, June 17, 1977); 40 CFR §§ 123.25(a)(4), (35) and (36). (States seeking delegation of the NPDES program are not precluded from omitting or modifying to make more stringent the provisions of 40 CFR §§ 122.21(m) and 124.62 and Part 125, Subpart H, all of which govern § 316(a) variances.)

Of course, despite the permissive nature of the variance requirement stated in § 316(a), EPA's permitting decisions are subject to the requirements of the Administrative Procedures Act and cannot be arbitrary and capricious. EPA would need to have a legitimate reason not to grant variance-based thermal discharge limitations in such circumstances, if it found that such limitations would otherwise meet § 316(a) biological standards. A possible example of such a situation might be if EPA concluded that a particular set of thermal discharge limitations would be sufficient to assure the protection and propagation of the balanced, indigenous population of fish, shellfish, and wildlife in and on the receiving water, but the discharge's thermal load was causing or contributing to violations of State water quality standards for dissolved oxygen, eutrophication, and/or aesthetics and interfering with attainment of designated uses such as primary contact recreation. In such a case, a State might refuse to certify the permit under CWA § 401(a)(1) or impose more stringent permit conditions in its certification that should be included in the

permit in accordance with CWA § 401(d). (The issue of the interaction of CWA § 316(a) and § 401 is discussed elsewhere in this document.)

2. Comment

PG&E-NEG acknowledged that it has the "burden of proof" in seeking to justify a proposed variance under CWA § 316(a). The permittee commented, however, that EPA incorrectly characterizes this burden of proof as "extremely rigorous." The permittee stated that EPA must review PG&E-NEG submissions to determine whether the permittee has "provided reasonable assurance" that its proposed 316(a) variance-based thermal discharge limits will not cause "appreciable harm" to the BIP of Mount Hope Bay. The permittee stated that instead of taking this approach, EPA has based the Draft Permit on a misreading of the relevant law and an erroneous biological analysis. PG&E-NEG said that EPA has created a "novel and unreasonable standard of law" for this case that is different from that applied in all other cases, and that EPA's analysis is inadequate to justify denial of the permittee's variance request.

Response

EPA believes it has properly characterized and explained the "burden of proof" that an applicant for a CWA § 316(a) variance must bear. The Agency has not created for this case a "novel" or "unreasonable" standard different from that applied in other cases. EPA's view of the burden of proof is discussed in some detail in § 6.2.3 of EPA's July 22, 2002, Permit Determinations Document. See also *Id.* at § 6.2.2.

When EPA characterized the burden faced by the applicant for a § 316(a) variance as "extremely rigorous," the Agency was simply trying to characterize the burden as defined by the statute, the regulations, and earlier EPA decisions. The Agency did not mean to suggest that it was adding any additional increment to the burden faced by the applicant and did not do so. EPA meant only to explain that the burden of proof for justifying a § 316(a) variance was "stringent."

EPA continues to believe that its characterization of the burden of proof was accurate. This is based on several points discussed in § 6.2.3 of EPA's July 22, 2002, Permit Determinations Document. First, CWA §316(a) itself states that the permitting agency may allow alternative variance-based thermal discharge limits only when the applicant has demonstrated to the

> . . . satisfaction of the Administrator that . . . [the effluent limits that would otherwise apply] *will* require effluent limitations more stringent than necessary to assure the pro[t]ection and propagation of a balanced, indigenous population of shellfish, fish, and wildlife in and on the body of water into which the discharge is to be made, . . . [and that the alternative limits] *will assure* the protection and propagation of a balanced, indigenous population of shellfish, fish, and wildlife in and on that body of water.

33 U.S.C. § 1326(a) (emphasis added). EPA believes this statutory language creates a stringent standard. See also CWA of 1972 Legislative History, p. 175; 40 CFR §§ 125.70 and 125.73(a). Second, the Administrator of EPA has expressly stated that "the burden of proof in a 316(a) case is a stringent one." *In the Matter of Public Service Company of New Hampshire (Seabrook Station, Units 1 & 2),* 10 ERC 1257, 1264 (U.S. EPA, NPDES Permit Application No. NH 0020338, Case No. 76-7, June 17, 1977).

Third, in § 6.2.3 of EPA's July 22, 2002, Permit Determinations Document, EPA was also clear that the amount and type of evidence needed to sustain a § 316(a) variance application may vary with the circumstances of the case and that this may result in the need for detailed, rigorous analysis even where an existing facility is seeking reissuance of a prior variance decision. The materials cited in the permittee's comments support the Agency's view. See, e.g., *Public Service Company of New Hampshire,*

10 ERC at 1264 ("[n]o hard and fast rule can be made as to the amount of data that must be furnished . . . [and that m]uch depends on the circumstances of the particular discharge and receiving waters"); *Review of Water Quality Standards, Permit Limitations, and Variances for Thermal Discharges at Power Plants* (EPA) (October 1992), p. 15 (the degree of evidence needed to renew a § 316(a) variance depends on the environmental circumstances of the case and detailed study may be needed); *Interagency 316(a) Technical Guidance Manual and Guide for Thermal Effects Sections of Nuclear Facilities Environmental Impact Statements* (DRAFT) (EPA) (May 1, 1977), §§ 3.1, 3.2, and 3.3 (different degrees of review and data are needed depending on the nature of the environmental issues presented by the case; factors discussed in the document would suggest detailed review for the BPS thermal discharge). EPA believes it has more than demonstrated that the facts of this case warrant the level of review that has been provided for this permit. See *Public Service Company of New Hampshire*, 10 ERC at 1264 ("The greater the risk, the greater degree of certainty that should be required" in making variance determinations under § 316(a).).

The permittee has noted that the burden on the applicant for a CWA § 316(a) variance has at times been characterized as a requirement to provide "reasonable assurance" that alternative thermal discharge limits will result in the protection and propagation of the balanced, indigenous population (BIP) of fish, shellfish, and wildlife in and on the receiving water. EPA does not disagree with this formulation. It merely recognizes that the language of § 316(a) requires "assurance" of the protection and propagation of the BIP—the statute says "will assure" rather than "might assure"—but that EPA cannot unreasonably refuse to find such assurance. EPA understands this.

Indeed, EPA also previously noted that the Agency should not hold out for "certainty" before granting a § 316(a) variance. See § 6.2.3 of EPA's July 22, 2002, Permit Determinations Document. EPA believes its evaluation has been reasonable in this regard. After careful evaluation, EPA concluded that the alternative thermal discharge limits proposed by the permittee did not provide reasonable assurance that protection and propagation of the BIP would be achieved. Rather than simply rejecting any § 316(a) variance, however, the Agency identified a more stringent set of alternative limits that it concluded **would** provide a reasonable degree of assurance of protection and propagation of the BIP and placed these limits in the permit. EPA concluded that these were the least stringent limits that would satisfy CWA § 316(a). These limits do not, however, **guarantee** the protection and propagation of the BIP. The permit limits still allow a significant discharge of heat to Mount Hope Bay that will adversely affect 10 percent of the bay's area, which includes sensitive spawning habitat. This discharge would also violate State water quality standards in the absence of a § 316(a) variance. Moreover, the seriousness of the cumulative effects of the plant's thermal discharge might vary depending on whether, and to what extent, the recent pattern of rising water temperature apparently associated with climate change continues. Thus, monitoring will be needed to determine whether the permit's thermal discharge limits remain sound for future permit reissuance proceedings.

The permittee states that in discussing the burden of proof, EPA cited comments regarding CWA § 316(a) by "Senator Muskey [sic]" from the legislative history for the Clean Water Act Amendments of 1977, despite the fact that § 316(a) was enacted as part of the CWA of 1972. See § 6.2.3 of EPA's July 22, 2002, Permit Determinations Document. EPA is well aware that Senator Muskie's comments in the 1977 legislative history were made **after** the 1972 enactment of § 316(a). Consequently, EPA also recognizes that they constitute less persuasive authority than if they had been made contemporaneously with enactment of the statutory provision in question. EPA did not, however, rely principally on these comments. Without these comments, the Agency's assessment of the burden of proof would be the same. EPA had already provided clear authority for its view from the statutory language, the legislative history of the 1972 Act, EPA regulations, and the Administrator's decision in *Public Service Company of New Hampshire*, 10 ERC at 1264. Nevertheless, as EPA noted in § 6.2.3 of EPA's July 22, 2002, Permit

Determinations Document, n. 5, Senator Muskie's comments about § 316(a) are of interest because, as the Supreme Court has noted, he was the "principal Senate sponsor of the Act." *Environmental Protection Agency* v. *National Crushed Stone Association*, 449 U.S. 64, 71 n. 10 (1980). His comments are consistent with the stringent burden of proof that EPA has described.

Finally, the permittee's citation to *Davila-Bardales* v. *INS*, 27 F.3d 1, 5 (1st Cir. 1994), is entirely inapposite. In that case involving an immigration issue, the government had altered its standard practice without explanation or recognition. Here, EPA did not alter its past practices or legal interpretation with respect to burden of proof. Moreover, EPA fully explained its approach to the issue and the basis for it.

3. Comment

PG&E-NEG argued that when assessing whether a thermal discharge will assure the protection and propagation of the "balanced, indigenous population of fish, shellfish and wildlife in and on the receiving water," as required by CWA § 316(a), the "baseline for analysis is the population that would exist today in the absence of the power plant." Furthermore, the permittee stated that EPA has distorted this standard and biased it by requiring an evaluation using as the reference point a hypothetical community of fish that would exist in the absence of numerous stressors unrelated to the power plant. PG&E-NEG stated that the appropriate reference point is the current population of fish in Narragansett Bay since EPA has agreed that Narragansett Bay's fishery has not been affected by BPS.

Response

EPA believes that it has properly applied the phrase "balanced, indigenous population of shellfish, fish and wildlife in and on [the receiving water]" (the "BIP") from CWA § 316(a) in the development of the NPDES permit for BPS. This issue is discussed in § 6.2.2 of EPA's July 22, 2002, Permit Determinations Document.

In its comments, the permittee argues that the BIP is whatever population would "exist today in the absence of the power plant." EPA thinks this approach would go too far in allowing thermal discharges to contravene the protection and propagation of the BIP as required by § 316(a). According to the permittee's approach, if a fish population had been decimated by, for example, pollution from other sources (or by overfishing or even an existing power plant's cooling water intake structure), the depleted population that remained would constitute the BIP to be protected. As a result, the power plant could be allowed to discharge as much heat as would not interfere with maintaining this decimated population regardless of whether much less thermal discharge would be required to assure the protection and propagation of an otherwise healthy BIP.

EPA believes that the permittee's approach would be inconsistent with CWA § 316(a). The statutory language refers to assuring the protection and propagation of a "balanced, indigenous" population. This does not mean it is just **any** population with some degree of balance; it is supposed to be balanced and **indigenous** to the receiving water. See *In the Matter of Public Service Company of Indiana, Inc.* (*Wabash River Generation Station, Cayuga Generating Station*, 1 E.A.D. 590, 1979 EPA App. LEXIS 4, 28 (NPDES Appeal No. 78-6) (Nov. 29, 1979) ["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."]). Although the specific term "indigenous" is not defined in the statute or regulations, the *American Heritage Dictionary (2d College Edition)* defines "indigenous" to mean "occurring or living naturally in a particular area or environment; native . . . [, i]ntrinsic, innate." This indicates that the BIP should generally consist of populations expected to exist in the waterbody naturally—with certain exceptions noted in EPA regulations and discussed below—rather than just **whatever** population may exist there today. As EPA explained in *Wabash*, 1979 EPA App. LEXIS at 28, defining the BIP as whatever population exists after it has been altered by pollution would be "at war with the notion of 'restoring' and 'maintaining' the

biological integrity of the Nation's waters," one of the core purposes of the Clean Water Act. 33 U.S.C. § 1251(a).

As EPA explained in § 6.2.2 of EPA's July 22, 2002, Permit Determinations Document, the legislative history of CWA § 316(a) confirms the Agency's view. The Conference Committee Report on S. 2770, which became the CWA of 1972, stated the following (in pertinent part):

> THERMAL DISCHARGES [Section 316]
>
> 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.

1972 Legislative History, p. 175.[1]

As is also discussed in § 6.2.2 of EPA's July 22, 2002, Permit Determinations Document, EPA regulations defining "balanced indigenous population" confirm this view as well. They note that a BIP may include "historically non-native species" only under certain specified circumstances (i.e., species introduced as part of a wildlife management program or "species whose presence or abundance results from substantial, irreversible environmental modifications"). 40 CFR § 125.71(c). EPA's regulation also states that a BIP will not normally include species whose presence or abundance is attributable to either discharges of pollutants that would be eliminated by compliance of all sources with CWA technology standards or thermal discharge limits authorized under a § 316(a) variance. See also *Wabash*, 1979 EPA App. LEXIS at 29 ("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'").

Furthermore, EPA's regulations direct that thermal discharge limits under a § 316(a) variance must assure the protection and propagation of a BIP in the receiving water "considering the cumulative impact of its thermal discharge together with all other significant impacts on the species affected." 40 CFR § 125.73(a). See also 33 U.S.C. § 1326(a) ("taking into account the interaction of such thermal component [of the plant's discharge] with other pollutants..."); *Public Service Company of New Hampshire*, 10 ERC at 1261–62. Thus, EPA has clearly interpreted CWA § 316(a) to require that protection and propagation of a BIP in the receiving water to be assured, taking into account the adverse effects of the thermal discharges in combination with other stressors, rather than using a degraded community to set the baseline, as argued by the permittee.

EPA disagrees with the permittee that the Agency has "biased" or "distorted" the BIP standard under CWA § 316(a). EPA has assessed the potential effects of the power plant's thermal discharges on the BIP, while also appropriately taking other stresses on the BIP into account in its assessment of these effects. EPA has tried to devise permit limits that will assure the protection and propagation of the BIP vis-a-vis thermal discharges. EPA has not tried to impose thermal discharge limitations that by themselves would somehow overcome all other stresses to the BIP. At the same time, the Agency has not used these other

[1] To the extent that the comments of Representative Clausen cited by the permittee are inconsistent with the Conference Committee Report, see 1972 Legislative History, p. 264 (House Consideration of the Report of the Conference Committee, October 4, 1972), that report constitutes superior authority to the remarks of a single Congressman about the report.

stresses as an excuse for allowing greater thermal discharges that would themselves cause or contribute to the failure to assure the protection and propagation of a BIP in Mount Hope Bay. EPA's analysis demonstrates that BPS's thermal discharge has contributed to the failure to maintain a BIP in Mount Hope Bay to date. EPA has further demonstrated that the new thermal discharge limits in the permit are sufficient to reasonably assure that thermal discharges from the power plant will be removed as an impediment to protection and propagation of the BIP in Mount Hope Bay. These limitations, however, would not likely be sufficient to **actually** restore a BIP if nothing is done about the adverse effects of species losses to the power plant's cooling water intake structure or overfishing. These problems are, however, also being addressed. As EPA discussed in its July 22, 2002, Permit Determinations Document, strict fishing restrictions have been in place for a number of years and losses to the BPS cooling water intake will be substantially reduced as a result of this permit.

The permittee also states that fish populations in Narragansett Bay are **the** proper reference point for assessing the effects of BPS's thermal discharge on a BIP in Mount Hope Bay. EPA agrees that fishery data from Narragansett Bay provide one interesting reference point, but by no means the only one for assessing the plant's effects on the BIP in Mount Hope Bay. First, contrary to the permittee's comment, EPA does not agree that BPS has no effect on Narragansett Bay. The plant's thermal plume reaches into Narragansett Bay under some tidal conditions. Moreover, the thermal plume and cooling water intake affect spawning and nursery habitat in Mount Hope Bay for species that also spend time in Narragansett Bay. These waterbodies are physically and ecologically connected.

Second, the larger Narragansett Bay is not itself necessarily a healthy ecosystem. Its fish stocks are affected by power plant cooling water systems on the Providence River, overfishing, and other pollution problems. Overfishing is being addressed, and other problems might be as well, but it is not clear that Narragansett Bay is a true reference point for a BIP for Mount Hope Bay.

Third, as EPA has discussed in its July 22, 2002, Permit Determinations Document, and elsewhere in this document, the data indicate that Narragansett Bay fish abundance is different from that in Mount Hope Bay to a statistically significant degree. Fourth, the *Wabash* case cited to by the permittee does not contradict EPA's view. In *Wabash*, the Administrator did note that the utility had evaluated the effects of the power plant by comparing conditions in the stretch of river affected by the discharge with conditions in other stretches that were not affected. See *Wabash*, 1979 EPA App. LEXIS 24. The more important aspect of the Administrator's analysis in *Wabash*, however, turned on an assessment of fish abundance trends and species composition over time **within** the river segments being affected by the plant. Id. at 25–30. Thus, EPA paid considerable attention in *Wabash* to changes in the pre-thermal discharge abundance of particular species and the composition of the BIP after commencement of the thermal discharge. Id. at 25–40. With respect to the § 316(a) variance for BPS, EPA considered both abundance trends and species composition within Mount Hope Bay, as well as comparisons of abundance between Mount Hope Bay and Narragansett Bay. Furthermore, EPA considered the relationship of the plant's thermal discharges to "critical temperatures" for resident species making up the BIP. EPA's analysis has been reasonable, appropriate, and consistent with existing guidance. Nothing in the *Interagency 316(a) Technical Guidance Manual and Guide for Thermal Effects Sections of Nuclear Facilities Environmental Impact Statements* (DRAFT) (EPA) (May 1, 1977) contradicts the manner in which EPA evaluated thermal effects from BPS.

4. Comment

PG&E-NEG stated that EPA erroneously interprets the meaning of the "balanced indigenous population" under CWA § 316(a) by adopting the view that alternative thermal discharge limits should be denied if plant operations could delay recovery of a species in Mount Hope Bay regardless of what caused the species' decline. The permittee argued that EPA cannot consider a thermal discharge's effect in delaying the recovery of a damaged "balanced, indigenous population" in evaluating proposed alternative thermal

discharge under CWA § 316(a). The permittee further argued that EPA has offered no support for considering this factor and that doing so is inconsistent with the legislative history of the CWA, which, according to the permittee, indicates that "enhancement" of the balanced, indigenous population is not necessary to qualify for a § 316(a) variance. The permittee also commented that using this consideration effectively eliminates the "appreciable harm" standard that EPA has used in applying § 316(a) because under this approach virtually any harm could delay recovery. The permittee also argued that when Congress wanted the element of delayed environmental recovery to be considered when evaluating a variance, it said so. The permittee pointed to CWA § 301(h)(2) and 40 CFR § 125.61(f) as an example of such a case and distinguishes it from § 316(a).

Response

EPA denied the CWA § 316(a) variance and alternative thermal discharge limits sought by the permittee because the Agency determined that the power plant's existing discharge had resulted in "appreciable harm" to the "balanced, indigenous population of shellfish, fish, and wildlife (the "BIP") in and on Mount Hope Bay"—indeed, contributed to the collapse of that BIP—and because the Agency determined that the limits sought by the permittee would not be sufficient to assure the protection and propagation of the BIP. There were a number of bases for the latter conclusion. Only one was that the thermal discharge proposed by the permittee would "delay"— indeed, would likely preclude—the recovery of depleted fish populations. The permittee seems to allege, however, that the power plant cooling system operations have played no role in the depletion of fish populations in Mount Hope Bay. EPA's analysis disagrees. In fact, even the permittee admits that power plant operations have had a measurable impact on, at a minimum, 5 square miles of Mount Hope Bay. In addition, as is discussed in Chapter 6 of the July 22, 2002, Permit Determinations Document, and elsewhere in this document, EPA is supposed to consider the effects of thermal discharges in conjunction with other stresses to the BIP. Therefore, other factors contributing to the problem are not irrelevant to this evaluation.

The permittee argues that EPA is foreclosed from considering whether alternative thermal discharge limits would "delay" recovery of a BIP in determining appropriate thermal discharge limits under CWA § 316(a). EPA disagrees. CWA § 316(a) requires that alternative thermal discharge limits be sufficient to assure the protection and propagation of the BIP. If alternative limits would **prevent** the recovery of the BIP, they would not meet the standard of § 316(a). Alternatively if the limits would **allow or facilitate** that recovery, presumably they would meet the standard. However, if an analysis showed that one set of alternative thermal discharge limits would allow the recovery within one time frame, while another set of alternative limits would also eventually allow the recovery but only after an unreasonably longer time frame, EPA believes the Agency could consider this and potentially find that the latter limits do not adequately assure the protection and propagation of the BIP. Unreasonably delaying recovery is arguably inconsistent with the notion of assuring the protection and propagation of the BIP. Of course, if the difference in time for recovery was insignificant, EPA would also likely have authority to impose the less stringent limits. This makes sense in light of the purpose of the CWA, the Act's deadlines for achieving compliance with technology-based and water quality-based standards, the fact that EPA permits must be reissued every 5 years, and the fact that § 316(a) allows a variance from these standards only if the alternative limits "will assure" the protection and propagation of the BIP. In any event, this issue is <u>not</u> presented by this case. EPA did not reject the alternative limits proposed by the permittee on the grounds that they would allow, but unreasonably delay, the recovery of the BIP. See July 22, 2002, Permit Determinations Document, § 6.4.2. EPA rejected the permittee's proposed limits because, as stated above, the Agency concluded that the permittee's past thermal discharges have caused appreciable harm to the BIP, and its proposed future discharge would not assure the protection and propagation of the BIP. The latter conclusion is based on a number of factors, only one of which is EPA's conclusion that the permittee's proposal would **prevent** (not merely delay) the recovery of the BIP.

EPA's position does not amount to requiring thermal discharge limits that would somehow "enhance" the BIP. The limits EPA proposes are merely designed to assure the BIP's protection and propagation. Furthermore, there is nothing about the Agency's approach that would eliminate the appreciable harm standard as stated in the regulations. 40 CFR § 125.73(c). See also *Wabash*, 1979 EPA App. 4, 16 (the "plain language of . . . [the regulations] establishes a test which equates a finding of 'appreciable harm' with a failure to satisfy the statutory requirements of protecting a balanced, indigenous aquatic community"). The term "appreciable harm" is not defined in the regulations, but it would be reasonable to interpret the phrase to encompass the effects of a thermal discharge causing a significant delay in the recovery of a BIP. See also *Wabash*, 1979 EPA App. 4, 40 (in a § 316(a) variance determination, it is appropriate to consider worst-case conditions and period of time that species would be affected by the discharge, and the amount of time that would be needed to reverse these effects). In any event, as explained above, this issue is not presented by this case because our § 316(a) determination does not turn on the issue of a mere delay to the recovery of the BIP.

Finally, EPA concludes that there is nothing about CWA § 301(h)(2), 33 U.S.C. § 1311(h)(2), or 40 CFR § 125.62(f)(3)[2] – which relate to secondary treatment variances for publicly owned sewage treatment plants – that is inconsistent with EPA's interpretation of CWA § 316(a) and the appreciable harm standard or that renders that interpretation unreasonable or inappropriate.

5. Comment

Citing EPA's decision *In the Matter of Public Service Company of Indiana, Wabash River Generating Station*, 1 EAD 590, 603–05 (Nov. 29, 1979), the permittee stated that the Agency believes that "significant [adverse] effects on relative abundance" may be acceptable in some cases under CWA § 316(a) and might even countenance the "virtual elimination" of certain species from the balanced indigenous population.

Response

EPA agrees that the *Wabash* permit appeal decision suggests that the Agency interpreted CWA § 316(a) in that case to allow that a significant reduction in abundance for some individual species **might be acceptable in some cases** without undermining adequate protection of the overall balanced, indigenous population of shellfish, fish, and wildlife in and on the receiving water. Of course, the decision also indicates that in other cases this would not be acceptable. It would depend on the facts of the case. Also, EPA does not read *Wabash* to necessarily indicate that "virtual elimination" of certain species from the BIP would be acceptable.

In any event, EPA thinks that significant adverse effects on individual species within the BIP could possibly be acceptable only where the overall BIP was otherwise generally healthy in terms of abundance and composition. The Agency believes the *Wabash* decision supports this view. Only in such circumstances might the Agency be able to conclude that assurance of the protection and propagation of the overall BIP was not compromised despite some effect on, for example, one or two individual species. These are not, however, the circumstances that exist with respect to Mount Hope Bay. The BIP in Mount Hope Bay has been seriously damaged, with substantial abundance declines for numerous species and the community as a whole, as well the appearance of some shifts toward more thermally tolerant species.

In *Wabash*, EPA states that "each Section 316 proceeding, by its very nature, is necessarily unique." 1979 EPA App. LEXIS at 20 (citing, *In the Matter of Public Service Company of New Hampshire (Seabrook*

[2] The permittee cites to "40 CFR § 125.61(f)," Foley Hoag Comments, p. 51 n. 97, but there is no such regulation. From the context of the comment, EPA believes that the permittee made a typographical error and meant to reference 40 CFR § 125.62(f). EPA has considered and responded to the comment on that basis.

Station, Units 1 and 2), NPDES Appeal No. 76-7 (August 4, 1978), 1978 EPA App. LEXIS 17, 81). The Agency also states that in assessing impacts on a BIP, effects on both individual species and the community as a whole must be considered, and a focus on community-level effects should not be allowed to obscure important impacts on individual species. 1979 EPA App. LEXIS at 21–22, 25. Therefore, the relative importance of particular degrees and types of impact could vary in different cases.

In *Wabash*, the facts apparently indicated that "while overall diversity and abundance may have been fairly constant, the emerging trends in the effects on individual species are disturbing." *Id.* at 26. EPA was clear that a significant change in overall community abundance or species composition within a community due to thermal discharges (e.g., from a cold-water assemblage to a warm-water one, or from a river community to a lake community) would be at odds with § 316(a), which, the Administrator underscored, should be interpreted in light of the CWA's overarching purpose of restoring the biological integrity of the Nation's waters. *Id.* at 28. The Administrator stated that it was difficult to assess the relative weight to give to the individual species problems that were evident versus the "comparative stability of the overall community indices." *Id.* at 31. He also stated that if making that assessment was the only question about the Regional Administrator's decision granting the variance, he might have been inclined to uphold the decision because it was not "clearly erroneous."

However, the Administrator **did** remand the decision to the Region because of its failure to adequately consider effects during potential "worst-case" low-flow conditions in the river. *Id.* at 31–41. EPA noted that data indicated that upper critical temperatures for various species would be exceeded in various river stretches owing to the plant's thermal discharge under worst-case conditions and that this heightened concern over the plant's ability to assure the "required protection of the aquatic community." *Id.* at 39. The Administrator also reasoned that because the permittee admitted that it would take a few years before the observed effects of the discharges on certain species could be reversed, "it is not unreasonable to infer that the discharges might have a substantial adverse effect on the aquatic community at the Q [7-10] level, causing a larger number of species to be adversely affected and for longer periods of time." *Id.* at 40. The Administrator's discussion appears to indicate that this type of effect would likely not be acceptable under § 316(a). As a result, the Administrator remanded the permit to the Regional Administrator to consider appropriate modifications to the permit, which the Administrator stated **might** include options such as requiring compliance with State water quality standards under certain flow conditions or at one of the permittee's two power plants on the river. *Id.* at 41.

EPA's § 316(a) variance determination for BPS is based on the specific facts of that case. It is not inconsistent with EPA's permit appeal decision in *Wabash*.

6. Comment

PG&E-NEG stated that EPA fails to meaningfully respond to the permittee's biological analyses and that although Region 1 participated in a number of studies conducted by the permittee, the Region "ignores what those analyses demonstrate." The permittee asserted that the Region "offers no in-depth biological analysis of its own" and, instead, "relies on little more than a review that consists of little more than speculative assertions of possible environmental effects, conclusory rejections of BPS's methods, and misleading and inaccurate references to pre-existing studies, the relevance of which EPA does not even attempt to demonstrate." The permittee then stated that speculative assertions regarding harm that might occur or some shortcoming in the permittee's analysis are not a "meaningful 'rebuttal'" of the permittee's § 316(a) demonstration.

