H. Response to Comments Concerning CWA § 316(b)-Based Cooling Water Intake Limits and Barrier Net System Installation

Comment H1: Mirant asserts that the draft permit includes a mix of new requirements arbitrarily based in part on Best Professional Judgment (BPJ) and in part on the final Phase II Rule under CWA § 316(b). Mirant also states the view that such a hybrid approach is inconsistent with the final Phase II Rule, which allows each permittee to select it own compliance option, and is beyond EPA authority or otherwise flawed.

Response to H1:

A. Introduction

EPA disagrees with Mirant's comment. The cooling water intake structure (CWIS) limits in EPA's Draft and Final Permits for Mirant Kendall Station (MKS) are derived from a BPJ-based determination of technology-based limits under CWA § 316(b), and from a determination of water quality-based limits needed to satisfy Massachusetts water quality standards (WQS). The permit requirements needed to satisfy state water quality requirements are specified in the Massachusetts Department of Environmental Protection's (MassDEP) water quality certification under CWA § 401(a)(1). EPA's approach to the MKS permit is entirely consistent with the CWA, the final Phase II Rule, and EPA's NPDES permitting regulations. Thus, EPA's approach to the permit neither exceeds the Agency's authority nor is otherwise flawed.

As explained in Section 7 of the Determination Document, CWA § 316(b) governs the development of technology-based NPDES permit requirements for CWISs and requires "that the location, design, construction, and capacity of cooling water intake structures reflect the best technology available for minimizing adverse environmental impact." In addition to satisfying these technology-based requirements, NPDES permit limits for CWIS must also satisfy any more stringent provisions of state water quality standards or other state legal requirements that may apply, see CWA § 301(b)(1)(C), as well as any applicable conditions of a state certification under CWA § 401. See also 33 U.S.C. § 1370.

The response below proceeds as follows: (1) first, justification is provided for developing technology-based CWIS limits on a BPJ basis; (2) second, the rationale for the Draft Permit's limits, including the consideration of the new Phase II Rule, is explained; and (3) third, the rationale for the Final Permit's limits, including the consideration of the new Phase II Rule, is explained. In explaining the Final Permit's limits, the response addresses the determination of technology-based requirements for the reduction of impingement mortality and entrainment, the determination of water quality-based limits for reducing these adverse impacts, the inclusion of a schedule for information submissions to support future permitting under the Phase II Rule, and the specification of monitoring requirements.

B. EPA Correctly Set Technology-Based CWIS Limits on a BPJ Basis

Turning first to the technology-based requirements under CWA § 316(b), in the absence of applicable regulations, EPA has long developed such requirements on a case-by-case, Best Professional Judgment (BPJ) basis. See CWA § 402(a) and 40 C.F.R. §§ 401.14, 125.90(b). See also, e.g., *Riverkeeper v. United States Environmental Protection Agency*, 358 F.3d 174, 191 (2d Cir. 2004). Although EPA has now promulgated regulations under CWA § 316(b) that are *generally* applicable to Mirant Kendall Station (MKS) – namely, EPA's new Final CWA § 316(b) Phase II Rule for large, existing power plants, 69 Fed. Reg. 41576 (July 9, 2004) (regulations promulgated at 40 C.F.R. Part 125 Subpart J) (referred to hereinafter as either the "Phase II Rule" or the "Phase II Regulations") – EPA has nevertheless properly developed technology-based CWIS limits for the MKS permit by applying § 316(b) on a BPJ basis. Relying on BPJ in this case is consistent with the express terms of the Phase II Regulations, EPA's general NPDES regulations, and CWA § 402(a).

The Phase II Regulations did not govern MKS's *Draft* Permit because they were not in effect when the Draft Permit was issued. EPA issued the Draft Permit to Mirant Kendall Station (MKS) on June 14, 2004. Although the final Phase II Regulations were signed by the Administrator on February 16, 2004, they were later modified in certain respects, were not published in the Federal Register until July 9, 2004, and did not become effective until September 7, 2004. Since the Phase II Regulations were not in effect at the time the Draft Permit was issued, EPA's general NPDES program regulations dictate that the Phase II Regulations were not "applicable requirements" that governed development of the permit's limits. See 40 C.F.R. §§ 122.43(a) and (b). As a result, EPA was correct to develop CWIS limits for the Draft Permit based on a BPJ application of CWA § 316(b).[1]

Of course, the Phase II Regulations are in effect now, but the Phase II Regulations themselves clearly indicate that it is also proper for EPA to develop CWIS limits for MKS's Final Permit based on a BPJ application of CWA § 316(b). Specifically, 40 C.F.R. §§ 125.95(a)(2)(i) and (ii) of the Phase II Regulations explain to permit applicants that (emphasis supplied):

> (i) You must submit your NPDES permit application in accordance with the time frames specified in 40 C.F.R. 122.21(d)(2);
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> (ii) If your existing permit expires before July 9, 2008, you may request that the Director establish a schedule for you to submit the information required by this section as expeditiously as practicable, but not later than January 7, 2008. *Between the time your existing permit expires and the time an NPDES permit containing requirements consistent with this subpart is issued to your facility, the best technology available to minimize adverse environmental*

[1] As discussed further below, EPA is also not required under 40 C.F.R. § 122.43(b) to reopen the MKS permit proceeding merely because the Phase II Regulations became effective after issuance of the Draft Permit but before issuance of the Final Permit.