Response

EPA has carefully considered the permittee's biological analyses, and has responded to the permittee's findings in detail in EPA's July 22, 2002, Permit Determinations Document and elsewhere in these responses to comments. In fact, EPA has worked with PG&E-NEG to determine the best method for

predicting thermal impacts on the biological community of Mount Hope Bay. EPA, members of the BPS Technical Advisory Committee (TAC), and PG&E-NEG and its consultants engaged in a multistep process to assess thermal effects from the operations of BPS. This collaborative effort began in 1997 and continued into 2001. Phase 1 was to derive a hydrodynamic model that would be able to predict thermal plume movements around Mount Hope Bay at multiple depths in the water column. A subcomponent of this model to be developed was supposed to be able to predict the effects of the thermal discharge on the dynamics of dissolved oxygen.

After several years of work by the permittee's consultant Applied Science Associates, the permittee, and some members of the TAC, the parties reached a general consensus that the hydrothermal model was a reasonable tool to predict the location and temperature of the discharge plume. The model was calibrated with data collected from arrays of thermistors in Mount Hope Bay and comparisons with NASA satellite images of Mount Hope Bay. Thus, concerns of underpredicting the size and extent of the thermal plume, which has been a problem with previous models submitted by BPS, were assuaged by calibrating this model with actual field data. As a result, in assigning impacts and thermal changes associated with various heat load scenarios, EPA is relying on the hydrothermal model developed by the permittee in collaboration with the TAC. Unfortunately, PG&E-NEG was not able to produce the model subcomponent predicting thermal effects on dissolved oxygen concentrations.

Phase 2 was to integrate the capabilities of the hydrodynamic model with a predictive assessment of biological effects. This was to be accomplished in two ways. For winter flounder, a RAMAS population model was to be used to assess entrainment and impingement impacts. A habitat suitability model was to be devised to feed into the RAMAS to examine the impact of the thermal plume on winter flounder. For about 10 species other than winter flounder, a review of relevant scientific literature on water temperature thresholds was completed. In interpreting the results of the various studies, there was general disagreement about the approach and application of this information between members of the TAC and the consultants to PG&E-NEG. The consultants to PG&E-NEG produced an analysis that derived temperature polygons for each species. These temperature polygons used chronic and acute mortality limits and, if available, avoidance and cold shock temperatures to derive "acceptable" temperatures for each species examined. The concept of thermal acclimation was applied in the derivation of the polygons. EPA and members of the TAC had numerous disagreements over the specifics details of the temperature polygons. Instead of recapping all the specific disagreements, EPA refers the reader to Chapter 6 of the EPA Permit Determinations Document. MA DEP, MA CZM, MA DMF, and RI DEM all submitted letters detailing their concerns on this issue, among others, and those letters are included in the appendices of the Permit Determinations Document.

It is worthwhile revisiting the question of thermal acclimation and its application in the temperature polygons. EPA acknowledges that thermal acclimation occurs in nature; however, the Agency disagrees with PG&E-NEG regarding the speed and magnitude of this process. PG&E-NEG relies heavily on laboratory studies that show it is possible for a certain fish species to survive up to a specific temperature when acclimated to a second lower temperature. These studies might establish what the species of interest can physiologically withstand, but they do not address what are optimal temperatures nor what is typical from a behavioral point of view. The TAC believed that the reliance on laboratory studies would tend to overstate the effects of acclimation in actual, real-world conditions.

The TAC also believed that PG&E-NEG's polygon method was limited in that it did not take into consideration the effect of temperature on ecological processes. For example, the work by Keller and Klein-MacPhee (2000) has demonstrated that small increases in winter water temperature lead to increased predation by sand shrimp, resulting in significant reductions in winter flounder egg and larval survival rates. This is a critical ecological component not captured in PG&E-NEG's temperature polygon method.

Finally, EPA and the TAC frequently viewed the results of the scientific literature differently than PG&E-NEG. The following is presented as a generic example of these different viewpoints. A population is composed of many individuals, all with their own temperature preferences. If one were to study the temperature preferences of this theoretical population, one would find that some individuals are affected at lower temperatures than others; but as temperatures continue to increase, 100 percent of the individuals are affected. In the scientific literature, one can find studies where researchers document the temperature where they first begin to see a biological effect (i.e., when the first individual reports being hot) and the point where they see that 100 percent of the population is experiencing the effect. The TAC preferred to adopt the lower temperature, which arguably could represent a no-effects level. PG&E-NEG preferred to focus on the point at which 100 percent of the population would demonstrate an effect. As a compromise the TAC and PG&E-NEG initially discussed using the assumption that there was a linear increase of effects between these two points. Members of the TAC were not comfortable with that assumption, however, because biological effects can frequently be triggered by all-or-nothing threshold concentrations and not a more gradual response. Literature on dose-response curves for thermal studies show that biological responses tend to be rapid with incremental temperature increases between a 50 percent and a 100 percent biological response (Coutant 1972).

Taking these differences into consideration, EPA decided to adopt the following approach to assessing thermal effects from BPS. EPA used the results from the predictive hydrothermal model and compared the output from numerous model runs with critical threshold temperatures agreed upon by the TAC. These critical threshold temperatures considered ecological consequences of the thermal discharge by targeting temperatures that resulted in lower predation rates on winter flounder eggs and larvae as detailed by Keller and Klein-MacPhee (2000). EPA chose threshold temperatures that represented an acceptable level of impact but did not represent a zero impact temperature. For example, winter flounder begin to show increased burrowing and decreased feeding activity at temperatures above 20 ºC. Temperature avoidance by juvenile winter flounder occurs at 24 ºC (Duffy and Luders 1978, Casterlin and Reynolds 1982), and EPA chose this as its target threshold temperature. This temperature clearly is in excess of a no-effects level, but the ecological impact of increased burrowing and decreased feeding is difficult to determine. However, avoidance of an area clearly is in conflict with EPA's duty to assure the protection and propagation of the balanced, indigenous population of Mount Hope Bay.

EPA believes that the use of target threshold temperatures is reasonable and appropriate in this case. It is more protective than PG&E-NEG's temperature polygon method but EPA believes this approach is warranted because of the dire condition of marine life in Mount Hope Bay and in light of EPA's duty under the CWA to "assure" the protection and propagation of the BIP. EPA has done a great deal more than just critique PG&E-NEG's approach and has put much thought and independent analysis into its decisions.

Casterlin, M.A. and W.W. Reynolds. 1982. Thermoregulatory behavior and diel activity of yearling winter flounder, *Pseudopleuronectes americanus* (Walbaum). Env. Biol. Fish. 7, pp 177–180.

Coutant, C.C. 1972. Biological aspects of thermal pollution II. scientific basis for water temperature standards at power plants. *CRC Critical Reviews in Environmental Control*, 3(1), pp 1–24.

Duffy, J.J. and G. Luders. 1978. Estimation of finfish temperature preference and avoidance in Mount Hope Bay. Report for New England Power Service Company, TR-1142-3, 70 p.

Keller, A.A. and G. Klein-MacPhee. 2000. Impact of elevated temperature on the growth, survival, and trophic dynamics of winter flounder larvae: a mesocosm study. Can. J. Fish. Aquat. Sci. Vol. 57, pp 2382–2392.

7. Comment

PG&E-NEG objected to EPA's statement that BPS's thermal impacts "in conjunction with the high quantity of impingement entrainment losses certainly will not allow for the recovery of winter flounder or the wider balanced indigenous community." The permittee argued that it has submitted "convincing evidence demonstrating that there has been no significant historical difference in abundance trends in Mt. Hope Bay and in Narragansett Bay. . . ." The permittee further argued that Narragansett Bay "is unaffected by BPS's operations" and that, therefore, the permittee has successfully made a "retrospective showing that there has been a lack of appreciable harm to the balanced indigenous community in Mt. Hope Bay as a result of BPS's [past] operations." The permittee argued that "EPA has provided no adequate scientifically sound basis for rejecting these conclusions." The permittee further stated that its revised "RAMAS modeling demonstrates that the fish populations in Mount Hope Bay will recover under the permit limits BPS has proposed [and that] . . . EPA's proffered reasons for rejecting the predicted (sic) RAMAS modeling are equally unsupported as well as misleading."

Response

EPA maintains that there is indeed a statistical difference between fish abundance in Mount Hope Bay and Narragansett Bay. For a detailed discussion of EPA's view of PG&E-NEG's analysis comparing fish populations in these two water bodies, see our responses regarding Section 316(b) issues elsewhere in this document. EPA does not agree with PG&E-NEG's contention that operations at BPS are not impacting Narragansett Bay. NASA satellite images show that on some stages of the tide the thermal plume from BPS extends into Narragansett Bay. Additionally, many of the fish species in Mount Hope Bay reside there for only part of the year and inhabit Narragansett Bay at other times. For example, adult winter flounder move into Mount Hope Bay to spawn and then move out again as water temperatures rise. Some percentage of these adults reside in Narragansett Bay. Thus, any impacts from water withdrawal or thermal discharge that affect successful reproduction and development of the winter flounder spawning stock of Mount Hope Bay will negatively affect the population in Narragansett Bay. The permittee also suggests that the there may be a net contribution of winter flounder larvae from Narragansett Bay to Mount Hope Bay. If this is true, then entrainment losses at BPS would represent a negative impact to Narragansett Bay.

Finally, EPA believes that the RAMAS model does not accurately replicate the past fluctuations of winter flounder populations in Mount Hope Bay. Although PG&E-NEG has added cormorant predation to the model to account for the disparity between its model predictions of populations in the 1990s and actual abundance data, it overstates the importance of this source of mortality. In addition, cormorant predation does nothing to explain discrepancies between model output and actual abundance data for the mid-1970s. These discrepancies suggest that the predictive capability of this model is unreliable. EPA discusses this issue further elsewhere in this document.

8. Comment

PG&E-NEG stated that EPA questions the use of the "acclimation concept" but contradicts itself by citing studies and reports that rely on the acclimation concept and confirm its validity. They argued that EPA's own consultants, Coutant and Bevelhimer, as well as Mark Gibson of RI DEM, have each endorsed the use of acclimation generally and for Mount Hope Bay in particular.

Response

EPA does not question the general concept of acclimation temperature, but, as previously explained, EPA questions PG&E-NEG's application of it. Detailed discussion of the acclimation temperature issue is provided in other responses to comments in this document.

9. Comment
PG&E-NEG stated that the thermal discharge limits set by EPA in the Draft NPDES Permit under CWA § 316(a) were arbitrarily selected. The permittee argued that the limits are "not based on biology at all, as required by CWA § 316(a)." Instead, according to the permittee, the thermal discharge limits are based on the reduction of highway fogging and icing as a result of cooling tower operation. The permittee stated that while public safety may be an important consideration for **other** (emphasis in original) CWA provisions, a § 316(a) determination is supposed to be based on biological considerations.

Response
EPA agrees with the permittee that CWA § 316(a) variance determinations must be made solely on the basis of the biological criteria stated in that provision of the statute. (EPA notes that this contradicts the permittee's other comments calling for economic issues to be factored into the § 316(a) determination.) The permittee is **incorrect**, however, in stating that EPA determined the permit's thermal discharge limits based on avoiding alleged problems related to cooling tower water vapor plumes. EPA's § 316(a) variance-based thermal discharge limits for the permit were based solely on application of the biological criteria from CWA § 316(a). The Agency simply noted that since it was authorizing, on biological grounds, some additional thermal discharge beyond what could be achieved by full application of the cooling tower technology, the permittee could engineer the system to allow bypass of the towers which could then be used to reduce or eliminate any vapor plume problem. The actual basis of EPA's variance-based thermal discharge limits and EPA's consideration of the vapor plume issue are discussed in detail elsewhere in this document and in Chapters 6 and 7 of EPA's July 22, 2002, Permit Determinations Document.

10. Comment
PG&E-NEG stated that there is no "discernible biological difference" between thermal discharge limit of 1.7 TBtus proposed by EPA, and the thermal discharge limit of 28 TBtus, as proposed by the permittee. The permittee argues, therefore, that EPA was wrong to deny the § 316(a) variance-based thermal discharge limits proposed by PG&E-NEG.

Response
EPA believes that there is a significant difference in the biological impact of the two proposed thermal limits. For example, the size and extent of the thermal plume would be dramatically different between the enhanced multi-mode option and EPA's proposed permit limits. EPA's thermal discharge limit will result in only 10 percent of the bottom waters of Mount Hope Bay exceeding the critical temperature threshold for winter flounder avoidance. In contrast, PG&E-NEG's enhanced multi-mode option would result in 62 percent of the volume of the bottom waters exceeding this threshold temperature. EPA's thermal discharge limit will allow over 50 percent more of the bay to retain water temperatures suitable for juvenile winter flounder. This percentage equates to more than 7 square miles of habitat that will be protected under EPA's permit. EPA believes that a difference of impact area of 7 square miles of habitat constitutes a "discernible biological difference," especially considering that the bay as a whole covers a total of 14 square miles. In addition, the thermal discharge limits proposed by the permittee would allow substantially more heat to be added to the bay compared to EPA's proposed limits. This would give greater stimulus to other adverse environmental effects that are promoted by heat (e.g., increased sand shrimp predation of winter flounder larvae and eggs, depressed dissolved oxygen levels, increased nuisance and thermo-tolerant species, and a greater likelihood of disrupting normal fish migration).

11. Comment
PG&E-NEG stated that EPA's use of the evaluation criteria from the 1977 CWA § 316(a) implementation guidance document is "subject to challenge." The permittee complained that CWA § 316(a) mentions fish, shellfish, and wildlife, and not lower trophic levels, but the guidance document addresses these lower levels and EPA considered them in evaluating § 316(a) issues related to BPS. Furthermore,

according to the permittee, EPA did not establish that "any changes in the lower trophic levels or food web have actually occurred" or that any such changes have affected higher levels or have been caused by BPS. The permittee stated that "EPA behaves as if failure to meet the Guidance criteria is itself reason to disallow BPS' request," yet it is not appropriate to use the Guidance in this prescriptive manner. The permittee asserted that before guidance can be used in a manner that gives it binding effect, it must be subjected to notice and comment procedures.

Response

EPA agrees that the *Interagency 316(a) Technical Guidance Manual and Guide for Thermal Effects Sections of Nuclear Facilities Environmental Impact Statements* (DRAFT) (EPA) (May 1, 1977), cannot be used by the Agency as if it had binding legal effect. It is only a guidance document, rather than a law or regulation. Indeed, it is only a draft guidance document. It did not go through formal public notice and comment procedures. Furthermore, the Draft Guidance itself states quite clearly that it does **not** have binding legal effect. *Id*. at §§ 2.2.1 and 2.2.2.

All of this creates no problem, however, because EPA did not use the 1977 Draft Guidance as if it had binding legal effect in developing the new NPDES permit for BPS. EPA simply looked to the Draft Guidance as an advisory document concerning possible ways to analyze thermal discharge issues under § 316(a), and then used some of the analytical constructs suggested by the document to the extent that they made sense in this case. EPA **did not** use the decision criteria suggested in the Draft Guidance as if they provided legal preconditions to a variance under CWA § 316(a). Furthermore, EPA **did not** order the permittee to conduct any particular analysis suggested by the Draft Guidance. Moreover, the Agency conducted analyses beyond those suggested in the Draft Guidance when it seemed appropriate in order to properly apply the tests from the statute and regulations. EPA's permit decision was reached on the basis of the proper application of the applicable law and regulations, rather than any rigid application of the 1977 Draft Guidance. Under the principles expressed in *General Electric Co.* v. *EPA*, 290 F.3d 377 (D.C. Cir. 2002), cited by the permittee, EPA used the 1977 Draft Guidance properly. (EPA also notes that in several instances the permittee itself cites the 1977 Draft Guidance, or other guidance documents, to support points made in its comments.)

The permittee also complained that the Draft Guidance suggests that the effects of thermal discharges on "lower trophic levels" of organisms should be considered, rather than limiting consideration to "shellfish, fish and wildlife" as stated in CWA § 316(a). First, it should be noted that EPA's evaluation for the BPS permit considered thermal effects on lower trophic levels, but focused most significantly on impacts to fish. Second, EPA believes it was well within its discretion to interpret the term "balanced, indigenous population of shellfish, fish, and wildlife" as used in CWA § 316(a) (the "BIP") to include lower trophic levels of animal life (e.g., zooplankton, meroplankton). See 1977 Draft CWA § 316(a) Guidance, p. 74. Furthermore, even if plant life may not be itself part of the "balanced, indigenous population of shellfish, fish, and wildlife," it is also appropriate to consider thermal effects on certain plant life (e.g., phytoplankton, habitat-forming plants) because of the role it may play in supporting the BIP. In addition, PG&E-NEG included eelgrass, which is a lower trophic level, within its own analysis.

Neither the phrase "balanced, indigenous population of shellfish, fish, and wildlife," nor the individual terms "fish," "shellfish," or "wildlife" are defined in the statute. It is obvious, however, that many of the lower trophic level organisms evaluated by EPA are simply the early life stages of fish, shellfish, and other wildlife (e.g., meroplankton include fish larvae and eggs). Moreover, they also constitute an important part of the food chain. Maintaining sufficiently healthy, balanced populations of lower trophic level organisms is necessary to maintain adequate balance at higher trophic levels. The regulatory definition of "balanced indigenous population" refers to the broad concept of a "biotic community," including "necessary food chain species." 40 CFR § 125.71(a). This clearly encompasses consideration of lower trophic level life forms. This is also consistent with the broad dictionary definition of the term

"wildlife," which, according to the *American Heritage Dictionary* (2d College Edition), means "[w]ild animals and vegetation, esp. animals living in a natural, undomesticated state."

Furthermore, the Conference Committee Report for the CWA of 1972 discussing CWA § 316(a) states that variance applicants must "show that elements of the aquatic ecosystem which are essential to support a 'balanced indigenous population of fish, shellfish and wildlife' would be protected" CWA of 1972, L. History, p. 175. Phytoplankton and various types of "habitat formers" (e.g., eelgrass) are clearly plant life that may be an essential element of the ecosystem supporting the protection and propagation of the BIP, due to their respective functions as primary producers and providers of important habitat features. Thus, even if one concludes that plant life is not part of the BIP, Congress clearly intended that thermal effects on some types of plant life should be considered. (Similarly, even if one argued that lower trophic levels of fish, shellfish and wildlife were not themselves part of the BIP, effects on them would need to be evaluated in this context.) Thus, the Draft Guidance quite properly suggests that effects on both phytoplankton and habitat formers be considered, and EPA did so in developing the NPDES permit for BPS.

EPA also disagrees that it has failed to discuss changes in the lower trophic levels of the Mount Hope Bay ecosystem and BPS's role in causing or contributing to those changes. EPA has adequately discussed these changes and impacts in Chapters 6 and 7 of the July 22, 2002, Permit Determinations Document and elsewhere in this document.

12. Comment

PG&E-NEG stated that EPA's "biological community" level evaluation for its CWA § 316(a) analysis is "fatally flawed." The permittee noted that EPA's analysis follows the Agency's 1977 Guidance, but the permittee argued that EPA's conclusions are "speculative" and cannot be relied upon as a basis to deny PG&E-NEG's variance request.

Response

Contrary to the permittee's statement, EPA did not base its conclusions regarding thermal impacts on Mount Hope Bay's biological community on mere speculation. Rather, EPA relied on numerous scientific studies, including analyses submitted by the permittee, to evaluate the full spectrum of environmental stressors and effects in Mount Hope Bay. EPA used the 1977 Draft Guidance primarily as a framework for considering and presenting information on thermal effects from BPS. By organizing the information in this fashion, it became apparent that observed problems with multiple, disparate biological communities could reasonably be explained by elevated water temperatures (in some cases in conjunction with other factors) and were not likely explained by other stressors. EPA denied PG&E-NEG's requested § 316(a) variance-based limits on the basis of a number of points including the following:

- First, a balanced indigenous community of fish, shellfish, and wildlife does not currently exist in Mount Hope Bay.
- Second, EPA believes that thermal discharges (and cooling water withdrawals) by BPS have caused or significantly contributed to the collapse of finfish populations in Mount Hope Bay.
- Third, EPA believes that permit limits based on PG&E-NEG's Enhanced Multi-Mode proposal would result in substantial thermal impacts on the biological community, as well as the loss of significant numbers of organisms due to entrainment and impingement. Overall, EPA believes that such permit limits would continue to result in substantial harm to aquatic life in Mount Hope Bay, and thus would not allow for the protection and propagation of the balanced indigenous community.

EPA's decision process included both retrospective and predictive assessments. Under the former, EPA concluded that the permittee's existing thermal discharges had caused appreciable harm to the BIP. Under the latter, EPA concluded that although the Enhanced Multi-Mode proposal would achieve a reduction in plant thermal discharges (and water withdrawals), the substantially greater reductions in thermal discharge and intake flow required by this permit are necessary to assure the protection and propagation of the balanced indigenous community of Mount Hope Bay **going forward**. For detailed discussions of EPA's biological community evaluation, see Chapter 6 of the July 22, 2002, Permit Determinations Document and responses elsewhere in this document.

13. Comment

PG&E-NEG characterized EPA's conclusion that adverse effects on phytoplankton might result from the thermal discharge limits associated with the permittee's proposed "Enhanced Multi-Mode" cooling system (i.e., 28 TBtu) as "unadorned speculation." The permittee stated that although EPA states that there is a "reasonable probability" that nuisance algae blooms will continue with the Enhanced Multi-Mode discharge level, there has been only one such bloom in 30 years of plant operations at higher levels. The permittee further stated that EPA knows nothing about the prevailing temperatures at the time of this single algae bloom. The permittee stated that EPA has not explained why more blooms would be caused by a discharge of 28 TBtu when the current discharge of 42 TBtu has only caused one such bloom in 30 years, nor has EPA shown that BPS's discharge had anything to do with that single bloom. The permittee also stated that it has demonstrated that blue-green algae blooms have been occurring with increasing frequency along the Atlantic Coast in locations where BPS's thermal discharge has no effect and these blooms "appear to be associated with nitrogen loadings, whereas BPS is not a significant source of nitrogen."

Response

In general, higher temperatures and elevated nitrogen concentrations are conditions that favor blue-green algae over other algal species in marine or estuarine environments. EPA agrees that BPS's thermal discharge does not add nitrogen to Mount Hope Bay, but it does elevate water temperatures and add substantial quantities of heat to the bay. This addition of heat contributes to conditions that favor nuisance blue-green algal species.

Moreover, the permittee's statement that only one bloom has occurred in the 30 years that BPS has been in operation is not based on actual monitoring data. Detecting the presence of blue-green algae has never been a part of the routine monitoring program for BPS. The aforementioned bloom in 2000 was detected because a substantial quantity of a then unknown substance became caught on the intake screens. MRI collected samples of this substance for analysis by academic experts, who identified it as blue-green algae. PG&E-NEG speculates that, because the intake may have only been clogged by a large quantity of blue-green algae once in 30 years, only one algal bloom has occurred. In reality, the actual frequency of these blooms in Mount Hope Bay is unknown. EPA views the large bloom in 2000, in conjunction with a number of other observations, as a sign of an ecosystem that is severely stressed.

The permittee also suggested that the enhanced multi-mode option will eliminate the potential for any further reoccurrence of blue-green algal blooms. While EPA agrees that the enhanced multi-mode option would achieve a reduction of the mass flux of heat into the bay on an annual basis, it would still result in a substantial thermal plume across the majority of the bay (Figure 1). The predicted size of the thermal plume leads EPA to believe that the enhanced multi-mode proposal is unlikely to do much to lower the probability of future blue-green algal blooms. EPA's permit limits will result in a substantial reduction in not only the mass flux of heat, but also the size of the thermal plume. EPA believes this represents a significant reduction in the potential for future nuisance algal blooms.

14. Comment

PG&E-NEG said that EPA's hypothesis that heat discharged by BPS may be helping to suppress the "'normal' winter-spring algae bloom" in Mount Hope Bay is not adequately supported. The permittee stated that the research cited by EPA indicates that the "normal winter-spring bloom" has also been absent from Narragansett Bay, which, according to the permittee, "is indisputably not touched by BPS' thermal plume." The permittee argued, therefore, that it is "highly unlikely" that BPS played a significant role in the disappearance of the normal winter-spring bloom or that thermal discharge modifications at BPS could "play a significant role in bringing it back." The permittee concluded that EPA "must" discard these considerations from its analysis because of the lack of support for them. The permittee also commented, however, that EPA has ignored actual field data that suggests that current phytoplankton populations are similar to those observed in historical data from 1972 to 1985.

Response

EPA disagrees with this comment in several respects. First, as explained elsewhere in this document, EPA does not agree that BPS's thermal plume neither reaches nor affects Naragansett Bay. Second, the absence of a normal winter-spring bloom in Narragansett Bay does not demonstrate that thermal discharges from BPS have not caused or contributed to the suppression of the normal winter-spring bloom in Mount Hope Bay. Narragansett Bay is also subject to a variety of environmental stressors, including thermal impacts, and therefore may also exhibit some of the "symptoms" of environmental stress.

Third, EPA has not only considered actual field data, but has sought more recent data than that offered by PG&E-NEG. EPA obtained data from Mark Berman of the National Oceanic and Atmospheric Administration (NOAA), who has collected more recent and comprehensive data in Mount Hope Bay than the MRI data to which the permittee referred. Dr. Berman's recent field sampling has failed to detect a normal winter-spring phytoplankton bloom in Mount Hope Bay for the past several years.

Keller et al. (1999), the study cited by EPA, points to increases in water temperature as a critical factor in eliminating the normal winter-spring algae bloom. A change in normal phytoplankton bloom dynamics has been observed in Mount Hope Bay. Similar changes have been noted elsewhere and explained by elevations in water temperature. The MRI data set is limited in replication and number of samples, but even this data set shows shifts in relative abundance of phytoplankton groups. Considering these facts, EPA concludes that BPS, which elevates the water temperature of Mount Hope Bay, may be a factor contributing to this change in the normal phytoplankton bloom dynamics.

Keller, A.A., C.A. Oviatt, H.A Walker, and J.D. Hawk. 1999. Predicted impacts of elevated temperature on the magnitude of the winter-spring phytoplankton bloom in temperate coastal waters: A mesocosm study. *Limnol. Oceanog*., Vol. 44(2), pp 344–356.

15. Comment

With respect to the effects of the BPS thermal discharge on zooplankton, PG&E-NEG stated that EPA concludes that the permittee's proposed permit limits insufficiently reduce thermal discharges from existing conditions because the heat might promote ctenophore blooms (i.e., expand their range and time of distribution), which could lead to increased natural mortality rates for winter flounder larvae and eggs both because ctenophores feed on them and because ctenophores feed on other zooplankton that otherwise provide food for winter flounder larvae. The permittee argued that this conclusion is "unfounded." According to the permittee, EPA's sole source of support for this conclusion is a paper by Sullivan et al. (2001), which found only a weak correlation between temperature and the timing of ctenophore blooms and no significant relationship between temperature and the magnitude of a bloom. The permittee stated that Sullivan (2001) concluded that the availability of food is the key factor determining these blooms and that she could not conclusively determine the cause of past blooms in Narragansett Bay. The permittee also stated that the "biological preconditions" for an "early bloom" have

not been demonstrated to exist in this case. The permittee argued that if earlier ctenophore blooms were occurring in Mount Hope Bay one would expect to see reduced zooplankton abundance and a shift from pelagic to demersal fish species, but this has not occurred. The permittee also argues that EPA's other references on this issue consist of a newspaper article and a couple of personal communications and that the Agency "cannot properly rely on such data and information that are known only to the Agency and have not been exposed to public scrutiny and comment."

Response

The permittee suggested that earlier ctenophore blooms have not occurred because no reduction in zooplankton and no shift from pelagic to demersal fish has occurred. However, EPA employees observed large quantities of ctenophores in Mount Hope Bay and on the intake screens of BPS in February 2001. Normally, ctenophores do not occur in these waters until July or August. Rhode Island DEM employees have noted the presence of large quantities of ctenophores in Mount Hope Bay on at least two occasions during their monthly trawl survey (June 1998, January 1999) (Lynch, pers. comm.). Dr. Sullivan attributed the timing of these early blooms to a number of factors, including water temperature. EPA never claimed that water temperature was the sole factor contributing to these blooms, but the Agency notes that Dr. Sullivan did see a positive correlation between water temperature and timing of the blooms. Based on these observations, and the fact that thermal effluent from BPS elevates water temperature in Mount Hope Bay, EPA believes BPS may be contributing to these early ctenophore blooms in Mount Hope Bay.

The permittee cites *Portland Cement Ass'n* v. *Ruckleshaus*, 486 F.2d 375, 393 (D.C. Cir. 1973), for the proposition that EPA may not rely on information in personal communications that have not been exposed to public scrutiny and comment. First, this is an overbroad statement of the principle stated by the court in *Portland Cement*. In that case, the court remanded a regulation to EPA because critical data underlying the rule had not been made part of an administrative record and subject to public review. This is inapposite to this permit development process because EPA has made the information that it has relied upon available to the permittee. To the extent that information is based on a personal communication, EPA has documented it in the record and made it subject to public review. EPA also notes that it did not rely unduly on such information, and that the permittee itself in its comments also cites personal communications (while providing EPA with no documentation of those communications).

Lynch, Tim, Rhode Island DEM, Pers. Comm. 9/11/2003.

Sullivan, B.K., D. Van Keuren and M. Clancy. 2001. Timing and size of blooms of the ctenophore *Mnemiopsis leidyi* in relation to temperature in Narragansett Bay, RI. Hydrobiologia, Vol. 451, pp113-120.

16. Comment

PG&E-NEG indicated that EPA cites "Maas" (*sic*) (2002) for the proposition that "'increased predation [of winter flounder larvae] by sand shrimp may be a temperature mediated phenomenon that BPS is contributing to significantly." The permittee states that EPA should not rely on this paper to support "the theory that higher temperatures increase predation by sand shrimp and thus lower larval survival" because "increased mortality for winter flounder larvae can also be readily explained independent of temperature."

Response

EPA has not relied solely on Haas (2002) in suggesting that higher temperatures increase predation by sand shrimp and thus lower the survival of larval winter flounder. Haas (2002) is one of two supporting pieces of evidence that EPA cited to support this point in its § 316(a) analysis. EPA also cited to Keller and Klein-MacPhee (2000) who conducted a mesocosm experiment that showed dramatic reductions in the survival rates of larval winter flounder associated with small increases in winter water temperatures.

The reduction in winter flounder survival rates corresponded with changes in sand shrimp activity levels, which increased in response to the warmer water.

Haas (2002) refers to a personal communication from David Taylor of the University of Rhode Island to staff members of MA DEP. Taylor explained that his work showed that sand shrimp prey on winter flounder during the winter in the field, not just in enclosed tanks. EPA also points out that Taylor presented these findings at the most recent meeting of the New England Estuarine Research Society (NEERS) in the spring of 2003, also attended by many representatives from the permittee, where he reiterated the results that he had communicated to MA DEP. Taylor also conducted laboratory studies to measure consumption rates of flounder eggs at different water temperatures. He found that as water temperatures increased, the rate of egg predation increased significantly. Since his presentation at NEERS, Taylor has informed EPA that his findings have been accepted for publication by the peer-reviewed journal *Marine Ecological Progress Series*.

Based on the above information, EPA concludes that small elevations of winter water temperature do pose a risk for winter flounder larvae because of increased sand shrimp predation.

Haas, G. 2002, May 16. MA DEP letter to EPA, Office of Ecosystem Protection Director Linda Murphy (Review of BPS Variance Request).

Keller, A.A., and G. Klein-MacPhee. 2000. Impact of elevated temperature on the growth, survival, and trophic dynamics of winter flounder larvae: A mesocosm study. *Can. J. Fish. Aquat. Sci.* Vol. 57, pp 2382–2392.

17. Comment

PG&E-NEG asserted that EPA misleadingly states that "Mustard (2001) found that 'essentially 100 percent of the bay' is impacted by warmer water temperatures from the thermal plume." The permittee stated that Mustard measured only the water's surface temperatures and that "his conclusion only referred to 'essentially 100 percent' of the surface waters being affected." The permittee also argues that since Mustard's work measures water surface temperatures, it does not support EPA's statement that the thermal plume influences "'large areas of Mount Hope Bay.'" Furthermore, according to the permittee, when "EPA states that 'thermistor data. . . showed that the satellite was recording the temperature of approximately the top 6 feet of the water column,' EPA has misread Mustard's report . . . [because he] only looked at thermistor data from 0.25 meters below the surface . . . ." The permittee stated that "[t]he reference to 6 ft. was to another study outside Mount Hope Bay and it is unclear whether that study looked at potential thermal stratification from power plant discharges." Finally, the permittee also stated that while EPA states that "satellite imagery by Jack Mustard 'shows that the surface water of Mount Hope Bay is on average 1.5 degree F warmer in the summer and fall than comparable shallow parts of Narragansett Bay,' . . . the comparison was only true for Upper Narragansett Bay, [and] not for any other 'comparable shallow parts of Narragansett Bay.'"

Response

EPA agrees that Mustard's report refers to 100 percent of the surface area of the bay and does not mean 100 percent of the volume. However, EPA maintains that the satellite images are a reasonable representation of at least the top 6 feet of the water column. This understanding is based on discussions with Dr. Mustard and the review of past water quality surveys that show fairly uniform water temperatures to depths below 2 meters (ASA, 1996; MRI, 1999). Because these satellite images represent water temperatures down to 6 feet, EPA maintains that the images demonstrate the influence of BPS's thermal plume over large areas of Mount Hope Bay.

Regarding the comparison of surface water temperatures, Mustard compared water temperatures of comparable shallow waterbodies at the same latitude to account for potential variance in climatic conditions due to changes in latitude. EPA agrees that the comparison was only for Upper Narragansett Bay. During the summer and into the early fall, water temperatures decrease as one progresses south in Narragansett Bay because of the influence of the ocean. A comparison of comparable shallow water farther south in Narragansett Bay with that in Mount Hope Bay would show an even **greater** discrepancy in temperature.

Applied Science Associates, Inc. 1996. *Data Report New England Power Company Brayton Point Station Dissolved Oxygen Assessment Field Studies*. 200 pp.

Marine Research, Inc. 1999. *Brayton Point Station 1998 Annual Report*. 600 pp.

18. Comment

PG&E-NEG stated that EPA's analysis of eelgrass, a habitat former, is speculative and inconsistent with the facts. According to the permittee, EPA "asserts that BPS is somehow responsible for preventing the recovery of eelgrass in Mount Hope Bay." The permittee argued that the data show that eelgrass disappeared not only from Mount Hope Bay but from most of the eastern seaboard in the 1930s and it has not recovered. The permittee also commented that there is no evidence that the thermal discharges it proposes for BPS (i.e., 28 TBtu) would affect the recovery of eelgrass if it were to return. The permittee argued that while EPA "speculates" that poor water quality conditions "would reduce the upper thermal limit of eelgrass," making it more sensitive to the BPS discharge, EPA "ignores the fact that the poor water quality alone has prevented recovery of eelgrass in Mount Hope Bay." The permittee stated that this poor water quality (eutrophication) is unrelated to BPS and supported this statement with a citation to a personal communication with Fred Short, University of New Hampshire (August 2002). The permittee also argued that any effect water temperature might have on eelgrass is immaterial because the poor water quality precludes its recovery anyway.

Response

EPA believes that the thermal discharge from BPS, alone or in combination with poor water clarity, has rendered Mount Hope Bay an unsuitable habitat for eelgrass. The two major physical factors that affect growth and survival in eelgrass are light and water temperature. Laboratory studies have shown that temperature affects photosynthesis and respiration rates in eelgrass (Marsh et al., 1986; Bulthius, 1987). Specifically, increased temperature increases photosynthetic rates and, to a greater extent, respiration rates. Field studies have shown that sustained exposure to temperatures in excess of 25 ºC correlates with eelgrass decline (Thayer et al., 1975; Evans et al., 1986). Burke et al. (1996) demonstrated that reduced light, high nitrogen, and warm water temperatures led to a negative carbon balance (i.e., the accumulation of photosynthetic carbon is exceeded by losses of carbon to respiration). Plants experiencing a negative carbon balance for a sufficient period will wither and die. Bintz et al. (2003) examined the cumulative effect of high nutrients and high temperatures on coastal lagoon communities that included eelgrass. They used mesocosm experiments to expose coastal lagoon communities to combinations of warm and cool water temperatures, high and low nutrients, and combinations of the temperature and nutrient variables. The warm water treatment ranged in water temperature from 13 to 27 ºC over the 4-month experiment. Sustained exposure to this warm water treatment resulted in reduced eelgrass survival, growth, and production as compared to controls. Similar reductions were observed for eelgrass in elevated nitrogen treatments. Significantly greater negative effects occurred in eelgrass in tanks with both elevated nutrient concentrations and elevated water temperature. These two stressors appear to work synergistically in restricting eelgrass growth and survival.

BPS's Enhanced Multi-Mode proposal would result in large quantities of Mount Hope Bay exceeding 25 ºC for extended periods of time during warm summers. This fact alone suggests that the thermal

discharge may represent a thermal exclusion zone for eelgrass, one of the RIS identified by the BPS TAC. This potential for thermal exclusion exists even if one does not consider the additional stress of high nutrient levels present in Mount Hope Bay. Elevated nutrient levels have been shown to reduce the temperature at which eelgrass will cease to grow or begin to experience mortality (Bintz et al., 2003; Bulthuis, 1987). The permittee claims that turbidity is the sole factor preventing eelgrass from growing in Mount Hope Bay. EPA agrees that water clarity is certainly an issue that needs to be addressed in Mount Hope Bay. However, turbidity alone has not prevented the growth of eelgrass in other turbid but cooler waterbodies. Both Boston Harbor and Salem Harbor currently support some eelgrass meadows, and have supported them even during the periods of poorest water quality. These populations are restricted to relatively shallow water, likely because poor water clarity prevents adequate light from reaching deeper areas.

In Mount Hope Bay, some combination of reduced water temperatures and improved water clarity will be necessary to reestablish conditions that would support eelgrass growth. Both Rhode Island and Massachusetts have scheduled a comprehensive review of nutrient loading in Mount Hope Bay through a TMDL analysis. This analysis will select a target level of nutrient loading that is protective of the designated uses and aquatic life of Mount Hope Bay and allocate appropriate nutrient loads to each discharger in the watershed. The ultimate result of this effort will be to significantly reduce nutrient concentrations in Mount Hope Bay.

In addition, during the past year close to $1 million has been awarded to Save The Bay and the University of Rhode Island from several different Federal and State funding sources to support efforts to restore eelgrass to various locations in Narragansett Bay. Clearly, concrete efforts are being made to bring this important nursery habitat back to areas that it had previously occupied. The thermal discharge limits in EPA's permit would remove one more obstacle to eelgrass restoration efforts.

Bintz, J.C., S.W. Nixon, B.A. Buckley, and S.A. Granger. 2003. Impacts of temperature and nutrients on coastal lagoon plant communities. *Estuaries.* 23(3), pp 765–776.

Bulthuis, D.A. 1987. Effects of temperature on photosynthesis and growth of seagrasses. *Aquatic Botany.* 27, pp 27–40.

Burke, M.K., W.C. Dennison, and K.A. Moore. 1996. Non-structural carbohydrate reserves of eelgrass *Zostera marina*. *Marine Ecology Progress Series.* 137, pp 195–201.

Evans, A.S., K.L. Webb, and P.A. Penhale. 1986. Photosynthetic temperature acclimation in two coexisting seagrasses *Zostera marina* L. and *Ruppia maritima* L. *Aquatic Botany.* 24, pp 185–197.

Marsh, J.A., W.C. Dennison, and R.A. Alberte. 1986. Effects of temperature on photosynthesis and respiration in eelgrass (*Zostera marina* L.). *Journal of Experimental Marine Biology and Ecology.* 101, pp 257–267.

Thayer, G.W., D.A. Wolfe, and R.B. Williams. 1975. The impact of man on seagrass systems. *American Scientist.* 63, pp 288–296.

19. Comment

PG&E-NEG stated that EPA had three major reasons for rejecting the annual thermal discharge limit of 28 TBtu proposed by the company, and these reasons are unfounded. According to the permittee, EPA rejected the company's proposed limit for the following reasons: first, dramatic swings in finfish abundance evidenced from 1972 to 1984 indicate an unstable population prone to collapse; second, winter flounder abundance in Mount Hope Bay has been declining since 1972; and third, analysis by MRI

indicates that certain species of finfish have noticeably declined in abundance in upper Mount Hope Bay during 1972–1978.

a. As to the first reason above, the permittee argued that the view that the fish population swings indicate an unstable population is "entirely speculative and unsupported by science." The permittee stated that EPA's only citation supporting this point was a comment in a cover letter (i.e., Hicks [1996]). The permittee further states that large population swings can occur in healthy populations.

b. The permittee also argued that the second and third reasons above are unsupported. The permittee argued that it has shown based on a review of the historical data that there is "no difference" between the abundance trends in Mount Hope Bay and Narragansett Bay for any species between 1972 and 1984. The permittee further argues that BPS "only affects Mount Hope Bay." Therefore, according to the permittee, there is "no evidence that the decline observed in Mount Hope Bay was caused by BPS." The permittee also stated that there is no evidence that "factors causing an equivalent decline in fisheries in Narragansett Bay (e.g., overfishing, nutrient loadings) are affecting Mt. Hope Bay." (EPA expects that the permittee meant to write the word "not" between "are" and "affecting" in the previous sentence.)

c. The permittee also stated that its analysis shows that "no meaningful biological difference" would result from imposing EPA's thermal discharge limitations instead of those proposed by the permittee. The permittee represented that its consultant DeAlteris "found that abundance trends in the lower 2/3 of the [Mount Hope] Bay have been identical to those in Narragansett Bay." The permittee further represented that its consultant LMS "found that the temperatures in the upper Bay under EMM would generally be very similar to those that now exist in the lower Bay" and that "the difference that would exist would be biologically insignificant."

Response

EPA rejected the permittee's proposed 28 TBtu limit because the Agency found, after prolonged and thorough analysis, that the limit would not assure the protection and propagation of the balanced, indigenous community of shellfish, fish, and wildlife in and on Mount Hope Bay, as is required by CWA § 316(a). Part of EPA's determination rested on evidence regarding trends in finfish abundance in Mount Hope Bay. Other factors also played a role in EPA's decision, such as the large extent of thermal exclusion zones for fish and eelgrass in the bay and the increased prevalence of heat-tolerant species that would result from the thermal discharge limits proposed by the permittee.

EPA has discussed evidence regarding BPS's contribution to the biological decline in Mount Hope Bay and the competing interpretations of abundance trends in Mount Hope Bay and Narragansett Bay in Chapter 6 of the July 22, 2002, Permit Determinations Document and elsewhere in this document. The Agency briefly addresses several of the specific points raised by this comment below.

To address the permittee's first point regarding the stability of the finfish population, EPA acknowledges that wide swings in abundance by themselves may not be indicative of a collapsing population. They do, however, represent a population at greater risk of collapsing. Ricklefs (1990) states that the probability of extinction increases as a population declines. Thus, a population that bounces between very low and high levels of abundance reflects some instability and would be at greater risk of extinction than a population that persists at some intermediate level of abundance. In addition, since winter flounder exhibit a high degree of site fidelity to their spawning sites, recruitment of individuals from neighboring populations, in times of low population abundance, may be limited. Thus, EPA believes in this specific situation that widely fluctuating winter flounder abundance from 1972–1984 does suggest an unstable population more at risk of a collapse, which it ultimately did.

PG&E-NEG has suggested that the 28 TBtu/year discharge associated with its Enhanced Multi-Mode proposal would be sufficient to protect fish stocks in Mount Hope Bay because this level of heat would be similar to the level discharged prior to the collapse of fish stocks in the mid-1980s, suggesting that this restriction should be sufficient to restore the balanced, indigenous community in Mount Hope Bay. Implicit in this suggestion, however, is a belief that fish populations prior to the collapse were stable, healthy communities.

However, EPA believes that fish populations were already beginning to decline in the 1970s, prior to the collapse in the mid-1980s. This opinion was supported not only by Hicks (1996) but also by most members of the TAC (See Agency Comment Letters in Appendix B of EPA's July 22, 2002, Permit Determinations Document). Therefore, the Agency does not believe that simply lowering the level of thermal discharge to match that of the company's pre-1985 operations would be an effective or scientifically sound way to assure the protection and propagation of Mount Hope Bay's fish populations. Indeed, past experiences in fisheries management have demonstrated that a fish stock's path to recovery is often not the same as its path of decline. To trigger recovery of a fish stock, fishery managers frequently must reduce mortality on a stock well below what they believe to be long-term, sustainable levels based on fisheries models.

EPA carefully examined the thermal impacts and entrainment and impingement losses associated with the permittee's Enhanced Multi-Mode proposal. The substantial differences between the thermal and biological impacts of PG&E-NEG's proposed permit limits and EPA's proposed permit limits are discussed in detail elsewhere in this document.

Ricklefs, R.E. 1990. *Ecology*. W.H. Freeman and Co., New York.

20. Comment

PG&E-NEG stated that it used "state of the art analytical techniques" to provide a "comprehensive picture" of the effects of thermal discharges on 18 species of fish. According to the permittee, its analysis "demonstrated that a thermal discharge of 28 TBtu [per year] would have negligible effects on the fish." The permittee complained that EPA rejected its evaluation in favor of an assessment of the effects of thermal discharges on fish based on "absolute temperature thresholds," and stated that EPA's approach was "simplistic," as well as "biologically arbitrary and conceptually flawed in critical respects." The permittee further complained that EPA did not explain why it uses its "clearly inferior method" instead of relying on the permittee's allegedly "state of the art" analysis. The permittee also stated that EPA's method cannot be used to determine if 28 TBtu would cause "appreciable harm" to the fishery.

Response

EPA disagrees that PG&E-NEG's analyses provided a comprehensive, accurate picture of the effects of thermal discharges on fish in Mount Hope Bay. Having considered these analyses in detail, EPA concluded that they did not provide meaningful, realistic predictions of biological impacts. EPA has explained its rationale for rejecting PG&E-NEG's analytical approach elsewhere in this document and in Chapter 6 of EPA's July 22, 2002, Permit Determinations Document. However, the Agency wishes to note a few points here.

It is important to note that any model or analysis is only as good as its ability to replicate what is actually occurring in the real world. Unfortunately, while the computer models and analyses used by PG&E-NEG may be sophisticated, they have failed to reflect actual data from Mount Hope Bay. For instance, the RAMAS model that the permittee used to predict winter flounder abundance was not able to replicate known changes in abundance that occurred in the 1970s and predicted a recovery of fish in Mount Hope Bay in the 1990s that never happened. Similarly, PG&E-NEG now claims there are 300,000 winter flounder currently residing in the bay, yet actual field data show that less than one winter flounder is

caught per tow in the majority of the bay. As EPA has explained elsewhere in this document, if there were actually 300,000 winter flounder in the bay, one would expect the trawl survey to catch tens of winter flounder per tow. As a final example, PG&E-NEG's thermal analysis suggests that there is little thermal impact from BPS's current thermal discharge, but these results contrast with the signs of thermal stress now found in Mount Hope Bay: winter flounder are currently found to be avoiding the warm, shallow water areas of Mount Hope Bay; nuisance algal species and other types of more thermally tolerant species have been detected in the bay; and normal fish migration patterns have been disrupted. The Agency also notes that it has clearly not been opposed to the use of sophisticated computer models where they have been shown to reasonably reflect reality. EPA and the other agencies worked long and hard with the permittee and its consultants on the development of a hydrothermal model to depict thermal discharge plumes under different operating conditions. Once the model was properly "ground-truthed" with field data, EPA agreed to use the results from the model.

EPA has explained its approach to assessing thermal impacts elsewhere in this document. The approaches used by EPA and PG&E-NEG are basically similar, but diverge in two key aspects. First, EPA does not agree with PG&E-NEG's application of acclimation temperatures. Second, EPA and PG&E-NEG disagree on the biological responses to certain temperatures as cited in the scientific literature. EPA has explained its findings regarding the application of acclimation temperatures and temperature thresholds for biological responses elsewhere in this document and in Chapter 6 of EPA's July 22, 2002, Permit Determinations Document. EPA notes here that its conclusions regarding these factors, which it believes are based on reliable data and credible scientific reasoning, produce significantly different (and, EPA believes, more reasonable and accurate) results than the interpretations chosen by PG&E-NEG.

Despite PG&E-NEG's criticism of EPA's analytical methods, the Agency believe that its methods most reasonably and accurately reflect the actual effects of thermal discharges in Mount Hope Bay. EPA considered a number of analytical approaches and chose those that best fit the available field data and sound scientific principles. In doing so, EPA chose the approach that could best determine what stressor(s) could have been significant enough to reduce fish abundance by 88 percent over a short period of time and a large area of the bay, and to cause this decline to continue for close to 20 years. EPA's analysis objectively looked at the impact of BPS operations not only on fish but on each distinct level of the aquatic community within Mount Hope Bay. EPA has also considered other stressors and acknowledged that overfishing and global warming are also likely to be playing a role in shaping the current biological community in Mount Hope Bay. Although PG&E-NEG may find EPA's analysis "simplistic," the Agency believes its analysis is reasonable and appropriate and provides a better match with the actual field data than the analysis offered by the permittee. Consistent with sound science, EPA has chosen to use the approach that more reasonably and accurately predicts the effects of thermal discharges and thus helps it to set permit limits that will meet the statutory test of assuring the protection and propagation of the BIP in Mount Hope Bay. Finally, EPA notes that recent data, such as the satellite images of the thermal plume, has revealed that prior "state of the art" analyses conducted by BPS for prior permits also underpredicted the environmental effects of plant operation.

21. Comment

PG&E-NEG stated that EPA wrongly questions the use of acclimation temperatures in setting thermal discharge permit limits. The permittee commented that using acclimation temperatures as suggested by the permittee is widely accepted by scientists, including scientists "contracted with EPA." The permittee stated that there is a wide range of temperatures at which there is some observable effect up to the point of mortality, and that small changes in temperature between the no effect level and the mortality level may have some effect, but that effect will be "proportionally smaller or negligible." According to the permittee, biologists "uniformly reject" the critical temperature approach taken by EPA under which an absolute temperature threshold is set which assumes that no harm will occur below that temperature and

significant harm will necessarily occur immediately upon reaching that temperature. The permittee stated that EPA consultants Coutant and Bevelhimer have rejected this approach, as have the MA DEP and Mark Gibson of RI DEM. The permittee complains that EPA's approach is inconsistent with reality and fails to take the "actual biological impact of heat" into account, and that EPA set its temperature thresholds and considers only whether they are exceeded or not, deeming it irrelevant whether they are exceeded by a lot or a little. According to the permittee, EPA treats even a small exceedance as critical, although "all biologists" would agree that a little exceedance would be unimportant.

Response

While EPA acknowledges that there may be competing viewpoints on how and when to apply acclimation temperatures in assessing thermal impacts, the Agency believes that it has appropriately rejected their use by the permittee in this case. The appropriate application of temperature acclimation depends on the circumstances of a particular biological community. EPA recognizes that many organisms have the capacity to survive higher than normal temperatures when first acclimated to lower temperatures. Numerous laboratory studies have demonstrated that this is physiologically possible. However, a number of other studies have demonstrated that behavioral changes can occur at substantially lower temperatures than the maximum temperature at which survival is seen in a laboratory study. For instance, a fish in a laboratory may survive at such high temperatures, but fish in the wild are likely to leave the area, thereby depleting the balanced, indigenous community. It bears emphasis here that the CWA requires EPA to assure the protection and propagation of the balanced, indigenous community of shellfish, fish, and wildlife in and on Mount Hope Bay, not that it simply assure the survival of some individual fish.

EPA is not convinced that the approach taken by PG&E-NEG to account for acclimation reflects biological reality. EPA's specific concerns are detailed in Chapter 6 of the July 22, 2002, Permit Determinations Document and elsewhere in this document. The distribution of fish in Mount Hope Bay itself may be the most compelling argument against PG&E-NEG's position that fish will stay in one location and acclimate to a higher temperature rather than seek out a more optimal temperature regime. In fixed trawl studies, significantly greater numbers of fish are caught in the deep (>20 feet) stations, where water temperatures are cooler, than in the shallow (<20 feet) stations. For a thermally sensitive species like winter flounder, approximately 80 percent of the catch is from deep stations. This is particularly telling, considering that the fishing effort in the shallow stations is five times greater than the fishing effort in deep water. Winter flounder in nearby upper Narragansett Bay show a preference for shallow water with 60 percent of the catch coming from depths of less than 20 feet (Lynch, personal communication).

EPA considered a variety of approaches and data before deciding that the use of threshold temperatures (as opposed to acclimation temperature) was appropriate. EPA considered PG&E-NEG's temperature polygon approach, the discrepancy between responses to elevated temperatures found in laboratory studies and field studies, changes in species interactions associated with elevated temperatures (i.e., increased sand shrimp predation on winter flounder eggs with temperature), the actual distribution of fish in Mount Hope Bay, and the dire condition of fish stocks and aquatic life in the bay. Based on all this information, EPA determined that its use of temperature thresholds was necessary and appropriate to reasonably assure the protection and propagation of the BIP in Mount Hope Bay.

Finally, the permittee overstates or misinterprets the position of other biologists regarding temperature acclimation. Mark Gibson of RI DEM, Gerry Szal of MA DEP, and Todd Callaghan of MA CZM all submitted comments to EPA on PG&E-NEG's variance application criticizing PG&E-NEG's approach to temperature acclimation. Charles Coutant and Mark Bevelhimer are proponents of using acclimation temperature when it is feasible and makes biological sense (e.g., in predicting lethal effects of entrained organisms exposed to elevated temperatures), but have not rejected other reasonable approaches to predicting thermal impacts.

Lynch, T., Rhode Island DEM, personal communication, September 5, 2003.

22. Comment

PG&E-NEG complained that EPA contends that using MRI field survey data to delineate habitat for RIS underestimates actual habitat utilization because as fish populations have declined, they use less habitat. The permittee stated that, contrary to EPA's assertions, it did not use the MRI survey data to develop the habitat delineations it applied in its CWA § 316(a) Demonstration. The permittee also stated that whenever it delineated RIS habitat as only a portion of Mount Hope Bay, the portion selected was in "the upper 1/3 of the bay," and if the habitat area "was changed to a 'whole bay' definition, the predicted biothermal effects would be slightly *lower*. . . ."

Response

When the permittee developed habitat maps for Mount Hope Bay for some of the RIS, EPA assumed that actual field data (i.e., the MRI survey data) regarding where fish had been caught, would be used to derive these habitat maps. However, according to the permittee, actual field data were not used to groundtruth the habitat delineations. Therefore, EPA is still not convinced that the delineations are accurate. Finally, EPA disagrees that including the whole bay in the definition of habitat area would decrease the predicted biothermal effects. The actual number of acres of habitat affected by the thermal plume would likely increase as well.

23. Comment

PG&E-NEG stated that EPA criticized its analysis for failing to separate the juvenile and adult life stages in the company's "temperature polygons." The permittee responded to this point by stating that the information in the scientific literature is not sufficient to do this. According to the permittee, "[t]he only biometric for which sufficient data exists to analyze juvenile and adult life stages separately is avoidance . . . [and t]he four species for which such data exists are alewife, Atlantic menhaden, bay anchovy, and white perch." The permittee stated that "separate evaluations of individual adult and juvenile predicted avoidance for these species showed little to no change in what was already presented." The permittee further stated that "almost all of the data presented in the polygon [for winter flounder] were for the juvenile life stage . . ." and that this was a conservative analysis since "the critical period and life stage for winter flounder are the summer period and juveniles, respectively. . . ."

Response

EPA disagrees that available data are insufficient to allow for a separate analysis of juvenile and adult life stages. EPA's review of the literature found numerous studies providing data on juveniles and adults for a number of the RIS. For winter flounder specifically, existing studies address temperatures for optimal egg hatching and larval survival and development, as well as juvenile and adult preferences (Keller and Klein-MacPhee, 2000; Rogers, 1976; Buckley et al., 1990; Williams, 1975; Laurence, 1975). It is unclear why PG&E-NEG did not consider these studies. The avoidance temperature for adult winter flounder is several degrees lower than that for juveniles (Coutant and Bevelhimer, 2001); thus, EPA would expect to see a substantial difference if the analysis was run for adults. Finally, EPA disagrees with the permittee's assertion that its analysis is conservative for the following reasons:

1. The hydrothermal model used to predict water temperature did not account for future increases in water temperature due to global warming.
2. Keller and Klein-MacPhee (2000) show that small changes in winter water temperature can result in dramatically different survival rates for eggs and larval winter flounder. In addition, Collie and DeLong (2002) detected a mortality bottleneck from the egg to larval life stages for winter flounder in Mount Hope Bay. The results of these studies suggest that the egg and larval life

stages are also critical periods. Yet, the PG&E-NEG assessment ignored the effect of temperature on these life stages.

Buckley, L.J., A.S. Smigielski, T.A. Halavik, and G.C. Laurence. 1990. Effects of water temperature on size and biochemical composition of winter flounder *Pseudopleuronectes americanus* at hatching and feeding initiation. *Fishery Bulletin*. 88, pp 419–428.

Collie, J.S., and A.K. DeLong.2002. *Examining the decline of Narragansett Bay winter flounder*, Final Report to RI DEM Division of Fish and Wildlife. 150 pp.

Keller, A.A., and G. Klein-MacPhee. 2000. Impact of elevated temperature on the growth, survival, and trophic dynamics of winter flounder larvae: a mesocosm study. *Can. J. Fish. Aquat. Sci.* 57, pp 2382–2392.

Laurence, G.C. 1975. Laboratory growth and metabolism of the winter flounder *Pseudopleuronectes americanus* from hatching through metamorphosis at three temperatures. *Marine Biology*. 32, pp 223–229.

Rogers, C.A. 1976. Effects of temperature and salinity on the survival of winter flounder embryos. *Fishery Bulletin*. 74(1), pp 52–58.

Williams, G.C. 1975. Viable embryogenesis of the winter flounder *Pseudopleuronectes americanus* from -1.8^{o} C to 15^{o} C. *Marine Biology*. 33, pp 71–74.

24. Comment

According to PG&E-NEG, the basis for EPA's concern about the company's use of acclimation temperatures was the "7 days in grid cell assumption." The permittee stated that its assumptions for "grid-cell sizes and duration of residence within those cells appear to be very reasonable" for winter flounder. The permittee further stated that it asked its consultant LMS to address EPA's concern by doing another analysis assuming acclimation in the whole bay rather than in just one grid cell, and that LMS found that the results were "basically the same."

Response

The permittee's use of the "7 days in grid cell assumption" was **one** of EPA's concerns regarding the use of acclimation temperatures. For a discussion of EPA's other concerns, see responses elsewhere in this document. The "7 days in grid cell assumption" assumes that fish reside in a particular grid cell of the hydrothermal model for 7 days to acclimate to higher temperatures. EPA's comment regarding the use of the 7-day assumption was a general rather than species-specific comment. Fish will tend to acclimate to their optimal temperature if they have free choice of location and a full temperature range available (Coutant, 1972). Thus, it is an unreasonable assumption to expect a mobile pelagic fish or even an adult demersal fish to reside for 7 days in a grid at a temperature that exceeds their optimal, when they have the option to seek out more preferential temperatures. EPA acknowledges that this may be a valid assumption for juvenile winter flounder because of the limited mobility of the juveniles and the size of the grids in question.

Coutant, C.C. 1972. Biological aspects of thermal pollution II. scientific basis for water temperature standards at power plants. *CRC Critical Reviews in Environmental Control*. 3(1), pp 1–24.

25. Comment

PG&E-NEG stated that EPA concluded that the company's use of "acclimation temperatures" to derive predicted "optimal temperatures" was inappropriate for the following four reasons: (1) the concept of acclimation temperatures is "uncertain and debatable"; (2) RI DEM data show that winter flounder

abundance decreases rapidly at 24 ºC; (3) Duffy and Luders (1978) and Casterlin and Reynolds (1982) found that juvenile winter flounder show avoidance at 24 ºC; and (4) Olla et al. (1969) found that winter flounder burrow into bottom sediments at temperatures greater than 22.2 ºC. The permittee asserted that the studies EPA cited do not support the Agency's position.

- According to the permittee, field studies are of questionable value for measuring avoidance because nonthermal factors may also be influencing matters.
- The permittee also stated that RI DEM is incorrect that winter flounder are absent from waters over 24 ºC, and that neither Duffy and Luders (1978) nor Casterlin and Reynolds (1982) suggest that juvenile winter flounder avoid water temperatures greater than 24 ºC.
- The permittee also argued that it is "not credible" to suggest that behavioral responses in fish would begin at 22.9 ºC. According to the permittee, McCracken (1963) states that this is "characteristic of 'disturbed' winter flounders, including those exposed to light." The permittee suggested, therefore, that the observation by divers of burrowing flounder reported in Olla (1969) "could easily be explained by a recent disturbance (which could have been the divers themselves) or by an increase of light exposure."

Response

EPA concludes that using the permittee's application of acclimation temperatures would have been inappropriate to predict the biological effects of thermal discharges in Mount Hope Bay. The Agency also concludes that the studies to which the permittee refers do, in fact, support EPA's conclusions. For a discussion of the application of acclimation temperatures in this case, see the Agency's responses elsewhere in this document.

EPA agrees that it is not possible to control all variables in a field study, although it does not agree that this makes field studies "of questionable value" in determining the ecological effects of thermal discharges. Certainly, the inability to control for all variables may make it more difficult to establish a cause-and-effect relationship between a temperature change and a biological effect. Laboratory studies better situate a researcher to try to control all variables, and thus the researcher may be able to establish a cause-and-effect relationship with more certainty. It is important to note, however, that laboratory studies often may not measure endpoints that are ecologically meaningful. For instance, designing a laboratory study that would meaningfully measure thermal avoidance is difficult, since most such studies would be performed in tanks and thus would not allow for true avoidance. In addition, placing animals in artificial enclosures creates an abnormal amount of stress on many species. Therefore, the investigator may be adding another variable by simply enclosing the animal before the experiment begins. The debate over the value of laboratory versus field studies is pervasive throughout science and it is not one that is going to be settled through this permit process. Recognizing that each approach has strengths and weaknesses, EPA considered information from both laboratory and field studies in assessing the likely response of fish populations to thermal discharges from BPS.

The permittee also disputes EPA's suggestion that biological effects on winter flounder occur at 22.9 ºC. EPA actually did not suggest that biological effects begin at 22.9 ºC, but at 22.2 ºC. EPA's conclusion was based in part on a paper by Olla et al. (1969), which the permittee originally submitted to EPA but now disputes. EPA maintains that the paper's findings are valid. Olla et al. (1969) found that winter flounder burrowed into the sediments, where it is cooler, in response to elevated water temperature (22.2 ºC). During the period in which winter flounder exhibit this burrowing behavior, they stop feeding. In addition, Grace Klein-MacPhee, a winter flounder expert at the University of Rhode Island, stated that sublethal effects begin at 20 ºC (MA DEP, 2002).

PG&E-NEG suggests that the burrowing behavior observed by Olla et al. (1969) was actually caused by changes in light intensity and the presence of the divers collecting data for the study. However, there is no indication that significant changes in light intensity occurred during the course of the Olla et al. (1969) study. Moreover, EPA has little reason to believe that divers caused the burrowing behavior. EPA biologists (Phil Colarusso, Eric Nelson), who have a combined number of north Atlantic dives close to 500, have observed winter flounder on many of their dives. When approached by a diver, winter flounder will typically remain stationary and rely on camouflage to hide it. A diver can easily approach a winter flounder and get within 2 to 3 feet without triggering a response. Furthermore, the winter flounder's response to disturbance by divers is first to swim away and then they may burrow into the sediments to avoid future detection. It has not been the Agency's experience that winter flounder burrow in place in response to divers, which was the behavior recorded by Olla et al. (1969).

EPA disagrees with the permittee on the characterization of the Duffy and Luders (1978) and Casterlin and Reynolds (1982) papers and maintains that these papers support an avoidance temperature of 24 ºC for juvenile winter flounder. In addition, Duffy and Luders considered data specifically from Mount Hope Bay.

Casterlin, M.A., and W.W. Reynolds. 1982. Thermoregulatory behavior and diel activity of yearling winter flounder, *Pseudopleuronectes americanus* (Walbaum). *Env. Biol. Fish*. 7, pp 177–180.

Olla, B.L., R. Wicklund, and S. Wilk. 1969. Behavior of winter flounder in a natural environment. *Trans. Amer. Fish. Soc.* 4, pp 717–720.

26. Comment

PG&E-NEG stated that EPA contends that the company's assumption of acclimation and the use of a 7-day acclimation period result in an underestimate of chronic mortality to juvenile winter flounder from thermal discharges. The permittee stated that EPA is incorrect to conclude that the "acclimation concept" results in an underestimate of chronic mortality. According to the permittee, "the thermal thresholds assessed in the Final Demonstration are exactly those referenced in the Bevelhimer and Coutant (2002) report prepared for EPA , which cites an acclimation temperature with respect to each of the five thermal threshold values shown." The permittee stated that this "suggests that the chronic mortality results are correct."

Response

Upon further review, EPA agrees that the chronic mortality results do represent a reasonable estimate for juvenile winter flounder. This is because use of the 7-day acclimation period may be appropriate here based on the limited mobility of juvenile winter flounder.

27. Comment

PG&E-NEG stated that EPA failed to acknowledge or address the fact that the outputs from the ASA model that predicted 5 days of temperature exceedance "were not 5 consecutive days." The permittee stated that this is of "critical importance" in assessing the biological impact of thermal discharges on fish because elevated temperatures over long, sustained periods would have different effects than intermittent temperature increases for short periods of time. The permittee complained that EPA is being arbitrary by measuring compliance with temperature thresholds based on whether they are exceeded in 5 or more days per month. According to the permittee, EPA's approach ignores the biological significance of whether there were 6 days or 26 days of exceedance, and effectively concludes that the difference between 4 and 5 days of exceedance is critical, but the difference between 6 and 26 days is not.

Response
EPA selected a temperature exceedance frequency of > 5 days as a measure of compliance because its analyses indicated that this was the maximum frequency that would allow for protection and propagation of the BIP in Mount Hope Bay. EPA's rationale for selecting a frequency of temperature exceedance of > 5 days is discussed in greater detail elsewhere in this document. PG&E-NEG's hydrothermal model predicted areas of the bay that would exceed a specific target temperature for > 5 days based on a variety of different thermal loading scenarios. EPA acknowledges that the model exceedances may not have always represented 5 consecutive days, but also recognizes that in many cases it likely represented a total quantity of time far **greater** than 5 days. The predicted daily average temperature was compared to a specific threshold temperature to determine an exceedance. A time period equivalent to a day was used because the complexity of the model made the time and expense of running the model at intervals less than a day prohibitive. This approach to temperature thresholds and biological effects is therefore not as conservative as it could have been. A daily average temperature of 25 ºC for instance, certainly potentially reflects hours of the day when water temperatures could substantially exceed 25 ºC. EPA's approach certainly does not reflect the "no effects" level that several commenters feel is warranted in light of the condition of fish populations in Mount Hope Bay. However, EPA believes that this is a reasonably protective approach that, when implemented along with continued fisheries management and water pollution control, will lead to a revitalized Mount Hope Bay ecosystem.

28. Comment
PG&E-NEG stated that EPA offers no biological justification for the 10 percent areal compliance cutoff it uses for applying its absolute temperature thresholds. The permittee commented that the 10 percent areal cutoff is meaningless "because it focuses only on the change in the area affected relative to one discrete target temperature," but does not quantify the biological consequences of the change. As a result, according to the permittee, there is no explanation of whether or not exceedance of the 10 percent cutoff translates into "a consequential biological effect." The permittee stated that its consultant LMS has concluded that it would have no biological consequence. In addition, the permittee argued that EPA's approach is misleading because large changes in the results would occur if one used modeling runs based on conditions other than the worst case conditions of 1999, or if one changed the critical temperatures by 1 degree. The permittee argued that these "flaws" render EPA's approach "unacceptable" for assessing whether the standards of CWA § 316(a) will be met.

Response
EPA based its areal impact limit on the maximum area of impact it believed would allow for the protection and propagation of the BIP in Mount Hope Bay. In assessing the biological consequences associated with the impact area, EPA considered the general advice from its 1977 draft § 316(a) Guidance Document. The Draft Guidance advocates avoiding thermal impacts on spawning and nursery habitat and generally minimizing the areal extent of thermal impacts to the extent possible. The biological benefits of avoiding thermal impacts on spawning and nursery habitat in Mount Hope Bay are substantial but difficult to quantify, given that the locations of these areas in the bay have not been precisely identified or quantified. Likewise, it is not possible to quantify the exact level of impact on eggs because the number of eggs produced and their exact location in the bay are not known. Nevertheless, it is clear to EPA that minimizing thermal impacts on spawning and nursery habitat in Mount Hope Bay is crucial to assuring the protection and propagation of the BIP.

In light of the above-mentioned data gaps, EPA used the best information available to determine the maximum acceptable area of thermal impact. Published studies regarding spawning area preferences identify a preference for certain habitat characteristics. For example, inshore stocks of winter flounder have been reported to spawn in the estuarine portions of rivers. Based on this general guidance and the location of winter flounder nursery areas identified by the MRI winter flounder young-of-the-year beach

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

Unfortunately, precise quantification of the level of improvement in fish spawning success and juvenile fish survival from reducing the area of thermal impact to 10 percent of the bay is not possible. The permittee implies that the lack of precise quantification is equivalent to "no consequential biological difference." EPA disagrees with this position as its permit limits represent substantial thermal discharge and impact reductions. Hydrothermal modeling predicts that the majority of areas known as winter flounder nursery habitat will be spared the influence of the thermal plume. In addition, winter flounder are known to spawn in the lower portions of river systems and EPA's Draft Permit minimizes the thermal impact on these areas as well. EPA contends that protection of these critical habitats is essential to help propel the restoration of multiple fish species in Mount Hope Bay. Moreover, the area of thermally induced winter flounder avoidance as a result of the plant's thermal discharge will also be greatly reduced, thus further helping to reasonably assure the protection and propagation of the BIP in Mount Hope Bay.

Marine Research Inc. 1999. *Brayton Point Station 1998 annual report*. 600 pp.

29. Comment

PG&E-NEG stated that the temperature thresholds used by EPA are "unnecessarily low." According to the permittee, EPA has used "highly conservative temperatures based on the lowest level of observed effects in the most sensitive species." The permittee stated that this approach is "inconsistent" with the suggestion in EPA's 1977 Draft CWA § 316(a) Guidance (p. 71) that limits should be set "only" so that temperatures will not exceed the upper limits for survival, growth, and reproduction of any representative important species. The permittee further argued that there is "no convincing evidence" that winter flounder will avoid temperatures greater than 24 ºC. According to the permittee, there is also "no convincing evidence" that striped bass will avoid water temperatures warmer than 25 ºC.

Response

EPA disagrees with the permittee's assertion that its temperature thresholds are unnecessarily low. Based on the severely degraded condition of fish stocks and aquatic life in Mount Hope Bay, significant improvements need to be instituted to allow for the recovery of the balanced, indigenous community of fish, shellfish, and wildlife. EPA has gathered facts, observations and data regarding the ecological community in Mount Hope Bay. Based on its analysis, EPA has constructed a rational, scientifically sound explanation for the adverse impacts that have occurred within the bay, including significant adverse impacts from thermal discharges. For a more detailed discussion of these ongoing impacts, see Chapter 6 of EPA's July 22, 2002, Permit Determinations Document and its responses regarding § 316(a) elsewhere in this document. EPA has considered the scientific literature in selecting thermal discharge limits and the resulting threshold water temperatures. The selected water temperature values are intended to be protective of the RIS, as required by CWA § 316(a), but they certainly do not represent "no impact" values.

EPA has set these limits in a manner consistent with EPA's 1977 Draft § 316(a) Guidance Document. The permittee misinterprets the intent of EPA's 316(a) Guidance Document when it states that the Guidance Document indicates that "when evaluating an applicant's demonstration, EPA is to ensure only that temperatures not be in excess of the upper temperature limits for survival, growth, and reproduction, as applicable, of any RIS occurring in the receiving water." Though the permittee suggests that this should be the target level of protection, the Guidance Document clearly intends it to be a bare minimum. For example, the Guidance Document specifies that thermal discharges to spawning grounds and nursery areas should be avoided. The Guidance Document also states that a 316(a) variance shall be deemed successful only if the EPA Regional Administrator finds that "there is no convincing evidence that there will be damage to the balanced indigenous community or community components, resulting in such phenomena as those identified in the definition of appreciable harm." For a more detailed discussion of the Guidance Document and the concept of "appreciable harm," see responses elsewhere in the § 316(a) section of this document.

EPA also disagrees that there is a lack of convincing evidence that winter flounder and striped bass will avoid areas with temperatures above 24 ºC and 25 ºC, respectively. EPA's conclusion regarding avoidance temperatures for these species was based on a number of studies in the scientific literature, as well as consultation with Dr. Grace Klein-MacPhee, a recognized expert on winter flounder. The avoidance temperature for striped bass was selected based on a review of the scientific literature and has been confirmed as scientifically valid by Dr. Charles Coutant, a recognized expert on thermal effects on fish and striped bass in particular. EPA has discussed this evidence in detail elsewhere in this document and in its 316(a) and (b) Permit Determinations Document. EPA believes that the temperatures chosen represent the level of control needed to assure the protection and propagation of the BIP in Mount Hope Bay.

30. Comment

PG&E-NEG stated that EPA criticizes the company's choice of optimal temperatures for tautog and hogchoker and stated that "'hogchoker avoid water temperatures above 25 degrees C." The permittee complained, however, that EPA "provides no evidence that a different choice would have an appreciable effect on the analysis." According to the permittee, it conducted an analysis using "the lowest temperature having literature support (26.9 degrees C) and found that the percentage of the Bay for which avoidance was predicted was still only 0.2 percent." The permittee further stated that there is "no support" for hogchoker avoidance at 25 ºC and that studies indicate that "hogchoker, when acclimated to 24 ºC, prefer temperatures up to and including 28 degrees C" (emphasis in original).

Response

EPA disagrees with the permittee's assertions regarding avoidance temperatures and optimal temperatures. PG&E-NEG cited two specific studies (Olla and Studholme, 1975, Peters and Boyd, 1972) to support their selection of "optimal" temperatures for tautog and hogchoker. The word "optimal" implies that these values represent the best temperatures for growth and/or survival. However, the authors of these studies never described any of the temperatures from their studies as "optimal." In fact, the temperatures chosen by PG&E-NEG actually represent values that trigger biological impacts. See EPA's July 22, 2002, Permit Determinations Document, pp. 6-32 and 6-33. Peters and Boyd (1972), a study cited by PG&E-NEG, stated that observations in nature indicate that hogchoker avoid temperatures above 25 ºC. Peters and Boyd (1972) thus support the point EPA has made elsewhere in this document, that an organism's response to elevated temperatures in nature often contrasts with responses found in the kinds of laboratory studies relied on by the permittee.

PG&E-NEG also claims that there is "no appreciable effect on the analysis" even if they accept the 25 ºC avoidance temperature for hogchoker. EPA disagrees with this statement. The permittee chose 26.9 ºC as its avoidance temperature for hogchoker, and the hydrothermal model predicted that only a small

percentage of the bay's bottom waters (the 3 feet closest to the bottom) would exceed that value in the summer under the current thermal discharge. Hydrothermal modeling results predicted virtually no areas of the bottom waters exceeding 26.7 ºC under the permittee's Enhanced Multi-Mode proposal. EPA also requested hydrothermal modeling results for the bottom waters that exceeded 24 ºC. Under the Enhanced Multi-Mode option, 80 percent of the bay exceeded this temperature value for at least 1 day. Thus, a small change in temperature can lead to a very large change in the level of biological effect.

Unfortunately, no model run was completed for 25 ºC in the bottom waters, but 25 ºC model runs were conducted for the surface (top 3 feet of the water column) and the midwater (the water column minus the top 3 and bottom 3 feet). For the Enhanced Multi-Mode option 34 percent of the bay exceeded 25 ºC in the midwater and 70 percent of the surface water (PG&E-NEG, 2001). At lower heat loads, the area exceeding this temperature was significantly reduced (PG&E-NEG, 2001). From these results it can be inferred that some substantial portion of the bottom waters of Mount Hope Bay would be 25 ºC. The affected areas would be closest to the point of discharge, which is near the lower portions of the freshwater rivers that enter the bay. Hogchoker is a demersal fish that is truly estuarine, favoring the lower salinities found in the lower parts of these rivers (Collette and Klein-MacPhee, 2002). Having established that hogchoker will avoid temperatures above 25 ºC, and that its preferred habitat areas are likely to be significantly affected by thermal discharges, EPA believes that there is indeed a substantive difference resulting from the selection of 25° C as an avoidance temperature as opposed to the company's selection of 26.9 ºC.

Collette, B.B., and G. Klein-MacPhee, eds. 2002. *Bigelow and Schroeder's fishes of the Gulf of Maine*. 3rd Ed., Smithsonian Institution Press, Washington.

Olla, B.L., and A.L. Studholme. 1975. The effect of temperature on the behavior of young tautog, *Tautoga onitis*.(L.). In *Proceedings of the 9th European Marine Biology Symposium*, pp 75–93. Aberdeen University Press.

Peters, D.S., and M.T. Boyd. 1972. The effect of temperature, salinity, and availability of food on the feeding and growth of the hogchoker, *Trinectes maculatus* (Block & Schneider). *J. Exp. Mar. Bio. Ecol.* 9, pp 201–207.

PG&E-NEG. 2001. Section 308 Information Request Response, August 10, 2001. 92 pp.

31. Comment

PG&E-NEG stated that EPA's proposed permit limits for thermal discharges must be too stringent because even without the plant operating, ambient water temperatures would still "routinely" exceed EPA's thresholds. The permittee also complained that EPA's approach incorrectly suggests that water temperatures below the threshold are "benign" while temperatures above the threshold would require plant shutdown.

Response

EPA disagrees that its thermal discharge limits are too strict simply because ambient water temperatures would sometimes exceed the cutoff values. EPA selected the threshold temperatures by reviewing the scientific literature regarding what temperatures would be supportive of critical life processes of the RIS of Mount Hope Bay. EPA assessed the biological effects of thermal discharges based on these values from the literature. The Agency assumes that PG&E-NEG's comment specifically refers to its selection of 5 ºC for a winter water temperature protective of winter flounder eggs and larvae, because in a warm winter the entire bay exceeds that value (PG&E-NEG, 2001). However, EPA believes this fact supports its selection of threshold temperatures. In warm winters, because of long-term water temperature rise, Mount Hope Bay may be a less than optimal habitat for winter flounder spawning and larval

development, even without added heat from BPS. Jeffries and Tereceiro (1984) first correlated winter flounder abundance in Narragansett Bay with winter water temperatures and found that warm winters resulted in poor recruitment. Therefore, there is natural variability in flounder abundance that is strongly temperature driven. Keller and Klein-MacPhee (2000) offer one explanation for this supported by experimental evidence. David Taylor has extended this work to include field studies, and his results support Keller and Klein-MacPhee's work. Both studies showed that sand shrimp predation on winter flounder eggs and larvae increase with warmer winter water temperatures.

The hydrothermal model was run using 1999 water temperature data as the ambient temperature. Based on 10 years of data, this was shown to be the warmest year. Ideally, it would have been preferable to run the model 10 times using each year of data as the ambient or background temperature. This would have allowed the Agency to predict with varying thermal discharges how often and over what area of the bay winter water temperatures exceeded 5 ºC. Time would not allow for the completion of this, however, and EPA felt that sufficient information was available to make a reasoned decision.

The permittee suggests that EPA characterizes any temperature below the threshold temperature as "benign" and anything exceeding it as requiring the plant to shutdown. This is incorrect. Nowhere in EPA's permit, Fact Sheet, or July 22, 2002, Permit Determinations Document does EPA say that BPS should be shut down. Thermal discharge limits must be set somewhere, and EPA believes it has set them at a reasonable point in light of the relevant science and data and CWA § 316(a)'s requirements that variance-based limits assure protection and propagation of the BIP. Moreover, EPA points out that all parties have agreed that installation of cooling technologies will actually allow BPS to increase electrical generation during peak hot weather periods, without running afoul of the permit's thermal discharge limits. Currently, the facility can be constrained by its discharge temperature limits during the hottest periods of the year.

EPA also understands that even temperatures below its threshold temperatures do not represent a "no impact" scenario. To be protective, EPA focused on the most sensitive life stage of the most sensitive species for each season. EPA also split the water column into the bottom water for demersal species and the rest of the water column for pelagic species. In consideration of ambient temperatures, the Agency selected data from 1999, the warmest of the 10 years for which data existed. EPA believes this was a reasonable approach, especially in light of data suggesting long-term temperature water increases in Mount Hope Bay. It also recognizes, however, that variability in temperatures will result in some years being cooler. Thus, the Agency believes its approach should be sufficient to reasonably assure the protection and propagation of the BIP in Mount Hope Bay. EPA acknowledges that biological systems are variable and as a result one could probably never select a temperature that would be 100 percent safe on all species all the time. That being said, EPA believes that by focusing on the most sensitive species and selecting temperatures that provide them with a reasonable level of protection, it will by extension assure protection for the rest of the community. In this particular case, winter flounder is the most sensitive species, and it is also one of the most ecologically, commercially, and recreationally important fish in the bay.

Jeffries, H.P., and W.C. Johnson. 1974. Seasonal distribution of bottom fishes in the Narragansett Bay area: seven-year variations in the abundance of winter flounder (*Pseudopleuronectes americanus*). *J. Fish. Res. Board Can.* 31:1057–1066.

Keller, A.A., and G. Klein-MacPhee. 2000. Impact of elevated temperature on the growth, survival, and trophic dynamics of winter flounder larvae: a mesocosm study. *Can. J. Fish. Aquat. Sci.* 57:2382–2392.

PG&E-NEG. 2001. Section 308 Information Request Response, August 10, 2001. 92 pp.

32. Comment
PG&E-NEG stated that the record supports the conclusion that an annual thermal discharge limit of 28 TBtu would not result in any appreciable harm to the fish populations of Mount Hope Bay. The permittee commented that it compared prevailing temperatures in "lower Mount Hope Bay" with those that would result in "upper Mount Hope Bay" under its proposed permit limits and found that only a small, biologically insignificant difference in temperature would result. The permittee stated that this difference would have "virtually no effect" on egg viability or winter flounder avoidance.

Response
EPA disagrees with PG&E-NEG's conclusion that a discharge limit of 28 TBtus would not result in any appreciable harm to fish populations in Mount Hope Bay. This level of discharge would result in substantial areas of Mount Hope Bay being above avoidance temperatures for juvenile winter flounder, increased predation on winter flounder eggs, impacts on migration of striped bass and Atlantic menhaden, and exclusion of important habitat formers such as eelgrass. For a detailed discussion of these effects, see Chapter 6 of EPA's July 22, 2002, Permit Determinations Document and responses elsewhere in this document.

33. Comment
PG&E-NEG stated that it is arbitrary to simplify matters to the point of setting "a single set of temperature thresholds for **all** demersal and **all** pelagic species" of fish (emphasis in original). The permittee stated that there are multiple species with different temperature thresholds involved in this matter and that although EPA is aware of this, it has not taken it into account. The permittee complained that EPA has not addressed how all these species would be affected by thermal discharges and, instead, has only focused on two species. According to the permittee, this is inconsistent with CWA § 316(a), which focuses on the entire balanced, indigenous community in the receiving water. The permittee stated that EPA guidance and administrative decisions indicate that CWA § 316(a) does not mandate that there can be no thermal impacts whatsoever. Instead, according to the permittee, there can be adverse effects (even significant adverse effects) on a few species, without necessarily requiring a finding that "appreciable harm" would occur. The permittee argues that by focusing on only two species, EPA has left itself unable to answer the questions regarding the balanced, indigenous population that must be answered to make a CWA § 316(a) determination.

Response
EPA agrees with the permittee that assuring the protection and propagation of a BIP under CWA § 316(a) does not mean that there can be **no** adverse effects whatsoever from the thermal discharge. Indeed, as the Agency has explained, the thermal discharge limits in the new permit for BPS issued by EPA will have **some** adverse effect on species that are part of the BIP. EPA has concluded, however, that these adverse effects are insufficient to undermine its reasonable assurance that protection and propagation of the BIP will be achieved. This is explained in Chapter 6 of EPA's July 22, 2002, Permit Determinations Document and elsewhere in this document.

The permittee also argues that even significant adverse effects on a few species do not necessarily **require** a finding of appreciable harm to the BIP that would preclude a § 316(a) variance. EPA agrees with this statement to the extent that the commenter is saying that even significant adverse effects on a few species might not create a **100 percent** inviolate requirement that no § 316(a) variance could be issued. EPA disagrees with the comment to the extent that the commenter is trying to say that in all cases significant adverse effects on one or more species that are part of the BIP will be acceptable. The point is that each § 316(a) variance determination is unique and, accordingly, is rendered on a case-by-case basis. Therefore, the importance of particular adverse effects may vary depending on the facts of the case, such as the nature and severity of the adverse effect, the number of species adversely affected, the importance of the species that is being adversely affected, the background condition of the BIP, and the cumulative

effect of this adverse effect when combined with other stressors. EPA's analysis takes these sorts of considerations into account and properly assesses whether the proposed variance limits will assure protection and propagation of the BIP.

EPA's approach in this permit is consistent with the 1977 Draft CWA § 316(a) Guidance Document and past permit decisions by the Agency. These discussions of how to apply § 316(a) clearly indicate that any significant adverse effects from the discharge may lead to denial of a variance application, and they certainly do not suggest that significant adverse effects are necessarily acceptable. See 1977 Draft 316(a) Guidance, §§ 3.3.2 and 3.3.3. Indeed, while EPA did not use the 1977 Draft Guidance to provide binding decision criteria for this variance application, if it were used in that way it would likely compel denial of the permittee's requested variance because of several important biological thresholds would be exceeded (e.g., discharge to an estuary causing winter flounder avoidance, increased winter flounder egg and larval mortality, interruption of normal fish migration, thermal exclusion of eelgrass). Similarly, the EPA Administrator's permit appeal decision in *In the Matter of Public Service Company of Indiana, Inc. (Wabash River Generation Station, Cayuga Generating Station*, 1 E.A.D. 590, 1979 EPA App. LEXIS 4, 28 (NPDES Appeal No. 78-6) (Nov. 29, 1979), is consistent with the analysis that EPA conducted for this permit and indicates that various types of adverse effects may lead to denial of a variance. Accord *In the Matter of Public Service Company of New Hampshire (Seabrook Station, Units 1 & 2)*, 10 ERC 1257, 1264 (U.S. EPA, NPDES Permit Application No. NH 0020338, Case No. 76-7, June 17, 1977).

The permittee's comment that EPA has considered thermal effects on only two species is incorrect. In fact, EPA considered possible thermal effects on numerous species that make up or support the BIP. It is true, however, that EPA used thermal tolerance data for the most sensitive species to help determine appropriate thermal discharge limits. This approach is perfectly appropriate under CWA § 316(a) and is consistent with the long-standing concept of focusing analysis on RIS. It is also clearly appropriate in this case, where commercially and/or recreationally important fish species such as winter flounder and striped bass helped to drive the permit limits because of their sensitivities to particular water temperatures. EPA's approach is also consistent with reasonable scientific practice, as well as other EPA permit decisions in which EPA based its analyses on "worst-case" conditions either by focusing on certain species that were most affected by the thermal discharge or by requiring investigation of the effects that would ensue under worst case background environmental conditions. See *Wabash*, 1979 LEXIS at 25-41; *Seabrook*, 1 E.A.D. 455 (Aug. 4, 1978).

34. Comment

PG&E-NEG stated that the "other heat effects" suggested by EPA are speculative and entitled to no weight in the CWA § 316(a) evaluation. The permittee argued that "no credible evidence" exists that these effects have occurred in the past due to BPS or that they would occur in the future with the permit limits it proposes.

a. **Lymphocystis:** The permittee stated that the rate of lymphocystis cited by EPA is incorrect and that EPA's data are unreliable. According to the permittee, EPA has also incorrectly stated that the thermal discharge has promoted a "significant outbreak of lymphocystis among striped bass and bluefish." The permittee stated that the disease rate EPA mentions for striped bass in the discharge canal—30 to 50 percent—is incorrect and is based on a single personal observation. More reliable figures from the same period indicate that the infection is significantly less than 1 percent. The permittee said that EPA relies on "a single personal observation" by a fisherman and that these data are unreliable, while the permittee collected more reliable data that found only four infected fish. The permittee also stated that only three bluefish were caught in the discharge canal from 1995 to 1997 during 905 hours of hook-and-line fishing, so that EPA's statement on p. 6-43 of EPA's Permit Determinations Document is clearly wrong. The permittee also stated that EPA incorrectly characterizes the danger of this disease. According to the permittee, the literature

indicates that the disease is a chronic rather than fatal condition, that it alters the appearance of the fish but that their behavior is unchanged, and that it "tends to clear in the fall with declining water temperatures."

b. **Striped Bass and Bluefish Migration:** PG&E-NEG stated that BPS has no effect of any consequence on striped bass migration for two reasons: (1) only a small number of striped bass overwinter in the plume, as compared to the millions of striped bass that make up the coastal population of the species; and (2) striped bass have variable migration behavior—the young do not migrate and only some adults do (other adults never leave their natal waters). Since some striped bass do not migrate, and this "plasticity" in migration behavior is "normal," the permittee concluded that "there is no evidence" that the BPS thermal plume is disrupting their "normal migration." In addition, the permittee argued that given that only three bluefish were reported to have been caught in the discharge canal in 904 hours of hook-and-line fishing from 1995 to 1997, any concern about the thermal plume's interfering with bluefish migration is "pure speculation."

c. **Increase in Smallmouth Flounder:** PG&E-NEG stated that EPA engages in "baseless speculation" by suggesting that the increasing frequency of smallmouth flounder in Mount Hope Bay has been "accelerated or exacerbated" by BPS's thermal discharge. The permittee complained that while EPA references a communication from Grace Klein-MacPhee (AR 714) to support this point, the communication indicates that there are several theories that might explain the increase and that she does not really know why it is occurring. Furthermore, according to the permittee, EPA provides no evidence of a greater increase in smallmouth flounder in Mount Hope Bay than exists in Narragansett Bay. Finally, the permittee argues that it is not even clear that an increase is occurring, since the Wilcox trawl does not reveal such an increase. The permittee further stated that impingement data show that smallmouth flounder are neither new to the bay nor more abundant in recent years than in the 1970s, because "the highest annual estimate [of smallmouth flounder] is from 1976, 26 years ago, when 499 fish were impinged."

d. **Menhaden Impingement Events:** PG&E-NEG stated that EPA efforts to link menhaden impingement with BPS's thermal discharges is "unsupported speculation." According to the permittee, there is "no evidence" to support "EPA's suggestion that [thermal discharges have contributed to] the delay in migration [and] has caused these fish to become more susceptible to impingement" and it is utterly unsupported by any scientific evidence. Furthermore, the permittee stated that there is no evidence that these events affect the menhaden population as a whole. The permittee indicated that "menhaden that appear in Mount Hope Bay are part of an enormous offshore stock and even sizable fish kills . . . are not believed to have any meaningful effect on its populations' ability to thrive."

e. **Winter Flounder Being Driven to the Deep Trawling Stations:** PG&E-NEG stated that EPA's suggestion that BPS's thermal plume might drive winter flounder to congregate in the few deep spots of Mount Hope Bay is "not supported by any data." The permittee states that age 1 or older winter flounder simply prefer deeper water. The permittee also argued that the percentage of winter flounder caught in the deep station near the plant is not significantly greater than the percentage caught at other deep stations in Mount Hope Bay, including those far from the discharge, and that this indicates that the thermal discharge is not the cause of this problem.

Response

EPA's biothermal assessment consisted of several components, some entirely predictive and some based on observational field data. The entirely predictive component consisted of using model results from the hydrothermal model and comparing predicted ambient water temperatures to temperature thresholds of various sensitive species in Mount Hope Bay. In addition to that, EPA attempted to compile field data and observations of current thermal impacts in Mount Hope Bay and assessed whether the thermal reductions

proposed by BPS would provide a reasonable assurance that these impacts would be mitigated. EPA also points out that there is presently no monitoring effort by the permittee or anyone else to comprehensively identify potential thermal impacts from BPS. Thus, EPA's list of Other Thermal Effects may not be complete. Below, EPA addresses each comment individually.

a. **Lymphocystis:** The incidence of lymphocystis in striped bass is discussed elsewhere in this document.

b. **Migration:** EPA maintains that the thermal discharge from BPS is disrupting the migration of striped bass, bluefish, and Atlantic menhaden in the fall. It has been well established that large numbers of striped bass, upwards of several thousand fish, and smaller numbers of bluefish, spend the winter in the discharge canal and thermal plume of BPS. PG&E-NEG suggests that some striped bass normally overwinter in Mount Hope Bay, though it provides no evidence to support this statement. PG&E-NEG also suggests that EPA's claim that BPS's thermal discharge may be disrupting bluefish migration is speculative, because only a small number of bluefish have been caught in the discharge canal. To the contrary, EPA relies on observations and information regarding the normal migratory behavior of striped bass and bluefish, rather than speculation, in concluding that the normal migration of both species is being disrupted by the thermal plume. In addition, there is abundant scientific literature showing striped bass being drawn to abnormally warm water from thermal discharges in the winter. Bluefish have also been observed in the discharge canal by fishermen in the winter. BPS's own sampling program found a small number of bluefish in the discharge canal during the winter. Furthermore, the discharge canal is a manmade structure, and the presence of fish in a manmade structure during a season when the majority of their kind have migrated farther south cannot be construed as "normal." Finally, large numbers of juvenile Atlantic menhaden have been impinged in "unusual impingement events" the last several winters. Atlantic menhaden are not known to naturally overwinter in any estuary north of Chesapeake Bay (Able and Fahay, 1998); thus, their presence in Mount Hope Bay in the winter is not "normal."

   PG&E-NEG dismisses these impacts as trivial based on the large numbers of striped bass, bluefish, and Atlantic menhaden along the Atlantic coast. It is certainly true that the large numbers of striped bass, Atlantic menhaden, and bluefish affected by BPS are small compared to the even larger Eastern Seaboard populations of these species. However, these species are part of the balanced, indigenous community of Mount Hope Bay, and that community is the appropriate frame of reference for this permit. These disruptions of normal migration patterns impact the BIP of Mount Hope Bay and need to be considered in that context.

c. **Increase in Smallmouth flounder:** Smallmouth flounder have been appearing more consistently in the RI DEM beach seine surveys, the MRI trawl surveys, and Grace Klein-MacPhee's icthyoplankton collections. A paper presented by Klein-MacPhee and coauthored by Mike Scherer of MRI suggests that these data sets, when considered together, represent an expansion of the range of this species. It is true that the cause of this expansion is unknown, but the two leading theories are that warming water temperatures make the habitat more suitable and the flounder are moving into an empty niche left by the decline of other demersal fish.

   BPS increases the water temperature in Mount Hope Bay, and EPA believes the station has significantly contributed to the decline in the demersal fish stocks. Thus, if either of the above theories proves to be true, BPS may have played some role in facilitating the expansion of smallmouth flounder into Mount Hope Bay. It is also possible that some other environmental change has triggered this expansion in the range of this species. EPA felt obligated to acknowledge this work as it was clearly relevant and publicly available, but the Agency did not

accord substantial weight to it in its final decision because of the incomplete status of the research on the subject.

d. **Menhaden Impingement Events:** Able and Fahay (1998) report that the normal migratory pattern of juvenile Atlantic menhaden is to move out of their estuarine environments in the fall and travel south to warmer offshore waters. This emigration begins earlier in northern locations and starts progressively later in the year the farther south the population lives. They also report that juvenile overwintering has been reported between Florida and Chesapeake Bay, but some have been seen overwintering as far north as Delaware in power plant discharge plumes. BPS has recorded numerous large wintertime impingement events of juvenile Atlantic menhaden. Based on the normal migratory pattern of Atlantic menhaden, EPA believes it is reasonable to assume that the presence of juvenile Atlantic menhaden in Mount Hope Bay during the winter is likely due to the thermal discharge from BPS. In the winter, these fish would be trapped by their thermal preference in the discharge plume as ambient bay temperatures drop below temperatures in which they can survive. Periodic reentrainment of the thermal plume, sudden drops in thermal output, or even extended cold snaps can leave these fish vulnerable to impingement.

   PG&E-NEG again dismisses the loss of these large numbers of fish as trivial compared to the Atlantic coast population of this species. Once again EPA acknowledges that compared to the entire Atlantic coast population, the tens or hundreds of thousands of menhaden individuals lost to impingement do appear to be minor. However, once again, EPA believes the proper frame of reference is Mount Hope Bay and how these losses reflect on the properly functioning, balanced indigenous community. Viewed in the context of Mount Hope Bay, these losses may have a significant impact on the BIP.

e. **Winter Flounder Being Driven to the Deep Trawling Stations:** There is no question that winter flounder in Mount Hope Bay are demonstrating a preference for deeper water (water deeper than 20 feet). This was observed in both the RI DEM survey and the MRI survey, where approximately 80 percent of the total catch was from deeper water. In contrast, data from upper Narragansett Bay show that winter flounder there have a preference for shallow water, with 60 percent of the total winter flounder catch coming from depths of less than 20 feet (Tim Lynch, personal communication, 2003). Sediment type, food availability, and water quality do not appear to vary substantially between the deep and shallow water stations in Mount Hope Bay. Water temperature collected at the bottom during the RI DEM survey showed a substantial difference between the deep and shallow water stations in Mount Hope Bay (Table 1). The distribution of winter flounder in Mount Hope Bay changed with the season, strongly suggesting a temperature effect (Table 2). Thus, EPA believes that the thermal discharge is contributing to a shift in flounder distribution in Mount Hope Bay from shallow water habitat to deeper water habitat based on thermal preference data from the literature. This issue is also discussed in detail elsewhere in these responses to comments.

Table 1. Comparison of Average Monthly Bottom Water Temperature (°C) collected by RI DEM in Shallow (< 20 feet) and Deep (> 20 feet) Trawl Stations from 1990 to 2003 (Lynch, 2003)

Month	Shallow	Deep
January	3.65	3.72
February	3.11	2.79
March	4.91	4.33
April	7.82	6.62
May	14.64	12.57
June	19.20	16.89
July	23.23	20.37
August	23.96	21.51
September	21.25	19.99
October	14.59	14.08
November	9.59	9.85
December	5.96	5.98

Table 2. Average Depth Distribution of Winter Flounder by Month Expressed as Percent of Total Catch for Mount Hope Bay (1990 to 2003) (Lynch, 2003)

Month	Shallow	Deep
January	46	54
February	32	68
March	29	71
April	15	85
May	17	83
June	5	95
July	2	98
August	4	96
September	4	96
October	6	94
November	14	86
December	30	70

Able, K.W., and M.P. Fahay. 1998. *The first year in the life of estuarine fishes in the Middle Atlantic Bight*. Rutgers University Press, New Brunswick, NJ. 342 pp.

Lynch, T. 2003. Personal Communication, September 5, 2003.

35. Comment

PG&E-NEG stated that EPA's assessment of cumulative impacts related to BPS's thermal discharges is "unsupported and unsupportable." According to the permittee, EPA's analysis begins from the "flawed premise" that BPS must compensate for the adverse effects of other stressors in the bay. While acknowledging that EPA must consider cumulative effects in determining whether proposed thermal discharge limits will be adequate to protect the balanced, indigenous population of fish, shellfish, and wildlife in and on the receiving water, the permittee stated that this does not mean that BPS must compensate for other stresses. According to the permittee, EPA's goal of achieving the removal of fishing restrictions is improper in the context of a CWA § 316(a) determination because BPS should not be required to compensate for the effects of other stressors. The permittee stated that "the sole question is whether BPS operations are causing (or would cause) appreciable harm to the community of fish that would exist in the absence of the plant's impact," and "[i]f all of the observed effects on the community would be substantially the same **even if BPS was not present**, then BPS' [variance] demonstration is successful."

Response

EPA disagrees with the permittee's comment that EPA's cumulative impact assessment is "unsupported and unsupportable." The permittee acknowledges that in determining whether thermal discharge limits based on a CWA § 316(a) variance will assure the protection and propagation of "a balanced, indigenous population of shellfish, fish and wildlife in and on the receiving water" (the "BIP"), EPA must consider the cumulative effects of the thermal discharge and other adverse impacts on the BIP. EPA discussed this in § 6.2.2 of its July 22, 2002, Permit Determinations Document. See also 40 CFR § 125.73(a) (§ 316(a) variance 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 . . . [the BIP]"); *Seabrook*, 10 ERC at 1261-62 ("the incremental effects of the thermal discharge should not cause the aggregate of all relevant stresses . . . to exceed the 316(a) threshold").

The permittee goes on to argue that EPA has devised thermal discharge limits designed to "compensate" for the adverse effects of others on the BIP and that this is inappropriate. Without commenting on the propriety or impropriety of attempting to devise permit limits that would compensate for other adverse effects on the BIP, the fact is that EPA did not develop the BPS permit limits on this basis. Rather, the Agency properly took other adverse effects into account in setting permit limits that satisfied CWA § 316(a). EPA did not impose requirements in the permit beyond those necessary to control the power plant's effects. The permittee's argument suggests that EPA determined the exact level of adverse effect from all other stresses on the BIP and devised thermal discharge limits for the power plant that would overcome not only its own effects but also all the other effects. Yet no such finely tuned calculus exists for setting thermal discharge limits, and EPA did not attempt develop permit limits on this basis. Having imposed thermal discharge limits (and cooling water intake limits) to control the plant's effects, EPA did not then go further and attempt, for example, to impose habitat restoration requirements. EPA properly and reasonably considered the effects of the thermal discharge and set limits for it, while taking into account adverse effects from other stresses.

Furthermore, as EPA discussed in detail in the July 22, 2002, Permit Determinations Document, other major stresses to the Mount Hope Bay fishery and ecosystem **are** being addressed. Fishing restrictions and water pollution control improvements are in place and/or under way. Without a proper application of

CWA § 316(a) and (b) to the BPS permit, the people and entities responsible for complying with these other requirements might well complain that **they** are being asked to overcompensate for the effects of the power plant.

The permittee comments that EPA's goal of facilitating the removal of fishing restrictions is improper (although elsewhere in its comments the permittee said this goal was "noble"). EPA would like to clarify its intent in this regard. As the Agency has stated, EPA's goal for permit limits to control thermal discharges is to reasonably assure the protection and propagation of the BIP in and on Mount Hope Bay. EPA expects, however, that achieving this goal will also help to allow the recovery of the fishery. EPA has concluded that the deterioration of the Mount Hope Bay fishery is the result of a combination of factors including the power plant's cooling system (i.e., thermal discharges to and water withdrawals from the bay) ***and*** overfishing. (Water pollution from various sources, including not only the City of Fall River but also the power plant itself, may also be contributing to the problem to some degree.) All of these factors must be addressed. This permit will address the power plant. Fishing is being restricted by both State and Federal requirements. Water pollution problems are also being addressed as appropriate in other permits and even enforcement actions. EPA's view is that for the fishery to recover and then remain in good condition, fishing restrictions are needed in addition to this NPDES permit, and will likely need to remain in place in the future. The hope is, however, that as the fishery's health recovers, these fishing restrictions can be loosened to allow a higher, sustainable level of fishing activity rather than the extremely strict restrictions that are presently necessary. The waters of Mount Hope Bay and the fishery that they should support are a public resource that should be protected and managed for the beneficial use of the public. Thus, while the **removal** of fishing restrictions would be the ideal goal, the **moderation** of fishing restrictions is probably a more realistic goal.

The permittee states that "the sole question is whether BPS operations are causing (or would cause) appreciable harm to the community of fish that would exist in the absence of the plant's impact ...." EPA disagrees to the extent that the permittee's statement implies that where a BIP has been depleted by factors that are not countenanced as acceptable modifiers of a BIP (see 40 CFR § 125.71(c)), then a thermal discharger can discharge as much heat as it wants even if those discharges would preclude recovery of the BIP. In other words, EPA does not agree that a thermal discharger can use existing environmental problems as a justification for adding to those problems when doing so would preclude assurance of the protection and propagation of the BIP.

In addition, the permittee states that "[i]f all of the observed effects on the community would be substantially the same **even if BPS was not present**, then BPS' [variance] demonstration is successful." First, as a factual matter, EPA concludes that the permittee has **not** demonstrated that either its existing operations or its proposed thermal discharge limits would yield a BIP exactly the same as if there was no discharge. Second, the statement goes too far. For example, EPA regulations state that a BIP normally 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." Therefore, if a BIP were altered in composition or abundance as a result of failures to comply with CWA § 301(b)(2), 33 U.S.C. § 1311(b)(2), then the permittee could not increase its discharge of heat to a higher level because it would be compatible with the degraded BIP. See also 1972 CWA Legislative History, p. 175 (Senate Consideration of the Report of the Conference Committee, October 4, 1972) (Remarks of Senator Muskie) ("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."). Similarly, if fish populations have been depleted by overfishing (and plant operations), it does not follow that a power plant can discharge higher levels of heat compatible only with these depleted populations. This becomes especially clear

when overfishing **is** being addressed, as it is in this case. As stated above, the permittee cannot take advantage of these other problems to increase its thermal discharges.

36. Comment

PG&E-NEG stated that EPA incorrectly rejects overfishing as the reason for fish population declines. The permittee stated that EPA rejects overfishing as an explanation for the decline of fish species in Mount Hope Bay for the following reasons:

a. Massachusetts and Rhode Island have virtually eliminated all commercial and most recreational fishing through regulation.

b. The frequency distribution of winter flounder and windowpane flounder shows a lack of smaller fish.

c. The decline in Mount Hope Bay was extremely rapid.

d. 16 of the 20 finfish species in Mount Hope Bay show a similar rate of decline.

e. There is an absence of species replacement in Mount Hope Bay.

f. The impact was localized to Mount Hope Bay.

g. No recovery has occurred in Mount Hope Bay.

h. The only stressor that showed a significant change at the time of the decline was a change in operations at BPS.

The permittee then stated that "there is no credible evidence to support any of the reasons EPA offers for rejecting overfishing as the cause of the decline in Mt. Hope Bay." According to the permittee, EPA cannot rely on the effectiveness of fishery management plans to control overfishing because Massachusetts and Rhode Island have not "virtually eliminated commercial and recreational fishing." The permittee stated that "[f]ishing is still allowed and conducted on a regular basis for certain species [and] it is clear that there have been violations of the regulations that are in effect." The permittee noted that it has submitted letters by the Atlantic States Fishery Management Council alleging that Rhode Island was out of compliance with the plan for tautog in 1999 and that Massachusetts was out of compliance for scup in 1998 and 2001. According to the permittee, the remaining reasons offered by EPA rely entirely upon the reports prepared by Mark Gibson of the RI DEM, but the permittee stated that it has refuted Gibson's reports, so EPA cannot rely on them.

Response

EPA has never disputed that fishing mortality has played a significant role in the decline of fish populations in Mount Hope Bay. That being said, EPA does not believe that PG&E-NEG has refuted Gibson's analysis showing a statistically significantly different decline for four species in Mount Hope Bay compared to Narragansett Bay. Gibson's analysis suggests that some additional site-specific impact is affecting fish abundance in Mount Hope Bay. EPA's assessment of Gibson's study is discussed in detail in EPA's July 22, 2002, Permit Determinations Document and responses to comments elsewhere in this document.

In addition, Collie and Delong (2002) conducted a comprehensive review of all data related to winter flounder within Narragansett Bay and Mount Hope Bay. This review considered data for all winter flounder life stages and examined a number of possible sources of winter flounder mortality, including overfishing, cormorants, seals, precipitation, dissolved oxygen, water temperature, and chlorine discharges. The study showed that Mount Hope Bay exhibited mortality bottlenecks for winter flounder that were at different life stages than any other sectors examined in Narragansett Bay. The study also positively correlated mortality in three life history stages of winter flounder with BPS cooling water flow.

The authors stated, "There was clear evidence that increases in Brayton Point power plant coolant water flow affected winter flounder in Mount Hope Bay. We found that the flow through the power plant affected the survival of winter flounder larvae, as well as older aged flounder (YOY in the summer and during the third winter)." Finally, even PG&E-NEG's own consultant concludes that BPS is having a measurable impact on 5 square miles of upper Mount Hope Bay. Thus, three separate investigators—a State government employee, an independent academic researcher, and a consultant to PG&E-NEG—have all concluded that BPS is having an impact on winter flounder in Mount Hope Bay beyond that inflicted by fishing mortality.

EPA offers the following additional views regarding fishing mortality. Overfishing certainly has occurred in the past and arguably continues for some species today. However, both Massachusetts and Rhode Island have implemented severe restrictions for commercial and recreational fishing in Mount Hope Bay and Narragansett Bay. For offshore Rhode Island and Federal waters, fishing mortality peaked in 1988 and has been curbed to about 33 percent of that level today. Additional restrictions on commercial fishermen are being considered, as Amendment 13 to the Northeast Multispecies Fishery Management Plan has been issued for public review. Fisheries managers intend to implement the plan, which will attempt to reduce fishing-induced mortality on winter flounder by 65 percent, by late spring of 2004. Thus, while fully acknowledging that overfishing is part of the problem, EPA is persuaded by the multiple analyses that have detected an impact on winter flounder populations from operations at BPS.

Collie, J.S., and A.K. DeLong. 2002. *Examining the decline of Narragansett Bay winter flounder*, Final Report to RI DEM Division of Fish and Wildlife. 150 pp.

37. Comment

PG&E-NEG stated that EPA "ignores" the role of "cormorant predation as a potentially significant factor in the fish decline and failure of fish to recover." The permittee pointed to two recent studies of what it calls the "explosion of the cormorant population since the 1980s and its probable effect on fish populations." According to the permittee, cormorant predation on small winter flounder "increased exponentially between 1984 and 1985" and remains at high levels. Moreover, the permittee stated that nesting and feeding patterns indicate more cormorant predation pressure on fish in Mount Hope Bay than in Narragansett Bay. The permittee also stated that while cormorant predation would not necessarily explain the original fishery decline, it would be "sufficient to contribute to the lack of recovery of winter flounder in Mount Hope Bay after fishing pressure was reduced."

Response

EPA acknowledges that cormorants have increased substantially since the 1980s; however, it finds that the analysis submitted by PG&E-NEG overstates the importance of this source of mortality to winter flounder. In addition, the Agency must emphasize that the decline of fish populations has also occurred in a number of species in addition to winter flounder. Four species showed a statistically greater decline in Mount Hope Bay than in Narragansett Bay: winter flounder, windowpane, hogchoker, and tautog. These are all demersal fish, but have different life histories. PG&E-NEG provided no data or analysis of cormorant predation on these other species.

PG&E-NEG submitted comments by its consultant Dr. Deborah French McCay, including her report entitled "Estimating Impacts of Cormorants on Fish Populations in Narragansett Bay Estuary." This document states that "the natural mortality of juvenile winter flounder in the Narragansett Bay Estuary (NBE) increased exponentially from 1980–1997 due to increases in the local cormorant breeding population" and that this "increase in mortality is significant relative to other sources of mortality of juvenile winter flounder." French McCay contends that the "estimated increase in cormorant predation rate is sufficient to explain the lack of recovery…of fish abundance in the Narragansett Bay estuary

discussed by Gibson (1996, 2002) and EPA….” French McCay further asserts, “[O]ur analysis and calculations confirm that cormorant predation is significant on winter flounder populations.”

The analysis whereby French McCay arrives at these conclusions is strictly a mathematical exercise that derives a series of predictions based on untested assumptions about the foraging behavior, physiology, and life history of cormorants in Narragansett Bay. Her analysis is not based on any site-specific data to confirm these predictions. French McCay does not have the scientific evidence to determine the magnitude of cormorant predation on juvenile winter flounder in Narragansett Bay, and no comparisons were made to other forms of predation to determine whether cormorant predation is significant relative to the others. Within this analysis are several assumptions that are untenable based on actual data and others that are highly questionable. These assumptions are detailed below.

Cormorant Foraging

Throughout her comments, French McCay assumes that cormorants are “opportunistic fish eaters” that “prefer” or “target” “slower-moving demersal species.” French McCay also assumes that cormorants are “exclusively piscivorous” (p.11). By focusing only on slow demersal fish species, French McCay ignores the breadth of information presented in works cited in her own comments. According to the scientific literature, cormorant prey preferences switch depending on the availability of prey in the suitable size range (Derby and Lovvorn 1997). Cormorants have been documented to eat schooling pelagic fish, demersal fish, crustaceans, molluscs, and aquatic insects (Clapp et al., 1982; Ehrlich et al.; 1988; Lewis 1929; Wires et al., 2001). A 1995 RI DFW study of the gut contents of 67 cormorants from Hope Island and Sakonnet Point found that on average only 8.7 percent of the diet of the cormorants sampled was winter flounder. French McCay uses the results of this study to suggest that cormorants “target” winter flounder “preferentially to all species available.” Without knowing the other contributions to cormorant diet, it is not clear how important winter flounder are relative to other species. However, it is clear that the 67 cormorants sampled were not targeting winter flounder, because most of their diet was composed of other food sources. French McCay’s assertion that cormorants preferentially select winter flounder is simply untenable based on the published literature and site-specific data collected in Narragansett Bay.

French McCay assumes that cormorants in Narragansett Bay behave like cormorants studied in other systems and thus that they will fly only 8 to 16 kilometers to their foraging grounds (Palmer, 1962) and only forage in water <8 meters deep within 5 kilometers of the shoreline (Wires et al., 2001). In addition, French McCay assumes that foraging behavior is equally distributed across all waterbodies. The latter assumes that fish dispersion patterns do not change, which clearly is not the case for schooling or migrating fish found in Narragansett Bay (e.g., herring, bay anchovy, butterfish, scup, menhaden). Given that the scientific literature abounds with descriptions of the breadth of cormorant diets, and that they have been documented to switch prey depending on availability, a major flaw in French McCay’s analysis is the assumption that winter flounder will always constitute 8.7 percent of a cormorant’s diet despite the time of year or the location of cormorant foraging. French McCay does not take into account the real-world temporal and spatial variability of cormorant prey. Furthermore, French McCay’s predictions remain questionable without verification that the cormorants in the Narragansett Bay area forage only in the areas that she assumed for the purposes of her analysis (e.g., she assumes that all the cormorants nesting at Sakonnet Point forage only in the Sakonnet River and Mount Hope Bay).

Cormorant Physiology

French McCay’s entire analysis hinges on two physiological parameters that she takes from the literature. The first is the basal metabolic energy needs of a two-kg cormorant (0.82 kJ/day at 11 ºC). This figure comes from a study on the North Platte River in Wyoming (Derby and Lovvorn 1997). No basal metabolic energy requirements were determined for the population of cormorants residing in the

Narragansett Bay area. Further, no basal metabolic energy requirements were determined for the range of temperatures that cormorants are likely to experience in the April to October time frame during which cormorants are most frequently found in the Narragansett Bay area. Clearly, the energy needs of a cormorant at 11 ºC cannot accurately represent the energy needs of a cormorant in the Narragansett Bay area, where air temperature from April to October ranges from 0 to 30 ºC.

The second important physiological parameter that French McCay takes from the literature is the conversion rate of fish to energy (5 kJ energy/g of fish). Once again, this figure comes from the Platte River study where the major species consumed were sucker and stocked trout fingerlings (Derby and Lovvorn, 1997). Given the wide breadth of prey species in the cormorant diet documented in the literature, it is unlikely that this conversion rate applies to all the prey species in the diet of Narragansett Bay cormorants.

The fact that French McCay's analysis depends on these two site-specific physiological values derived for a study in Wyoming seriously calls into question her predictions about the number of winter flounder consumed by the Narragansett Bay area cormorants.

Cormorant Life History

Other major untested assumptions in French McCay's analysis are the number of cormorants per nesting pair, the number of young cormorants per nest that fledge, and the survivorship of fledglings. As with her assumptions about foraging behavior and physiology, French McCay assumes that fledging success and fledgling survivorship in Narragansett Bay are equivalent to rates found in other studies. These are untested predictions that should have been verified to account for local differences in these rates. Regarding the number of cormorants in the population per breeding pair, French McCay assumes that the rate of population growth in cormorants across all regions of Narragansett Bay is exponential, even though the data presented in her analysis (p. 6, Table 1; p. 7, Figure 2) describe a stable population for both the Sakonnet Point and Little Gould Island roosts (those closest to and, according to McCay, most likely to feed in Mount Hope Bay) beginning in 1986 and 1995, respectively. McCay estimates the size of the Narragansett Bay population of cormorants based on a ratio of four nonbreeders for every pair of breeders, as documented by Hatch (1995) for exponentially increasing populations. This ratio was not confirmed for the Narragansett Bay population of cormorants and, as stated above, likely does not apply to the cormorants most likely to feed in Mount Hope Bay. In using this ratio, French McCay likely overestimates the true population of cormorants in the Mount Hope Bay area and therefore overestimates their energy needs and predatory impact.

In summary, French McCay presents an inferential argument for the magnitude of cormorant predation in Narragansett Bay. The analysis is based on information on cormorant foraging behavior, physiology, and life history culled from studies done in freshwater systems. Assumptions made by French McCay for this study are untenable or questionable, and the net effect is to overstate the relative importance of cormorant predation on winter flounder in Mount Hope Bay.

In any event, EPA recognizes that cormorants may well take some winter flounder from Mount Hope Bay. That, however, is a natural process that EPA does not, and could not, regulate under the CWA. Therefore, it becomes another cumulative pressure on fish stocks that EPA must consider in determining thermal discharge limits under CWA § 316(a) that will assure the protection and propagation of the BIP. That being said, EPA does not believe cormorant predation is as large a factor as the permittee suggests.

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38. Comment

PG&E-NEG stated that EPA erroneously rejected the results from the "RAMAS population model." The permittee complained that EPA and the TAC "required" the permittee to develop and apply the RAMAS model to integrate heat and flow impacts on winter flounder populations, but the Agency then rejected the model because it did not like the results. The permittee also asserted that "BPS temporarily discontinued work on the RAMAS model because it was informed by EPA that the results of the model would never be accepted no matter what changes were made to improve it." The permittee stated that the model showed that BPS had only a minimal effect on the Mount Hope Bay winter flounder population under current operations and that effects under the new limits proposed by the permittee would be negligible. According to the permittee, EPA has complained that the model's results did not fit the data from the mid- to late 1970s or post-1996, but the company has now solved this problem. The permittee indicated that at the time of the initial modeling work, it did not have all the RI DFW sampling data or the analyses of its consultants Joseph DeAlteris (regarding fish abundance) and Deborah French McCay (regarding cormorants). The permittee also indicated that it had redone all the modeling, including this new information, and the results now "fit" the data. According to the permittee, "[t]he revised RAMAS modeling confirms that the fish species in Mount Hope Bay will recover under BPS's requested permit limits" for thermal discharge and that these limits would adequately protect Mount Hope Bay's winter flounder. The permittee stated that the model results confirm that a "raw annual population effect (conditional mortality) from entrainment and impingement of winter flounder of about 10 percent will not prevent recovery" of the bay's population of this species. The permittee also stated that EPA has concluded that a 26 percent loss is acceptable and, therefore, that a 10 percent effect must also be acceptable.

Response

To evaluate the permittee's request for a CWA § 316(a) variance, EPA required the permittee to submit scientifically sound analyses to demonstrate that its proposed thermal limits would satisfy § 316(a) biological standards. EPA did not dictate what specific analyses, approaches or use of models had to be used. EPA, as part of the BPS TAC worked with the permittee for many years in determining the types of analyses and approaches that would be appropriate to support its variance application. The permittee was never restricted to using approaches advocated by the TAC and was free to submit additional information as it saw fit. In fact, the TAC and the permittee disagreed over numerous aspects of PG&E-NEG's

temperature polygon assessment, yet despite these disagreements the permittee submitted the resulting information.

Furthermore, EPA did not indicate to the permittee that it would never accept the results of the RAMAS model no matter what changes were made to improve it. Prior to the permittee's use of the RAMAS model, EPA and the TAC made it very clear to the permittee and its consultants that any model submitted in support of its variance application must be able to re-create historical changes in abundance to assure reviewers of its ability to predict future changes. This is basic, sound science. The RAMAS model was not able to do that, most notably failing to re-create changes in the mid-1970s and erroneously predicting a recovery in Mount Hope Bay in the mid-1990s. The permittee claims that it has improved the model by including analysis from DeAlteris on fish abundance and French McCay on cormorants. EPA has reviewed the analyses completed by DeAlteris and French McCay and has significant disagreements with many of their assumptions and final conclusions. See responses elsewhere in this document for EPA's critiques of these analyses. The permittee relies exclusively on the French McCay analysis to "correct" the divergence between the predicted model results produced by the RAMAS model and the actual field data for the mid-1990s. However, French McCay's analysis relies heavily on a number of questionable assumptions for which she cites one scientific paper. Todd Callaghan of the TAC contacted one of the authors of this paper, who disputed several of the critical assumptions that French McCay makes. His e-mail communication is included in EPA's Administrative Record for this permit. At this point, EPA believes that the RAMAS model still is not able to adequately replicate past winter flounder abundance changes and thus cannot be viewed as a reliable predictive tool.

The permittee also produced a model to predict conditional mortality. It should be noted that this analysis was done independent of any input from the TAC. Using this model, the permittee predicted a conditional mortality of 10 percent. Members of the TAC disagreed with a number of assumptions that went into this model and felt that it significantly underestimated conditional mortality. Those concerns were detailed in Chapter 7 of EPA's § 316(a) and (b) Permit Determinations Document. In addition, it is worth noting that MA CZM stated that it believed the 10 percent conditional mortality figure was an underestimate, but even if it was not, the value was very high for a stock that was not recovering (Appendix B, § 316(a) and (b) Permit Determinations Document).

Finally, EPA disagrees with the permittee's statements regarding EPA's assessment of conditional mortality. First, EPA has never stated that a 26 percent loss is "acceptable." Second, the Agency disagrees with the permittee's assertion that its Enhanced Multi-Mode proposal would result in only a 10 percent loss. See responses elsewhere in this document for a detailed explanation of these points.

39. Comment

PG&E-NEG stated that EPA indicated that "'members of the TAC were especially critical of USGen NE's analysis of finfish diversity …[, which] artificially limited the sample number to 50 fish, out of a sample total much greater than that, in the samples from 1972 to 1986[, and] reduces the number of species present.'" The permittee also quoted EPA as stating that, "'This bias was not present in samples after 1986, when only 50 fish were being caught in all of the trawls combined.'" The permittee responds that "[r]educing the sample size does not necessarily reduce the number of species collected" and EPA is incorrect to suggest that this necessarily biased the results.

Response

Based on the information submitted by PG&E-NEG, EPA maintains that the permittee's decision to limit the sample size used in its finfish diversity index was unsupported and might have biased the result. In samples taken after the collapse of fish stocks in 1984–1985, the 50 fish comprising the sample size represented all the individuals in a sample. For the 1972–1985 time period, samples contained greater than 50 individuals per sample, in some cases substantially more than 50 individuals. In order to validate

this approach, the permittee should have demonstrated that the subsample of 50 fish was representative of each of these larger samples. The permittee did not make this demonstration. EPA agrees that this subsampling scheme does not automatically bias the results, but without justification demonstrating the representativeness of the subsampling scheme, it is impossible to know.

40. Comment
The permittee complained that "EPA indicates that BPS 'submitted a prospective analysis suggesting that their future operations would allow for the recovery of a balanced indigenous community.'" The permittee stated that it clearly presented "both a retrospective and prospective demonstration."

Response
EPA agrees that the permittee submitted both a "retrospective" and a "prospective" demonstration document seeking a thermal discharge variance under CWA § 316(a). EPA, in fact, evaluated the permittee's variance application from both perspectives. See, e.g., § 6.4.2 of EPA's July 22, 2002, Permit Determinations Document.

41. Comment
PG&E-NEG argued that EPA incorrectly concludes that it may disregard costs in rendering a CWA § 316(a) variance determination. The permittee stated that EPA reached this conclusion on the basis of a "conclusory assertion." While acknowledging that CWA § 316(a) makes no mention of cost, the permittee argued that Congress intended that "costs, and cost effectiveness, would be considered in determining the appropriate level of thermal reduction under Section 316(a)." The permittee states that CWA § 104(t) required EPA to conduct studies on the subject of controlling thermal discharges, including costs, and that Congress must have meant to have these costs considered in implementing § 316(a). The permittee also argued that doing so would not be inconsistent with the Supreme Court's ruling in *Whitman* v. *American Trucking Association*, 531 U.S. 457 (2001), because CWA § 104(t) expressly directs the Administrator to consider the § 104(t) studies in applying § 316(a).

Response
EPA disagrees with the permittee's argument that the Agency incorrectly concluded that costs are not a proper consideration in rendering CWA § 316(a) variance determinations. The permittee also incorrectly claims that EPA reached this conclusion based on a "conclusory assertion." EPA's conclusion in this regard is consistent with the language of CWA § 316(a) and the Agency's longstanding interpretation of it. Moreover, EPA's view is based on consideration of the statutory language, the legislative history, EPA regulations, EPA permit decisions, and other relevant case law. This is explained, with pertinent references provided, in § 6.2.2 of EPA's July 22, 2002, Permit Determinations Document. In response to the permittee's comments, additional discussion is provided below.

When interpreting a statute, executive agencies (and the courts) must first look to the statutory language. If the language is clear, then the inquiry is at an end and the language must be followed. See e.g., *Whitman* v. *American Trucking Association*, 531 U.S. 457, 481 (2001) (citing *Chevron U.S.A.* v. *Natural Resources Defense Council*, 467 U.S. 837, 842-43 (1984)). The language of CWA § 316(a) is absolutely clear: the costs of compliance are not valid considerations in rendering thermal discharge variance decisions under § 316(a). The sole criteria for granting a thermal discharge variance under § 316(a) are (a) that the effluent limits that would otherwise apply under CWA §§ 301 or 306 are more stringent than necessary to assure protection and propagation of a balanced, indigenous population of shellfish, fish and wildlife in and on the receiving water (the "BIP"), and (b) that the permitting agency decides to impose alternative thermal discharge limits that will be sufficient to assure the protection and propagation of the BIP. 33 U.S.C. § 1326(a). Thus, the plain language of the statute dictates that thermal discharge variance decisions under CWA § 316(a) are made on biological grounds alone.

Contrary to the permittee's claim that Congress intended for EPA to consider compliance costs in rendering § 316(a) variance decisions, the legislative history of the provision confirms the plain meaning of the statutory language: that thermal discharge variance determinations must be based solely on the specified biological considerations. This is revealed by Congressional statements regarding the intent and import of CWA § 316(a). See CWA of 1972 Legislative History, p. 175 (Senate Consideration of Conference Committee Report, Oct. 4, 1972 - remarks of Senator Muskie). Accord Id., pp. 263–264 (House Consideration of Conference Committee Report, Oct. 4, 1972). The intent that determinations would be based on biological considerations is further evident from the history regarding the evolution of the provisions that ultimately became § 316(a). The Conference Committee Report for the CWA of 1972 explains that while the Senate bill would simply have treated the discharge of heat in the same manner as any other pollutant subject to §§ 301 and 306, the House bill had proposed a version of § 316 that would have called for separate regulations to provide a unique standard to govern thermal discharges, as well as a case-by-case variance based on a test involving a comparison of costs against benefits. The Conference Committee substituted a provision that was finally enacted as § 316(a), which provided that heat would be treated like any other pollutant, except for the creation of the limited variance specified in § 316(a). Notably, consideration of costs and benefits was not included in this provision. Id., p. 320 (Conference Committee Report, Sept. 28, 1972). See also Id., p. 175. Thus, the legislative history is entirely consistent with the reading of § 316(a) presented above.

EPA's interpretation of the plain language of § 316(a) also makes complete sense in the overall statutory scheme. In the absence of a § 316(a) variance, thermal discharge limits are to be based on the more stringent of technology-based or water quality-based requirements. The discharge of heat is governed by the BAT standard as explained in § 4.2.3 of EPA's July 22, 2002, Permit Determinations Document. This technology standard **does** require costs to be considered to the particular degree specified by Congress (i.e., costs are to be considered but cost-benefit balancing is not required). Id. at § 4.2.3b. Cost implications may also be considered in certain ways by states in setting their water quality standards. See e.g., 40 CFR §§ 131.10(g)(6) and (i), 131.3(g). Therefore, Congress dictated that costs would be factored into setting thermal discharge limits under technology-based and water quality-based requirements in a particular manner and to a particular extent.[3] Congress then decided, however, to allow less stringent limits under a limited variance if the specified biological standard was met. While costs were to be considered in setting the baseline limitations, they were not to be a consideration in determining whether to grant a variance from those baseline standards. Of course, if an applicant does not qualify for a thermal discharge variance under § 316(a), then the applicant's thermal discharges are simply to be regulated under technology-based or water quality-based requirements under which cost **would** be relevant to the extent dictated by the statute.[4]

All of the above shows that Congress considered the issue of cost with respect to thermal discharge, as with other discharges, and specifically identified when and how costs should be considered. See 33

[3] With respect to water quality standards, costs are relevant in that States may consider costs in certain ways in **setting** their standards. Of course, as explained elsewhere, once these standards are set, it is well established that they must be complied with regardless of cost. See § 5.2 of EPA's July 22, 2002, Permit Determinations Document. See also, e.g., *Ackels* v. *United States*, 7 F.3d 862, 865–66 (9th Cir. 1993).

[4] It is worth noting that Congress also took another step related to the costs of controlling thermal discharges with the enactment of CWA § 316(c). This provision provides for a "period of protection" from new thermal discharge limits for 10 years "or the period of amortization or depreciation" for a facility that undergoes modification after October 18, 1972, and, as modified, meets limits based on § 301 or 303 (water quality) and these limits will assure protection and propagation of the BIP. This further shows that Congress was cognizant of cost issues related to the control of thermal discharges, but decided not to make them a relevant consideration in § 316(a).

U.S.C. § 304(b)(2). Where Congress plainly did not dictate that costs should be considered, as it did not with respect to CWA § 316(a), EPA can properly conclude this was intentional.

EPA has, in fact, interpreted CWA § 316(a) in this manner in its regulations. EPA's regulations governing the criteria for § 316(a) variance determinations, 40 CFR Part 125 Subpart H, dictate that cost and economic considerations are not proper considerations. The criteria set forth in the regulations address solely biological considerations as directed by the statute.

Furthermore, in its permit appeal decision in *In the Matter of Public Service Company of Indiana, Inc. (Wabash River Generation Station, Cayuga Generating Station*, 1 E.A.D. 590, 1979 EPA App. LEXIS 4, 41-43 (NPDES Appeal No. 78-6) (Nov. 29, 1979), EPA directly addressed the question of whether or not costs were appropriate considerations in making CWA § 316(a) variance determinations and concluded they were not. The Administrator of EPA explained:

> [t]he Regional Administrator had concluded that the provisions of § 316(a) "require a demonstration by the permittee which is totally biologically oriented . . ." and there is no "provision for the application of economic factors in the consideration of alternative thermal effluent limitations." I agree. Consideration of economic factors is only appropriate in setting the original thermal limitations from which the § 316(a) variance is sought on biological grounds. This is true whether the original thermal limitations are derived from Federal technology-based effluent limitations or from state water quality standards (as in the present case). In the case of state water quality standards, the Agency allows the states to take costs into consideration; however, if they do not, that is their choice. [Citation omitted.]
>
> The plain language of § 316(a) requires this result. The decision to grant or deny a request for less stringent thermal limitations pursuant to § 316(a) hinges solely on proof of the biological effects of the discharges. Terms commonly used to denote cost considerations are notably absent from § 316(a), in contrast to other provisions of the Clean Water Act. Compare § 304(b)(1) & (2) (speaking of practicability and achievability) and § 306(b)(1)(B) (speaking of the cost of achieving effluent reduction). Consequently, cost considerations should not be read into § 316(a). [Citation omitted.] Moreover, as the Regional Administrator noted, the Senate and House managers rejected a provision which would have established an economic link in § 316(a). While such rejection is not conclusive, it weighs heavily, particularly when, as here, the alternative is at odds with the plain language of that section. [Citation omitted.]

Wabash, 1979 EPA App. LEXIS at 41-43 (citations and footnotes omitted). Accord In re Central Hudson Gas and Electric Corporation, et al., EPA GCO 63 (July 29, 1977) (Issue of Law No. VII) ("Under Section 316(a) the applicant has the ultimate burden of persuasion and economic considerations are not appropriate . . ..").

While acknowledging that CWA § 316(a) makes no mention of cost, the permittee argued that CWA § 104(t), 33 U.S.C. § 1254(t), indicates that Congress intended EPA to consider costs in making § 316(a) variance determinations. CWA § 104(t) required EPA, working with other parties, to conduct studies and gather data concerning the environmental effects of thermal discharges, possible methods of controlling

thermal discharges, the potential environmental effects of using these methods, and the economic feasibility and cost-effectiveness of different methods. CWA § 104(t) also directed that the results of these studies should be reported by EPA "not later than 270 days after October 18, 1972, and [that they] shall be made available to the public and the States, and considered as they become available by the Administrator in carrying out section 1326 of this title and by the States in proposing thermal water quality standards."

The permittee argues that this language indicates that Congress intended EPA to consider costs in rendering individual § 316(a) variance decisions. EPA disagrees for several reasons. To begin with, as discussed above, this is simply inconsistent with the both the plain language of § 316(a) and the legislative history concerning § 316(a) which indicate that costs are not a proper consideration. It would also be inconsistent with the approach that Congress devised under which costs could be considered in setting technology-based standards for thermal discharges, and under which States can consider cost in particular ways in setting water quality standards, but cost was not to be considered in addressing a § 316(a) variance application. The permittee's approach would allow a cost test to be injected into § 316(a) that could potentially cancel the consideration of costs under § 301 and the biological criterion of § 316(a).

Moreover, it is not at all clear that the language of § 104(t) means what the permittee suggests. Instead, § 104(t) can be read to indicate that the results of the report were to be considered by the Administrator in developing regulations for thermal discharges under § 316(a) and perhaps §§ 301, 303, and 306 (and possibly for use in developing cooling water intake regulations under § 316(b)). After all, the report was to be submitted within 9 months of enactment of the statute (i.e., in 1973), which was before the pertinent regulations had been developed. Moreover, the legislative history related to § 104 generally, and 104(t) specifically, supports this reading of the statute, rather than the reading offered by the permittee. In the House Consideration of Conference Committee Report, Representative Clausen stated as follows:

> Subsection 104(t) provides that the Administrator shall conduct continuing comprehensive studies of the effects and methods of control of thermal discharges. The results of these studies shall be reported by the Administrator no later than 270 days after enactment and shall be considered by the Administrator *in proposing regulations* with respect to thermal discharges under Section 316 and by the States in proposing thermal water quality standards. These studies will provide needed data and should be very helpful to the Administrator *in proposing regulations*. The Administrator should consider the results of these studies *in promulgating regulations* not only under section 316 but also under other sections of the act where thermal discharges may be regulated, including section 301 on effluent limitations, section 303 on water quality standards, and section 306 on new source performance standards.

CWA of 1972 Legislative History, p. 264 (emphasis added). See also *Id.* at pp. 186, 273, 285. Thus, § 104(t) directed EPA to conduct research and issue a report intended to be considered in developing

regulations.[5] It does not direct that cost and economic factors be considered in making individual variance determinations under § 316(a).[6]

Furthermore, the permittee's reading of § 104(t) would be inconsistent with the structure of the CWA, under which standards setting for pollutant discharges is governed by the provisions of Subchapter III of the Act entitled, "Standards and Enforcement." This subchapter includes § 316(a) as well as §§ 301, 303, 304, and 306, all of which govern the setting of various types of standards for regulating thermal (and other types of pollutant) discharges. CWA § 104(t) is found in Subchapter I of the Act, which addresses "Research and Related Programs." Section 104, 33 U.S.C. § 1254, is titled, "Research, investigations, training and information," and CWA § 104(t) creates a research and reporting requirement. It does not expressly or clearly dictate that economics should be considered in rendering § 316(a) variance determinations. EPA does not believe that Congress would have undertaken such a fundamental alteration of the criteria for setting thermal discharge standards under a variance by placing the requirement in an ancillary provision, in a different subchapter of the statute that does not address standards setting, and then make statements in the legislative history indicating that no such alteration was intended. As the Supreme Court stated in *Whitman* v. *American Trucking Association*, 531 U.S. 457, 468 (2001), "Congress, we have held, does not alter the fundamental details of a regulatory scheme in vague terms or ancillary provisions -- it does not, one might say, hide elephants in mouseholes." (See more detailed discussion of American Trucking further below.)

Similarly, in *American Textile Manufacturers Institute* v. *Donova*n, 452 U.S. 490, 510-13 (1981), the Supreme Court rejected an argument that a particular general definition in the Occupational Safety and Health Act (OSHA) required cost-benefit balancing in setting certain OSHA standards where the specific standards setting provision plainly did not. The plain language of the provision only required that feasibility be considered. The Court explained that, "[w]e decline to render Congress' decision to include a feasibility requirement nugatory, thereby offending the well-settled rule that all parts of a statute, if possible, are to be given effect . . .[,]" and cautioned that "we should not 'impute to Congress a purpose to paralyze with one hand what it sought to promote with the other.'" *Id.* at 513 (citations omitted). This reasoning applies equally well to support rejecting the permittee's argument regarding §§ 104(t) and 316(a).

[5] PG&E-NEG states that "carrying out" 33 U.S.C. § 1326 consists **entirely** of reviewing individual variance applications and, therefore, it must mean that costs should be considered in individual variance determinations. Yet, this is clearly not so. As Representative Clausen's remarks indicate, when 104(t) was being enacted in 1972, EPA still had yet to develop regulations for regulating thermal discharges under either §§ 301, 306, or 316(a) (and also had not promulgated regulations under § 316(b)). The § 104(t) report was intended to be used in the regulation development process and apparently it was. See *Appalachian Power Co.* v. *Train*, 545 F.2d 1351, 1369 (4th Cir. 1976).

[6] Even if § 104(t) was read to require ongoing consideration of §104(t) reports in future implementation decisions under § 316(a), it would not necessarily mean that it was intended to indirectly inject cost considerations into the evaluation criteria of § 316(a) contrary to the language of that provision. Instead, § 104(t) might simply be a source of information to be used under the various standards setting provisions for thermal discharges (i.e., §§ 301, 303, 306, and 316) to the extent that these provisions authorize consideration of the particular information. The § 104(t) report was supposed to gather information regarding technology, and economic and environmental issues. Under § 316(a), only the biological information would be relevant. Under §§ 301 and 306, technology and economic information would be relevant. This reading, like the view that § 104(t) merely required a report to assist in regulation development, would harmonize § 104(t) with the standards setting provisions of the statute without doing violence to the plain language of § 316(a). The permittee's proposed reading of § 104(t), however, would put the provision at odds with § 316(a).

In light of the above, the most that can be argued is that § 104(t) might create an ambiguity regarding whether costs should be considered in making § 316(a) variance determinations. However, EPA has clearly interpreted § 316(a) not to require the consideration of costs in making variance determinations. This is clearly a reasonable interpretation that would be entitled to judicial deference under *Chevron*, 467 U.S. at 843.

Finally, the permittee urged that in light of CWA § 104(t), considering costs in this CWA § 316(a) variance determination would not be inconsistent with the Supreme Court's ruling in *Whitman* v. *American Trucking Association*, 531 U.S. 457 (2001). EPA disagrees. Although EPA did not actually cite *American Trucking* as a specific reason for concluding that costs are not a proper consideration in making variance decisions under CWA § 316(a), see § 6.2.2 of EPA's July 22, 2002, Permit Determinations Document, the Agency feels that the case supports its conclusion.

In *American Trucking*, the Supreme Court held that EPA could **not** consider costs in setting NAAQS under the Clean Air Act (CAA). As a CAA case, *American Trucking* is not strictly determinative of whether costs can be considered in rendering variance decisions under CWA § 316(a). Still, EPA believes that the Supreme Court's reasoning in *American Trucking*, when applied in this context, leads to the conclusion that costs cannot be considered under § 316(a).

The *American Trucking* Court's analysis began with the fact that the operative CAA provision, 42 U.S.C. § 7409(b)(1), authorizing EPA to set NAAQS does not indicate that costs are to be a factor in setting the standards. Since it makes no mention of costs as a relevant consideration, the Court concluded that the language "does not permit the EPA to consider costs in setting the standards," and that the language was "absolute." 531 U.S. at 465 (citation omitted). The language of CWA § 316(a) is similarly "absolute." The Court further explained that since other standards setting provisions in the CAA did authorize the consideration of costs, it "therefore refused to find implicit in ambiguous sections of the CAA an authorization to consider costs that has elsewhere, and so often, been expressly granted." 531 U.S. at 467. As discussed above, this reasoning would also indicate that Congress did not intend costs to be considered under CWA § 316(a) because the provision makes no mention of costs, whereas **other** CWA standards setting provisions **do** authorize the consideration of costs (e.g., § 304(b) governing certain technology-based standards).

The Court said that to overcome these points, the respondents in the case would need to show a "textual commitment" that Congress authorized EPA to consider costs in setting NAAQS. *Id.* at 468. The Court further explained that the textual commitment needed to be "clear" because the "Congress, we have held, does not alter the fundamental details of a regulatory scheme in vague terms or ancillary provisions – it does not, one might say, hide elephants in mouseholes." Id. See also *American Textile Manufacturers Institute* v. *Donovan*, 452 U.S. 490, 510-13 (1981). The Court then went on to reject various arguments regarding whether certain words in the standards setting provision for the NAAQS actually made the provision ambiguous as to whether costs could be considered. *Id*. No such arguments can even be fairly presented concerning the language of CWA § 316(a), given the clarity of its terms.

The Court also rejected arguments that costs could be considered in setting NAAQS because while the CAA did not actually specify that costs could be considered, it also did not specify that they could not be. The Court explained that Congress could not have intended to allow cost considerations because it clearly required NAAQS to be based on public health protection, and costs "are so indirectly related to public health and so full of potential for canceling the conclusions drawn from direct health effects that it would surely have been expressly mentioned in [CAA] §§ 108 and 109 had Congress meant it to be considered." Id. at 469. Similarly, costs have no relationship to the protection and propagation of the BIP, and a cost-based test could potentially "cancel" conclusions regarding what is otherwise necessary to assure the

protection and propagation of the BIP, which, after all, is both the standard of § 316(a) and an important minimum goal of the CWA. See 33 U.S.C. § 1251(a)(2).

Finally, just as the permittee points to CWA § 104(t), the respondents in *American Trucking* pointed to provisions other than the NAAQS setting provision which required EPA to produce reports to be issued regarding air pollution control equipment and the costs of construction and operation of such equipment. *Id*. at 469–70. The respondents argued that this made no sense unless costs could be considered in setting NAAQS. The Court disagreed. It concluded that it was sensible for Congress to require the reports to help provide information to the States, but it had "no bearing" on whether Congress had decided that costs would or would not be taken into account in actually setting the NAAQS at the Federal level. *Id*. at 470–71. Similarly, the fact that Congress directed EPA to prepare a § 104(t) report for EPA and State use in regulation and water quality standards development, respectively, has no bearing on whether Congress intended to have costs taken into account in individual variance determinations under CWA § 316(a). The Court held in *American Trucking* that CAA § 109(b) unambiguously barred consideration of costs in setting NAAQS; a similar analysis would lead to the same conclusion with respect to CWA § 316(a).

42. Comment

PG&E-NEG stated that even apart from its argument regarding CWA § 104(t), EPA still is not "entitled to wholly disregard costs" in making a CWA § 316(a) determination. The permittee argued that even when a statute is silent, consideration of economic factors may be a necessary component of reasoned decision making under two cases decided by the United States Circuit Court of Appeals for the District of Columbia: *American Petroleum Institute* v. *EPA*, 216 F.3d 50 (D.C. Cir. 2000); and *Chemical Manufacturers Assoc'n* v. *EPA*, 217 F.3d 861 (D.C. 2000). The permittee further argued that where the costs will be high and the result will not achieve the stated environmental objective, it would not be reasoned decision making not to consider these costs.

Response

EPA disagrees with the permittee's suggestion that the consideration of cost is necessarily a part of "reasoned decision making" under CWA § 316(a). EPA believes that making decisions consistent with the criteria set out by Congress constitutes reasoned decision making and Congress dictated that costs would not be considered in making variance determinations under CWA § 316(a). Certainly, any general legal argument that costs must always be considered whenever a statute does not expressly state that they **cannot** be has been laid to rest to by the Supreme Court's decision in *Whitman* v. *American Trucking Association*, 531 U.S. 457, 465-71 (2001), as discussed elsewhere in this document. Indeed, having held in *American Trucking* that costs could not be considered in setting NAAQS under the CAA, the Court also made clear that NAAQS could be set aside if they were had been on costs. *Id.* at 471 n. 4. See also *City of Waukesha* v. *EPA*, 320 F.3d 228, 240-41 (D.C. Cir. 2003) (where a cost-benefit analysis would not be relevant for setting a particular Safe Drinking Water Act standard, EPA did not need to prepare a cost-benefit analysis for the record because "a cost-benefit analysis would have no consequence and the agency is justified in concluding that Congress did not intend to require it to undertake such a futile exercise").

It is up to Congress to determine when and how costs should be considered in setting standards for thermal discharges and it has done so: costs are relevant for setting technology-based standards; they also may be factored into a State's setting of water quality standards (though they are not relevant for setting permit limits to meet water quality standards); and costs are not relevant to rendering § 316(a) variance determinations. There is nothing about this that is antithetical to "reasoned decision making" under the law. See *Ackels* v. *United States*, 7 F.3d 862, 865–66 (9th Cir. 1993) (permit limits must meet State water quality standards regardless of economic and technological feasibility).

The permittee cited *American Petroleum Institute* v. *EPA*, 216 F.3d 50 (D.C. Cir. 2000), in support of its position, but the case is inapposite to the present issues. The dispute in that case was over whether EPA had properly characterized a substance ("oil-bearing wastewaters") as a discarded waste subject to regulation under the RCRA, or whether the material had not yet truly been discarded because the industry could still garner beneficial uses from it. It the latter was true, the material would not be subject to regulation. *Id.* at 55. The court found that EPA's decision that the material had been discarded was arbitrary and capricious and remanded the matter to the Agency for further proceedings. *Id.* at 58. The court noted that in deciding that the material was being discarded as a waste by the industry, EPA did not consider the relative costs and benefits to the industry of the material, or otherwise explain why EPA felt the material had truly been discarded. *Id.* at 57. This consideration of costs and benefits was only relevant for determining whether the material in question would actually have been discarded by the industry and, thus, would be a waste subject to regulation. This has nothing to do with the question of whether the cost of compliance with environmental regulations generally, or § 316(a) in particular, must be assessed to constitute reasoned decision making under the applicable law.

The other case cited by the permittee, *Chemical Manufacturers Ass'n* v. *EPA*, 217 F.3d 861 (D.C. 2000), is also inapposite. This CAA case involved EPA's interpretation of an ambiguous compliance provision and a situation where EPA's stated rationale for its decision was not supported by the record. *Id*. at 865–66. Specifically, this case involved EPA setting compliance deadlines for waste combustion facilities to comply with certain air emissions standards. *Id.* at 862. (The applicable standards setting provision expressly required consideration of costs, technological capabilities, and environmental and health benefits. *Id.* at 862.) EPA set a 3-year compliance date for facilities that proposed to modify their equipment in order to meet the new emissions standards, but EPA also set a 2-year "early cessation" deadline for any facility simply planning to close rather than make modifications to comply with the new standards. *Id.* at 863.

The controversy in Chemical Manufacturers Association was over the early cessation date. EPA had stated in its record that environmental benefits would accrue from the early cessation of the facilities not planning to meet the new standards. *Id*. at 863. However, the court found that EPA admitted that it had no evidence of such benefits and that the wastes would likely just be transferred to other combustion facilities so that there would likely be no environmental improvements and perhaps even environmental harm. Id. at 865–66. The court held, and EPA agreed, that the CAA was ambiguous regarding the legality of the early cessation requirement. Id. at 866. The court also held that EPA's action in adopting it was arbitrary and capricious since the agency did not provide a satisfactory rationale for its action and, indeed, its claimed rationale was admittedly at odds with the facts. Id. at 866. The court also found that given the CAA's goal of environmental protection, it was unreasonable to interpret the ambiguous provision in the CAA to allow the early cessation program when the record did not show it would provide any benefits and might cause harm. Id. at 866–67. The court remanded the matter to EPA and stated that if EPA produced a record showing that the previously claimed benefits would result—and the court allowed that this was possible—then the early cessation program might be upheld. Id. at 867.

This case has nothing to do with the issues at hand here. First, it says nothing about whether cost must be considered under CWA § 316(a) or any other standards setting provision that expressly does not require it. Second, there is no suggestion that EPA's interpretation of § 316(a) would be somehow inconsistent with the environmental protection purpose of the statute as existed with EPA's interpretation of the ambiguous compliance provision in *Chemical Manufacturers*, which EPA had interpreted to allow an early cessation requirement that might cause environmental harm. Indeed, EPA's interpretation clearly furthers the CWA's environmental purposes by focusing on the stated statutory goal of assuring protection and propagation of the BIP. (As we have stated previously, EPA recognizes that outside the § 316(a) variance process, costs are a proper consideration in developing a technology-based standard

under CWA § 304(b)(2).) Third, EPA is not dealing with an ambiguous statutory provision here because the language of § 316(a) is clear. Fourth, there is no demonstration, much less any admission, that EPA has stated a rationale for finding an environmental benefit that is demonstrably inconsistent with the facts. The permittee might disagree with EPA's biological analysis, but that does not create a legal obligation to consider costs under § 316(a).

43. Comment

PG&E-NEG stated that EPA arbitrarily set its alternative, CWA § 316(a) variance-based thermal discharge limit of 1.7 TBtu annually. According to the permittee, EPA offers no good reason for the limits it selected. The permittee argues that while EPA suggests the 10 percent areal cutoff as a reason, it offers no biological explanation for picking 10 percent. Further, the permittee complained that EPA gives no explanation for the 5 days per month threshold for violating the critical temperatures. The permittee concludes that these thresholds are "ill reasoned and arbitrary." The permittee argues that the "real" reason for the limit is to allow 122 hours of once-through cooling in order to prevent fogging from the cooling towers. In other words, states the permittee, there is really no biological basis for limit at all.

Response

EPA's thermal discharge limits are neither arbitrary nor without biological basis. In setting the thermal limits, EPA considered scientific literature on species-specific temperature thresholds, future plant operation, background water temperatures, the location of winter flounder nursery habitat near BPS, and results from PG&E's hydrodynamic model. For a detailed discussion of the reasoning and data supporting EPA's determinations, see Chapter 6 of the July 22, 2002, Permit Determinations Document and other responses in this document.

The fact that EPA has developed these permit limits in the face of unavoidable scientific uncertainty does not render them arbitrary. EPA has made reasonable judgments consistent with the applicable law and regulations, as well as with sound scientific practice. Also, EPA did **not**, as the permittee alleges, develop the permit's thermal discharge limits in an effort to allow a certain amount of cooling tower bypassing so as to avoid possible problems from water vapor plumes from the cooling towers. EPA discussed the reasoning behind the bypass allowance in Chapter 6 of EPA's July 22, 2002, Permit Determinations Document. EPA merely noted that if the power plant developed cooling towers with bypass capability, it could engage in a certain amount of bypassing according to the thermal discharge limits EPA set under § 316(a), and that this could help minimize any vapor plume concerns that might arise.

44. Comment

PG&E-NEG stated that 9 years of data support either eliminating or reducing the canal inspection requirement. The permittee comments that permit condition A.22 requires inspection of the discharge canal, the discharge canal net, and the nearby beach every other day from April to November for dying fish, and that BPS has undertaken such inspection since 1993 but has observed only one dead fish. The permittee stated that divers clean the nets three or four times a week and are also instructed to tell the company of any fish mortality observed. The permittee commented that this requirement should be eliminated, or at least changed, to apply from June to September when water temperatures are higher.

Response

Due to the dramatic reduction in thermal discharge required by the permit, and the fact that divers are frequently inspecting the nets in the discharge canal, EPA has eliminated this permit requirement.

Response # III.45	**Document #**:1033

Comment
EPA received one comment stating that the thermal discharge is affecting the Sakonnet River in Rhode Island.

Response
Satellite imagery collected by NASA and interpreted by Jack Mustard of Brown University shows that there certainly are times when the Sakonnet River in Rhode Island is affected by the thermal plume from BPS. The level and frequency of this impact are proportional to the distance from the point of discharge. Therefore, the magnitude and frequency of the thermal impact in the Sakonnet River are less than those seen at Spar Island and points closer to the discharge.

Response # III.46	**Document #**: 1037

Comment
EPA received one comment stating that Mount Hope Bay is 1.5 degrees warmer than similar shallow coastal waterbodies.

Response
EPA agrees. According to satellite imagery interpreted by Jack Mustard of Brown University, during the summer and fall of the year, Mount Hope Bay is on average 1.5 ºF warmer than similar shallow coastal waterbodies. This is a baywide average value. Actual temperatures at locations closer to the point of discharge are higher than the average, and temperatures at locations more distant from the point of discharge are lower. It should be noted that field data collected in conjunction with aerial thermal imagery show that the temperature detected by satellites or aerial imagery represents the temperature of the water to a depth of at least 6 feet. During the winter and spring, the thermal plume was often not visible by satellite. It is suspected that the plume becomes submerged and dispersed through the bay closer to the bottom. Heat exchange in a submerged plume is much lower than in a plume on the surface in contact with the atmosphere. Therefore, it is reasonable to assume that in the winter and spring, the difference in the average temperature of the plume and ambient water temperature is even greater than 1.5 ºF.

Response # III.47	**Document #**: 1066, 1067, 1095

Comment
EPA received three comments stating that the thermal discharge limit for the permit should be 0.8 trillion Btus per year.

Response
EPA believes that the limit set by this permit, 1.7 trillion Btus per year, is sufficient to ensure the protection and propagation of the balanced indigenous population of shellfish, fish, and wildlife in Mount Hope Bay. For a complete discussion on the derivation of the thermal discharge limit, see the Agency's responses regarding § 316(a) elsewhere in this document.

Response # III.48	**Document #**: 1095

Comment
EPA received one comment stating that there is a significant difference in blue crab populations in the Kickamuit River compared with the Palmer River in Rhode Island. The commenter attributes the difference in population levels to the operation of BPS.

Response
EPA is unaware of any blue crab catch data or population census data for these locations and is therefore not able to verify this claim. If the commenter is aware of specific data that addresses this point, EPA would welcome their submission.

Response # III.49	**Document #:**1008, 1236

Comment
EPA received two comments disputing the Agency's estimate of the percentage of striped bass that are suffering from lymphocystis in the discharge canal. One of the commenters also disputed the validity of using a hook and line survey method and whether lymphocystis was a fatal condition.

Response
EPA's concern regarding lymphocystis arose when the Agency became aware that large numbers of striped bass and bluefish were overwintering in the discharge canal of BPS. EPA became concerned about the health and general condition of these fish, as well as the potential for a large fishkill. Lymphocystis is a highly contagious disease that has been found to be especially prevalent among fish residing in dense schools in thermal effluents. This disease is fatal to a certain percentage of the fish that get it. At a minimum, it indicates diminished health in the individuals that contract it.

On March 20, 1997, EPA sent New England Power, the owner of the facility at the time, an information request asking for an estimate of both the number of fish in the canal and the prevalence of lymphocystis. EPA did not require the company to use a specific sampling method for the fish in the discharge canal. Obviously the company needed to consider safety and plant operations. Trawling and gillnetting within the channel is not possible because of the strength of the current within the channel. A rod and reel survey was the only safe way to sample fish in this location.

As to the actual percentage of striped bass suffering from lymphocystis, EPA acknowledges that the incidence of lymphocystis does vary annually and with the season. However, EPA has relied on the most recently generated data from BPS. On April 8, 1997, New England Power sent a response to EPA's information request, estimating a population of 3,000 to 4,000 striped bass in the discharge canal. New England Power estimated the incidence of lymphocystis at 30–50 percent. EPA cited these data in its 316(a) and (b) Determinations Document. In submitting its comments on the Draft Permit, PG&E-NEG refers to data generated by its consultant from 1995 to 1997 that showed a much lower incidence of lymphocystis among striped bass in the discharge canal. It is unclear why the former owners of BPS did not submit these data in 1997 in response to EPA's information request instead of initiating a new sampling effort and reporting those results. The data submitted in 1997 represent the most recent information available, and EPA deems it to be credible. Regardless of which data set the Agency relies on, both submissions indicate some incidence of lymphocystis among striped bass, and thus the potential for an outbreak continues to exist. The presence of this disease is indicative of, at a minimum, an environmentally stressful situation for the fish that is associated with the thermal discharge and that does lead to mortality in a percentage of infected individuals.

Response #III.50	**Document #**:1008, 1236

Comment
EPA received two comments stating that global changes in jellyfish populations are responsible for the observed changes in comb jelly abundance in Mount Hope Bay, and BPS's thermal plume is not contributing to this change.

Response
In Chapters 6 and 7 of EPA's *Clean Water Act NPDES Permitting Determinations for Thermal Discharge and Cooling Water Intake from BPS in Somerset, MA* (July 22, 2002), EPA discusses the current scientific theories on the proliferation of comb jellies. Comb jelly abundance has increased in a number of areas. Scientists have looked at the environmental factors common among some of these locations. Increases in nitrogen and water temperature are the two most consistent factors. Since water temperature plays a role in the proliferation of comb jellies and thermal discharge from BPS has increased water temperature in Mount Hope Bay, BPS is likely contributing to this phenomenon.

Response #: III.51	**Document #**:1022

Comment
EPA received one comment expressing concern about the impact of pollutants to winter flounder, tautog, and other fish in Mount Hope Bay.

Response
It is not clear what specific pollutants the commenter had in mind. However, the permit the Agency issues today is designed to protect Mount Hope Bay from negative impacts associated with a number of pollutants, including heat. Chapter 6 of EPA's *Clean Water Act NPDES Permitting Determinations for Thermal Discharge and Cooling Water Intake from BPS in Somerset, MA* (July 22, 2002) discusses the impact of the thermal discharge on Mount Hope Bay fish populations.

BPS also uses chlorine and a number of biocides to control biofouling of the condenser tubes. This permit represents a significant reduction in the use of chlorine and some biocides as a result of the implementation of a new condenser cleaning system. The permit limits for chlorine and biocides are based on a review of laboratory toxicity data and estimates of initial dilution in the bay. EPA was conservative in its estimate of initial dilution, using a dilution factor of 5 to 1. In addition, EPA reviewed laboratory toxicity testing data for the biocides used at BPS. The manufacturer of these products tested their effects on numerous species, and upon reviewing these results, EPA selected a value that was protective of the most sensitive marine species. This value, in conjunction with the initial dilution value, was used to derive a chronic permit limit of 0.0375 mg/l and an acute limit of 0.065 mg/l.

Response #: III.52	**Document #**: 1028, 1099

Comment
EPA received one comment expressing concerns about the mass mortality of blue mussels and sea stars in Portsmouth, Rhode Island, and near the Sakonnet River Bridge, while another commenter expressed concern about mass blue mussel mortality observed along the shoreline of Common Fence Point.

Response
Although EPA does not speak to these specific events, mass mortalities of blue mussels do occur with some frequency in Mount Hope Bay and areas of Narragansett Bay. Phil Colarusso and Eric Nelson of EPA observed a large quantity of blue mussels agape in Mount Hope Bay, just south of Spar Island in September 2002. These mortalities may be the result of increased water temperature and decreased dissolved oxygen. Research conducted at the Millstone Nuclear Power Station in Connecticut has shown that mussels begin to experience heat-induced mortality when water temperatures reach 25 degrees Celsius (Johnson et al. 1983). Johnson et al. (1983) found that mortality was 100 percent by 27 ºC. In addition, thermal modeling done by consultants for PG&E-NEG shows that in warm summers under the current plant operations, water temperatures for almost the entire bay can exceed 25 ºC for days at a time (Figure 1).

Low dissolved oxygen may be another factor in mussel mortality. Low dissolved oxygen conditions increase the physiological stress on aquatic organisms, making them significantly more susceptible to the toxic effects of other pollutants (Rand and Petrocelli 1985). Mount Hope Bay does experience low dissolved oxygen. Moreover it is likely that BPS's thermal discharge directly and indirectly reduces dissolved oxygen concentrations in Mount Hope Bay. First, raising the temperature of water reduces the solubility of oxygen in it. Simply put, warmer water holds less oxygen than colder water. Second, bacterial degradation of organic matter, a process called respiration, which uses oxygen, increases with temperature. Third, the thermal discharge can create a thermocline in the water column that would limit aeration of the bottom waters. EPA believes that the thermal discharge from BPS is contributing to low dissolved oxygen concentrations in Mount Hope Bay. Additionally, thermal modeling done by consultants for PG&E-NEG shows that under the current plant operations, water temperatures in almost the entire bay exceed 25 ºC for days at a time during warm summers (Figure 1). However, the area of the bay exceeding 25 ºC would be greatly reduced if PG&E-NEG implemented closed-cycle cooling. Currently, EPA believes that BPS is likely contributing to the frequency and magnitude of the mussel die-offs observed in Mount Hope Bay by elevating water temperature and lowering dissolved oxygen concentrations.

Johnson, G., J. Foertch, M. Keser, and B. Johnson. 1983. "Thermal backwash as a method of macrofouling control at Millstone Nuclear Power Station, Waterford, Connecticut, USA." Symposium on Condenser Macrofouling Control Technologies: The State of the Art. I. A. Dias-Tous, M.J. Miller, and Y.G. Mussalli, eds., EPRI CS-3343, Electric Power Research Institute, Palo Alto, CA, 25-1-25-15.

Rand, G.M. and S. R. Petrocelli. 1985. Fundamentals of Aquatic Toxicology, Hemisphere Publishing Corporation, Washington. pp 666.

Response #: III.53	**Document #**: 1132, 1133, 1148, 1180

Comment
EPA received four comments suggesting that the proposed thermal limits for the permit are not stringent enough to ensure the protection and propagation of the balanced indigenous population.

Response
EPA carefully reviewed potential thermal impacts associated with various control technologies using modeling results and comparisons to species-specific temperature sensitivity information. As with most biological analyses, there is some degree of uncertainty associated with the determinations that are made. However, EPA's analysis concludes that this level of control is sufficiently protective to allow for the protection and propagation of the balanced indigenous community of fish shellfish and wildlife of Mount Hope Bay. If subsequent data suggest that additional controls are still needed, this decision can be revisited at each permit reissuance (every 5 years), or, if there is substantial new information, additional controls can be required by the permitting agencies at any time.

Response #: III.54	**Document #**: 1133

Comment
One commenter stated that PG&E-NEG's proposed enhanced multi-mode system will not protect the balanced indigenous population of Mount Hope Bay.

Response
EPA agrees. EPA evaluated the potential impacts associated with the permittee's proposed enhanced multi-mode system and determined that this proposal did not sufficiently reduce the impacts associated with plant operation to protect the balanced indigenous population of marine organisms in Mount Hope Bay. For more detailed information, please refer to Chapters 6 and 7 of EPA's *Clean Water Act NPDES Permitting Determinations for Thermal Discharge and Cooling Water Intake from BPS in Somerset, MA* (July 22, 2002).

Response #: III.55	**Document #**: 1133

Comment
A commenter stated that PG&E-NEG's proposed enhanced multi-mode system could result in a thermal discharge that acts as a barrier to migration or causes avoidance behavior in fish.

Response
In developing the Draft Permit, EPA considered published literature values for fish temperature preferences and observations of fish behavior in the bay. This included temperature values for herring and other migratory fish that might have migration routes impacted by the increased temperatures. Certainly, PG&E-NEG's proposed enhanced multi-mode system represents a reduction in the thermal discharge and an improvement compared with current conditions. However, EPA still has concerns about impacts on fish migration and avoidance of areas. Under current conditions, significant numbers of striped bass and bluefish eschew their normal southerly migration and reside in the thermal plume and discharge canal over the winter. Additionally, large schools of Atlantic menhaden have been found in Mount Hope Bay in the winter. This represents a disruption of their normal migratory behavior. This attractant effect may be slightly reduced by the proposed enhanced multi-mode, but it is unlikely to substantially reduce the number of fish affected. According to information the company submitted to EPA in 1997, the estimated number of striped bass that overwintered in the thermal plume and discharge canal was 3,000 to 4,000 in 1997. BPS also documented an incidence of lymphocystis, a contagious disease associated with concentrated numbers of fish in thermal discharges, at 30–50 percent.

In addition, with the proposed enhanced multi-mode system, PG&E-NEG predicts that water temperatures during warm summers will be sufficient to cause some chronic toxicity in juvenile winter flounder in the lower portions of the shallow river systems along the north shore of the bay. Finally, 80 percent of the bottom waters of the bay during warm summers would exceed temperatures that trigger avoidance in juvenile winter flounder. As global water temperatures continue to increase, the frequency and duration of these avoidance temperatures being exceeded in Mount Hope Bay will only increase. BPS's thermal discharge serves to exacerbate the situation.

Response #: III.56	**Document #**: 1133, 1161

Comment
Two commenters stated that PG&E-NEG's variance request is flawed for the following reasons:

- The methodology employed was not sensitive to varying heat loads and changes in ambient temperatures.
- The company's model is based on inappropriate assumptions concerning acclimation, tolerances, and migratory blockage.
- The studies conducted by the company do not evaluate ecosystem-induced impacts of elevated temperatures and avoidance behavior.
- The methodology employed to estimate temperature elevations from the proposed limits underestimates the impacts by averaging and basing predictions on thermal output levels that are less stringent than those requested.

Response
In crafting the Draft NPDES Permit for BPS, EPA and other Federal and State resource agencies worked together with the plant's owners for several years in an attempt to develop a comprehensive approach to assessing BPS's impacts on Mount Hope Bay. Multiple models were envisioned that would assess how the thermal plume moved around the bay, how dissolved oxygen concentrations in the bay were affected by the thermal discharge, and how losses from entrainment and impingement and the degradation of habitat would affect winter flounder populations in Mount Hope Bay. In addition, the results from the hydrodynamic model were to be compared with scientific data on temperature tolerances of the list of representative important species (RIS).

These commenters question a number of assumptions that were the basis for several of these modeling efforts. EPA reviewed these models and had concerns with specific approaches or assumptions used in several of them. EPA agrees with many of the concerns articulated by these commenters. For the details of the Agency's concerns, see Chapters 6 and 7 of EPA's *Clean Water Act NPDES Permitting Determinations for Thermal Discharge and Cooling Water Intake from BPS in Somerset, MA* (July 22, 2002).

Response #: III.57	**Document #**: 1133, 1180

Comment
Two commenters requested a more comprehensive environmental monitoring program, one that includes monitoring water temperatures throughout the bay.

Response
The existing water quality monitoring program includes seven stations in Mount Hope Bay for temperature, dissolved oxygen, and salinity. Data are collected at these stations every 4 to 5 days from March through September and once a month from October through February. This level of effort will be

supplemented by adding four sampling locations and requiring the deployment of continuous temperature recorders at each station. These systems include monitors at the surface and near the bottom at each location (Figure 2). This will supplement the existing monitoring program and, when taken in conjunction with data from the buoys deployed by the State of Massachusetts, will give a more complete picture of plume dynamics in the bay.

Response #: III.58	**Document #**: 1136, 1161

Comment

Two comments stated that the large decline in fish stocks is an indication that the balanced indigenous population is not being protected. This dramatic decline cannot be explained by regional overfishing or pollution. In cases of regional overfishing, there has been an almost simultaneous increase in nontarget species, and overall fish biomass has stayed constant. In Mount Hope Bay, aggregate fish abundance has declined, suggesting that the habitat is not able to sustain the same finfish biomass regardless of which species are present.

Response

EPA recognizes that fish populations in Mount Hope Bay experience impacts from a number of different stressors, including fishing, BPS cooling water withdrawals, and water pollution (including thermal discharges). In addition, these populations experience natural mortality from a variety of predators. For a more specific discussion of the importance of overfishing to fish populations in Mount Hope Bay, see pages 6-47 to 6-50 in EPA's July 22, 2002, Permit Determinations Document.

BPS operations add to the total list of stressors that these populations already face. The station's thermal discharge elevates water temperatures throughout large sections of the bay and exacerbates water quality problems in the bay by contributing to low dissolved oxygen concentrations. The cooling water intake impinges and entrains large numbers of adult, juvenile, and larval fish and fish eggs. EPA has concluded that BPS operations have contributed to the collapse of the bay's finfish populations and are interfering with a recovery of the balanced indigenous community.

Although it may be hard to quantify the relative magnitude of each stressor, the evidence suggests that BPS operations represent a significant stressor for Mount Hope Bay. Aggregate fish abundance estimated from bottom trawls has declined significantly. This has happened in Narragansett Bay as well, but with a corresponding increase in pelagic fish species. However, it is not possible to determine from existing data whether a shift to pelagic species has occurred in Mount Hope Bay. The Marine Research, Inc. (MRI) bottom trawl survey and the Rhode Island Department of Environmental Management trawl survey are directed at demersal species but do catch some pelagic species in the process. Quantitative analysis of catch rates of pelagic species in bottom trawls is difficult and should be approached with great caution. Typically, catch rates of pelagic species in bottom trawls tend to be very low, and variability in sampling can make drawing any definite conclusions from the data difficult. A bottom trawl samples a discrete portion of the water column and will target fish that are on or near the bottom very effectively. However, if a species can be oriented anywhere within the water column or is oriented toward the surface, a bottom trawl is a poor choice of sampling gear. In addition, differences in depth between stations can result in the net's sampling different percentages of the vertical water column, making comparisons highly problematic. All that being said, the reduction in biomass in demersal species is so large that even with the low catch efficiency of the bottom trawls, it is likely that they would have detected a significant increase in pelagic species. Neither the MRI trawl series or the State of Rhode Island survey in Mount Hope Bay has detected a substantial increase in pelagic species.

Response #: III.59	**Document #**: 1148

Comment
One commenter states that the cumulative effect of a long-term temperature rise in Mount Hope Bay is creating a more narrow range of suitable temperatures for native species and a wider range of suitable temperatures for nuisance species. This will only increase the difficulty of restoring depleted fish stocks and the balanced indigenous community.

Response
EPA agrees that the long-term increase in water temperature makes restoring a balanced indigenous population to the Mount Hope Bay ecosystem a more difficult challenge. During the process of deriving discharge limits for the Draft Permit, EPA cited long-term temperature rise as one reason to select conservative assumptions in the analysis for setting thermal discharge limits.

Response #: III.60	**Document #**: 1148

Comment
EPA adopted a critical threshold temperature of 24 °C in the summertime based on adverse effects on juvenile winter flounder. One commenter felt that value was not sufficiently protective.

Response
The selection of 24 °C does not represent a "no effects" temperature. The literature and experts in the field suggest that sublethal effects will become apparent beginning at 20 °C. However, EPA believes that 24 °C will be sufficiently protective of the balanced indigenous population of Mount Hope Bay for a number of reasons. See Chapter 6 of EPA's July 22, 2002, Permit Determinations Document and other responses to comments in this document for more detailed information.

Response #: III.61	**Document #**: 1148

Comment
EPA adopted a critical threshold temperature of 5 °C in the wintertime based on the hatching success of winter flounder eggs. One commenter felt this value was not sufficiently protective.

Response
EPA believes that this temperature will be sufficiently protective of the balanced indigenous population in Mount Hope Bay. For more detail, see Chapter 6 of EPA's July 22, 2002, Permit Determinations Document.

Response #: III.62	**Document #**: 1148

Comment
One commenter felt that the permit should be written so as not to allow the company to discharge at all (i.e., "zero discharge").

Response
EPA believes that, consistent with CWA § 316(a), the limits in the Draft NPDES Permit are sufficiently stringent to assure the protection and propagation of the balanced indigenous population of Mount Hope Bay. Stricter permit limits do not appear warranted at this time, but this can be re-evaluated for future permits.

Response #: III.63	**Document #**: 1155, 1160

Comment
The National Marine Fisheries Service (NMFS) and the New England Fishery Management Council did not have any essential fish habitat recommendations pursuant to § 305(b)(4)(A) of the Magnuson-Stevens Fishery Conservation and Management Act beyond the requirements in the Draft Permit. However, if EPA were to weaken its discharge limits in issuing the Final Permit, NMFS and the New England Fishery Management Council would reinitiate the consultation process.

Response
The discharge limits in the Final Permit are virtually identical to those in the draft. Therefore, EPA believes that it has fulfilled its commitments under the Magnuson-Stevens Fishery Conservation and Management Act and no additional consultation on essential fish habitat is required.

Response #: III.64	**Document #**: 1159

Comment
One commenter suggested that there was an inconsistency in the permit on pages 19 and 20 with respect to whether the discharge temperature needs to be reduced to 90 °F or 95 °F in response to a fish kill.

Response
The commenter was correct in noting this inconsistency. This was an oversight and has been corrected in the Final Permit. When a thermally induced fish kill occurs, the permittee is required to reduce the discharge temperature to 90 °F.

Response #: III.65	**Document #**: 1159

Comment
One commenter sought clarification on the origin of the 0.16×10^{12} Btu/year figure used to calculate the number of hours that BPS is allowed to operate once-through cooling.

Response
The value of 0.16×10^{12} Btu/year appeared in a sample calculation in the fact sheet; however, this was a typographical error. The value actually used in the calculation was 0.9×10^{12} Btu/year.

Response #: III.66	**Document #**: 1176

Comment
One commenter stated that there is little evidence of a direct impact from BPS on winter flounder populations in Mount Hope Bay. Thermal impacts alone or in combination with other plant impacts do not seem strong enough to affect the distribution of winter flounder.

Response
EPA has substantial direct evidence that intake flow and thermal discharges at BPS are affecting winter flounder in Mount Hope Bay. PG&E-NEG has estimated the number of winter flounder larvae and eggs that are entrained through the facility. Based on prior experience, and in lieu of any credible contradictory information, EPA assumes that the eggs and larvae that pass through the facility do not survive. In addition, PG&E-NEG has provided data on the number of winter flounder that are impinged by the facility, although data are not available regarding the condition of these fish after impingement. Based on personal observations of fish in the wetwell at BPS, experience at other plants, and observations of sea birds feeding on fish exiting the fish return system, the long-term health and survival of impinged fish is

doubtful. Thus, EPA assumes 100 percent mortality for these as well. EPA also has compelling evidence of thermal impacts on winter flounder abundances. Satellite thermal images show that the thermal plume from BPS extends over the entire bay on the outgoing tide. It also shows that in the summer and fall Mount Hope Bay is 0.8 °C (1.5 °F) warmer than comparable waterbodies of similar depth. For more detailed information on the effects of thermal discharge on winter flounder, see responses elsewhere in this document.

Response #: III.67	**Document #**: 1211

Comment
One commenter stated that there is a clear correlation between increases in plant operations and declines in fish populations in Mount Hope Bay.

Response
There is no question that a significant increase in thermal rejection to the bay and increased intake flow at BPS correlate with reduced fish populations in Mount Hope Bay. This connection in time does not establish cause and effect in a strict scientific sense, but it is highly suggestive that, at a minimum, operations at BPS caused or contributed to the fishery's collapse. It should be noted that EPA has examined a number of other possible explanations for the collapse and has not found another set of factors more likely to explain the collapse than the increases in thermal discharge and intake flow at BPS.

Response #: III.68	**Document #**: 1036, 1037, 1038, 1039, 1042, 1056, 1062, 1066, 1074, 1075, 1077, 1086, 1225, 1053, 1070, 1071, 1137, 1211

Comment
EPA received 18 comments stating that the thermal discharge is having a detrimental effect on fish populations and the marine environment.

Response
EPA agrees that the thermal discharge is altering the natural temperature profile in Mount Hope Bay and increasing water temperatures above levels that scientific studies suggest would result in negative impacts on fish and other marine life. For a full discussion on the specific thermal effects, see Chapter 6 of EPA's July 22, 2002, Permit Determinations Document.

Response #'s: III.69	**Document #'s**: 1006, 1011, 1182

Comment
Several commenters, some referring to the transcripts of the CBS News broadcast on August 28 and 29, 2002, expressed concern that increased air emissions may contribute to the effect of global warming (1006) and that the proposed permit "may cause more problems than what already exists." And that "glacial warming and El Nino have resulted in changes in the ocean water temperatures and these changes are a hundred times more detrimental to the fish population in Mount Hope Bay than the effect of the Brayton Point Power Plant." (1011)

Response
It has been reasonably well established by several independent researchers (Oviatt 1994, MRI 2002) that water temperatures within Narragansett Bay and Mount Hope Bay have been increasing over the last 30-40 years. The cause of this trend has not been established as man-induced global warming or some natural long term climatic variation. In Mount Hope Bay, the effects of this warming are only further worsened by the thermal discharge of BPS. EPA has calculated that long-term temperature rise contributes an additional 0.0383 trillion Btu/year in heat; this compares with BPS's current permitted discharge, which

contributes up to 42 trillion Btu/year. Further, while air emissions from coal combustion at BPS may likely contribute to global warming conditions, this permit only addresses water pollution issues.

Response #'s: III.70	**Document #'s**: 1016

Comment
One commenter suggested that horticulture or floriculture processes could reuse the heat generated from the plant, and that the Department of Agriculture should be consulted in this regard.

Response
EPA recognizes that this could be a promising idea in some cases, but currently has no knowledge of any similar applications.

Response #'s: III.71	**Document #'s**: 1096

Comment
One commenter asked "what the elevated temperatures may be doing to other marine life and our environment?"

Response
EPA refers the reader to Chapter 6 of EPA's July 22, 2002, Permit Determinations Document for a discussion of thermal impacts on marine life.

Response #'s: III.72	**Document #'s**: 1155

Comment
One commenter supported the Draft Permit and indicates that EPA correctly identified the main issue of concern for minimizing impacts on essential fish habitat is the thermal discharge into the Bay.

Response
This comment has been noted. No further response is necessary.

Response #'s: III.73-82	**Document #'s**: 1132, 1133, 1150, 1175

73. Comment
Several commenters supported EPA's denial of the CWA § 316(a) variance requested by PG&E-NEG, which would have set thermal effluent limitations, including a 28 TBtu annual discharge limit, based on the performance capability predicted by PG&E-NEG of its preferred cooling technology, the so-called "Enhanced Multi-Mode" (EMM) cooling system. These commenters felt that PG&E-NEG had not adequately justified such a variance. (1133, 1150, 1175)

Response
EPA agrees with these comments. Thus, EPA did not grant the CWA § 316(a) variance-based thermal discharge limits sought by the permittee. EPA did, however, conclude that a different set of thermal discharge limits somewhat less stringent than the technology-based (BAT) limitations and water quality standards-based limitations that would otherwise have applied could satisfy the standards of CWA § 316(a). Therefore, the thermal discharge limitations we included in the Draft and Final Permits are based on a § 316(a) variance.

74. Comment
Many commenters indicated, either expressly or implicitly, that the evidence indicates that the BIP of aquatic organisms that ought to reside in Mount Hope Bay has been damaged and does not exist at

present. They also contended that this must be taken into account when evaluating the permittee's variance application. (1133, 1150, 1175).

Response

EPA agrees that the BIP that ought to reside in Mount Hope Bay does not exist at present. The current condition of aquatic populations and the ecosystem on which they depend is discussed in substantial detail in EPA's CWA NPDES Permit Determinations Document for Thermal Discharges and Cooling Water Intake from BPS in Somerset, MA (July 22, 2002) (EPA's July 22, 2002, Permit Determinations Document). It is also discussed further elsewhere in this document.

EPA also agrees that the current condition of the ecosystem and the BIP must be considered when assessing the proposed thermal discharge and a request for thermal discharge limits based on a CWA § 316(a) variance. This is true for a number of reasons. For example, consideration of the current condition of the BIP is necessary in evaluating a variance application presented on the theory that an existing thermal discharge has caused no "appreciable harm" to the BIP (i.e., a "retrospective" variance application). Furthermore, consideration of the current condition of the BIP is necessary in evaluating the degree of thermal discharge that can be permitted while still "assur[ing] the protection and propagation" of the BIP going forward (i.e., a "prospective" variance application). At the same time, it should be remembered that the BIP to be protected is not merely whatever community of organisms presently exists. Otherwise, a discharger could harm a community and then argue its discharge should be permitted because it is compatible with the now depleted population. This would be inconsistent with CWA § 316(a). See 40 CFR § 125.71(c). These issues are discussed in §§ 6.2.1, 6.2.2 and 6.2.3 of EPA's July 22, 2002, Permit Determinations Document.

75. Comment

One commenter pointed out that "[i]t is not the government's burden to demonstrate that BPS was the cause of the degradation of MHB." Rather, according to the commenter, it is PG&E-NEG's burden to show that its proposed variance would both assure the protection and propagation of the BIP and protect elements of the aquatic ecosystem essential for protection and propagation of the BIP–whether or not predators or other factors are contributing to the stress on the BIP. This commenter further stated that PG&E-NEG failed to meet this standard because (1) the data support the conclusion that past and existing BPS operations, including thermal discharges, have significantly contributed to the decline of the bay's fishery and degradation of water quality; (2) the company has underestimated the adverse effects of its past and existing operations as well as the effects that would result from future operations under its EMM-derived variance proposal; (3) discharges from the proposed EMM cooling system could cause fish avoidance and interfere with normal fish migration in the Mount Hope Bay estuary; (4) discharges from the proposed EMM cooling system would chronically violate numeric and narrative water quality standards in both Rhode Island and Massachusetts waters that are designed to protect habitat for fish and other aquatic life; (5) the permittee has not demonstrated that existing water quality and existing uses will be protected and maintained as required by the CWA and water quality standards; and (6) the data show that the permittee's proposal might contribute to further degradation. (#1133)

Response

EPA agrees that the discharger has the burden to "demonstrate to the satisfaction of the Administrator" that any effluent limitations it proposes pursuant to CWA § 316(a) will satisfy the biological standard of the statute (i.e., will assure the protection and propagation of the BIP). These legal issues are discussed in EPA's July 22, 2002, Permit Determinations Document in §§ 6.2.1, 6.2.2, and 6.2.3. Moreover, in this case, EPA has concluded that the permittee has not adequately carried this burden (i.e., it has not demonstrated to the satisfaction of EPA that its proposed thermal discharge limits will ensure the protection and propagation of the BIP). See *Id.*, Chapter 6. Having rejected the permittee's specific variance application, EPA did not, however, simply propose thermal Draft Permit limits based on

technology-based or water quality-based limitations. Instead, EPA has proposed its own alternative thermal discharge limitations, which are less stringent than the technology-based and water quality-based conditions that would otherwise apply, but more stringent than those proposed by the permittee. See *Id*., at Chapters 6 and 8. EPA has concluded, from detailed analysis, that these thermal discharge limitations will be sufficient to assure the protection and propagation of the BIP, and has included these limits in the permit. EPA has the burden of demonstrating that these standards will meet the standards of CWA § 316(a). EPA believes it has done so in the July 22, 2002, Permit Determinations Document and in this document (and other supporting materials). EPA also believes that if the standards of CWA § 316(a) are met, the thermal discharge will not interfere with the attainment of the designated uses of Mount Hope Bay. These designated uses include providing high-quality fish habitat and a recreational fishing resource. EPA recognizes that some commenters have objected that the thermal discharge limits proposed by EPA under § 316(a) are not stringent enough, while others object that they are too stringent. These comments are addressed elsewhere in this document.

76. Comment

One commenter stated that EPA granted BPS's 1976 NPDES permit "contrary to the advice of all Federal and State biologists who were consulted on the matter" (citing AR 2040) and that EPA should not repeat this mistake. (1133)

Response

In addition to conducting its own biological analysis, EPA has considered the views and information offered by biologists and officials from numerous Federal and State resource agencies, including the National Marine Fisheries Service, the U.S. Fish and Wildlife Service, the MA DMF, the MA DEP (a co-permitting agency), the MA CZM, and the RI DEM. These agencies have uniformly agreed with the proposed permit conditions, with the exception that the U.S. Fish and Wildlife Service felt the conditions should be more stringent in certain respects. The U.S. Fish and Wildlife Service's concerns are addressed elsewhere in this document.

EPA has also considered the views and information offered by biologists retained by the company to offer comments on this permit. These comments have disagreed with the permit, finding it too stringent and questioning various aspects of EPA's biological analyses. These comments are addressed elsewhere.

EPA has also considered the views and information offered by biologists and other knowledgeable people from fishery management bodies (such as the New England Fisheries Management Council and the Atlantic State Marine Fisheries Management Council), environmental groups (such as the CLF, Save The Bay, Massachusetts Audubon, and others), and fishing organizations (such as the Rhode Island Salt Water Anglers Association, Rhode Island Inshore Trawler Fishing Association, and others). These organizations have largely supported the permit, though some have found it not stringent enough in certain respects. These issues are addressed elsewhere in this document.

EPA hopes that, by engaging in this lengthy and inclusive process, it will have improved its chances of avoiding a repeat of past permitting errors that may have occurred. Unfortunately, many of the critical issues related to this permit unavoidably involve a certain amount of scientific uncertainty. EPA cannot be 100 percent sure that the permit limits it is imposing will be sufficient to meet the applicable environmental standards and facilitate the restoration of the fishery. EPA also cannot be 100 percent sure that the permit limits it is imposing will not be more stringent than would have been sufficient to allow for the protection and propagation of the BIP. EPA has done its best, however, to conduct a reasonable and appropriate analysis considering all of the relevant information, to draw reasonable and appropriate conclusions from it, and to properly apply the standards of the CWA.

77. Comment
One commenter pointed out that based on the language of CWA § 316(a), the legislative history of this section, and governing regulations, cost or economic issues are not to be considered in determining whether to grant a variance from thermal discharge standards. CWA § 316(a) variance determinations are, instead, to be based on whether or not a discharge would meet the statutory requirement for protection and propagation of the BIP. (1133)

Response
EPA agrees with the commenter. EPA explained its view on this point in the July 22, 2002, Permit Determinations Document. See EPA § 6.2.2 of the document. This is discussed further elsewhere in this document.

78. Comment
One commenter agreed with EPA that under CWA § 316(a), EPA can grant variances from technology- and water quality-based standards, but the commenter stated that the magnitude of the thermal discharge allowed by EPA's Draft Permit may be excessive. The commenter stated that because EPA's proposed variance would allow BPS to exceed technology-based standards for maximum thermal discharge temperatures by more than 10 percent and for total heat load by more than 100 percent, and in light of "data [indicating] . . . that a number of fish populations have all but disappeared from Mount Hope Bay," it is uncertain that EPA's proposed limits would be sufficient to ensure the protection and propagation of a BIP, as required by § 316(a). (1132)

Response
As a logical matter, the degree to which the thermal discharge limits would exceed technology-based standards has no necessary relationship to whether or not those limits would be sufficient to assure the protection and propagation of the BIP. Technology-based standards for thermal discharge are based on the degree of effluent reduction achievable from use of the BAT economically achievable, as discussed in EPA's July 22, 2002, Permit Determinations Document. They are not based on what would or would not be adequate for protecting the BIP. In general, where technology-based limits would not be adequate to protect water quality standards (i.e., criteria and uses), more stringent water quality-based limitations would apply. When it comes to thermal discharges, the specific variance standards of CWA § 316(a) might also come into play.

With respect to the severely depressed status of fish populations in Mount Hope Bay, as discussed elsewhere in this document, these facts must be considered in the context of reaching conclusions under CWA § 316(a).

As discussed elsewhere in this document, EPA agrees with the commenter that the Agency cannot be completely certain that its proposed permit limits will be sufficient to assure protection and propagation of the BIP. Nevertheless, EPA concludes that the limits imposed are appropriate. As discussed in EPA's July 22, 2002, Permit Determinations Document, CWA § 316(a) imposes a stringent test for justifying the application of alternative thermal discharge limitations. See § 6.2.3 of the document. Moreover, as EPA has explained, "[t]he greater the risk, the greater the degree of certainty that should be required." (*Id.*, quoting *In re Public Service Company of New Hampshire*, 10 ERC at 1265) At the same time, however, absolute certainty is not required to support a variance and would be impossible to achieve in almost any case unless no thermal discharge was permitted whatsoever. EPA believes that it has conducted a reasonable and appropriate analysis in this case, taking into account the significant risk that applies to the BIP in Mount Hope Bay, given its apparently depleted status and the various stresses it faces. EPA also concludes that there is a reasonable and appropriate justification for concluding that the thermal discharge limits it has imposed under CWA § 316(a) will assure the protection and propagation of the BIP.

79. Comment
Several commenters requested that EPA mandate continued environmental monitoring of the plant's operations. (1132, 1133) One specifically called for more comprehensive requirements than proposed in the current Draft Permit. (1133) One commenter stated that detailed monitoring of plant operations is required to determine whether Final Permit conditions are adequately protecting the BIP. (1132) Another commenter wrote that any new NPDES permit for BPS should require BPS to monitor "thermal effects and water temperatures throughout the water column as well as other ecological indicators . . . to accurately reflect ecological conditions of the Bay on a continuing basis." (1133)

Response
EPA clearly has authority under the CWA to require reasonable monitoring requirements necessary to track the pertinent operations of the facility and to discern its effects on the marine environment. See, e.g., 33 U.S.C. §§ 1318, 1342(a)(2). The permit contains a variety of different types of monitoring requirements to track the various types of pollutants discharged by the facility (e.g., heat, chemicals), as well as to track the effects of the cooling water intake structures (e.g., entrainment and impingement data collection).

Despite the substantial reductions as compared with current operations, the facility will still have a relatively large volume discharge and withdrawal (39 MGD and 56 MGD, respectively). Therefore, monitoring is still needed. (To provide an indication of the relative magnitude of the discharge and withdrawal volumes even after the required reductions, EPA notes that a withdrawal of more than 50 MGD classifies a plant as a "large facility" under the proposed Phase II 316(b) regulations, and EPA generally classifies discharges of more than 1 MGD as "major dischargers." Furthermore, as a nearby point of comparison, the Fall River POTW has a permitted average monthly discharge of 31 MGD.)

EPA has tried to balance these competing factors to devise a monitoring program that provides necessary data to determine compliance with the permit and satisfaction of the applicable CWA standards, while also being fair to the permittee. The monitoring requirements are spelled out in detail in the Final Permit.

80. Comment
One commenter stated that given the inevitable uncertainty regarding whether the variance-based thermal discharge limits proposed by EPA in the Draft Permit are adequately protective, EPA should restore the "backstop" narrative thermal discharge conditions that were included in previous permits, including the existing permit, and that prohibit discharges that would, among other things, "degrade aquatic habitat quality." (1132)

Response
The "backstop" provision was needed in earlier permits due to uncertainty over future biological effects. EPA believes that the far more stringent thermal discharge limits in this permit are sufficient to assure the protection and propagation of the BIP, and thus satisfy CWA § 316(a), and are sufficient to prevent the degradation of aquatic habitat quality. Therefore, we have decided to omit the "backstop" narrative provision from the permit. If future information indicates otherwise, this can of course be reviewed in permit reissuance or modification proceedings.

81. Comment
One commenter stated that EPA's 316(a) analysis correctly "pinpoints" BPS as one of the "most likely causes" of fishery collapse, while properly taking other stressors into account. The commenter noted that because Mount Hope Bay's aquatic populations are subject to various significant stressors, EPA was correct to take a holistic approach and demand more of a reduction in thermal discharge to Mount Hope Bay than might be needed in an otherwise healthy habitat. (1132) Another commenter cited *In re Public Service Company of New Hampshire*, 10 ERC 1257, 1261 (June 17, 1977), in support of the conclusion

that EPA correctly considered whether or not the "incremental effects of the thermal discharge will . . . cause the aggregate of all relevant stresses (including entrainment and entrapment by the intake structure) to exceed the 316(a) threshold." (1133)

Response
EPA agrees that when assessing thermal discharge limitations under CWA § 316(a), it is necessary to consider cumulative impacts and to set thermal discharge limits necessary to assure the protection and propagation of the BIP taking other stressors into account. See EPA's July 22, 2002, Permit Determinations Document, § 6.2.2. EPA also has determined that operation of the BPS cooling system has likely contributed significantly to the decline of the Mount Hope Bay fishery. EPA's biological assessment is discussed further elsewhere in this document and in the record for the Draft Permit.

82. Comment
One commenter stated that there was a legal presumption against granting variances and, in light of this "presumption," requested that EPA explain more fully the scientific reasoning behind its determination that allowing a thermal discharge impact zone (in which exceedances of critical temperatures for fish would occur) that would cover 10 percent of the area of Mount Hope Bay would nevertheless be sufficient for the protection and propagation of the BIP. The commenter stated that this was particularly important considering that the area expected to be impacted by the plume includes shallow subtidal areas in the northern portion of the estuary, the preferred juvenile winter flounder habitat. The commenter further noted that technology-based standards would require a lesser thermal discharge. (1132)

Response
EPA agrees that technology-based standards would require more stringent thermal discharge limitations. EPA determined what such limitations would require in Chapter 4 of EPA's July 22, 2002, Permit Determinations Document. See also Chapter 8 of the document.

CWA § 316(a) expressly authorizes EPA to set variance-based—as opposed to technology-based or water quality-based—thermal discharge limitations if the rigorous standards of § 316(a) can be met. This is discussed in detail in § 6.2.3 of EPA's July 22, 2002, Permit Determinations Document. EPA has provided further explanation of the variance-based thermal discharge limits elsewhere in this document.

Response #'s: III.83	**Document #'s**: 1133

Comment
One commenter stated that cost and other economic considerations are not, as a legal matter, to be considered under CWA § 316(a).

Response
EPA agrees with this comment, as discussed in Chapter 6 of the July 22, 2002, Permit Determinations Document and elsewhere in this document.