> *impact will continue to be determined based on the Director's best professional judgment.*

Applying these regulations to the MKS permit, it is clear that CWIS limits under CWA § 316(b) should be developed on a BPJ basis. The existing permit for MKS expired in 1993 and, consistent with 40 C.F.R.§ 122.21(d)(2), the permittee applied for permit reissuance before such expiration. In addition, the permittee has yet to submit permit application material containing all the information required by the Phase II Regulations, so a permit containing requirements consistent with this subpart could not be developed at this time. The Phase II Regulations plainly address this type of situation by allowing the ongoing permitting process to be completed by applying CWA § 316(b) on a BPJ basis.

Therefore, EPA is issuing the Final Permit to MKS with CWIS limits under § 316(b) based on a determination of the Best Technology Available (BTA) for minimizing adverse environmental impacts that "continue[s] to be determined based on the Director's best professional judgment." Contrary to Mirant's comment, EPA's approach to permit development is consistent with the express terms of the new Phase II Regulations.

The above conclusions regarding how to develop limits under CWA § 316(b) for MKS's Final Permit in light of 40 C.F.R. § 122.43(b) and the new Phase II Regulations is further supported by the discussion provided by EPA in the August 19, 2004, set of "Questions and Answers" related to the Phase II Regulations posted on EPA's website (www.epa.gov/waterscience/316b/Phase2-q-and-a.pdf). In Section 2.A, Q2 of this document, EPA addresses a hypothetical scenario involving the precise sequence of events presented by the MKS permit. EPA describes the situation as follows (emphasis in the original):

> The draft permit is proposed before the 316(b) Phase II Rule takes effect, but the final permit would be issued after the Phase II Rule takes effect. At the time of the final permit issuance by the State or the Region (as the case may be), the facility has not submitted the comprehensive demonstration study and other information needed to determine limitations under the 316(b) Phase II Rule.

EPA indicates that in such a case, the 316(b) limits in the final permit would be based on BPJ for either of two reasons. EPA explains that a draft permit issued prior to the new regulations becoming effective would be based on BPJ because 40 C.F.R. § 122.43(b) states that only regulations that are actually in effect are applicable requirements that govern a permit's limits. At the same time, however, EPA explains that 40 C.F.R. § 122.43(b) further indicates that "the Director has the discretion to reopen the permit proceedings when he or she determines prior to issuance of the final permit, based on information in the record, that the new Phase II Requirements . . . are of sufficient magnitude to make additional proceedings desirable (e.g., re-proposing the draft permit to reflect the new Phase II Requirements)." EPA goes on, however, to

specifically state that the "Director could reasonably determine that the Phase II Requirements are not of sufficient magnitude *at that time* to justify reopening the proceedings to consider new limitations when, as here, the facility has not provided the permit writer with the comprehensive demonstration study or other information needed to determine limitations based on one of the compliance alternatives in the Phase II Rule" (emphasis in original).[2] EPA explains that in such a case, "[t]he 316(b) limitations would be based on BPJ whether or not the Director reopens the permit, because under § 125.95(a)(2)(ii) for the Phase II Rule, a BPJ-based permit limit is required for facilities that have not submitted the information required under the Phase II rule" (emphasis in original). This is exactly the situation with respect to the Final Permit for MKS.

EPA's approach in 40 C.F.R. § 122.43(b) makes sense because it prevents ongoing permitting from being unduly delayed as a result of new regulations. Consistent with that approach, instead of delaying permits by requiring them to go through all the new procedures of the new Phase II regulations, EPA promulgated 40 C.F.R. § 125.95(a)(2)(ii) to provide for a reasonable transition from permitting on a BPJ basis to permitting based on the information requirements of the new regulations. By enabling expired permits to be reissued without extended delay because of the new regulations, EPA's approach is consistent with the CWA's goal of maintaining progress toward the elimination of pollutant discharges and the restoration and maintenance of the chemical, physical and biological integrity of the Nation's waters. *See* 33 U.S.C. § 1251(a)(1).

Therefore, for the final MKS permit, EPA has decided to exercise its discretion not to reopen the permit proceedings due to the Phase II Regulations because the new requirements are not "of sufficient magnitude to make additional proceedings desirable." For this permit, as in the example from the EPA Questions & Answers document, the facility has yet to provide the Agency with the permit application information required by the Phase II Rule. Therefore, EPA could not presently apply the substantive CWIS requirements of the Phase II Regulations to the new permit. Under these circumstances, the Rule expressly states that BTA limits will be determined on a BPJ basis. See 40 C.F.R. § 125.95(a)(2)(ii). See also 40 C.F.R. §§ 125.90(a) and (b). Thus, as EPA states in the Questions & Answers, technology-based intake limits would be based on BPJ "whether or not" the permit proceeding was reopened due to the Phase II Rule.

C. EPA Reasonably Considered the Material in the Record, Including the Final Phase II Rule, In Applying CWA § 316(b)'s BTA Standard on BPJ Basis to Determine Technology-Based CWIS Limits for the Permit

In developing a technology standard on a BPJ basis, it is necessary to apply the factors required

[2] EPA also states that the discretionary decision as to whether or not to reopen the proceedings to revise the draft permit should be explained in the permit record, as Region 1 is doing here.

by the statute for the standard in question to the specific case at hand (e.g., for the BTA standard it is necessary to consider technological alternatives and if and how they might be applied to the facility seeking a permit). The CWA sets no limit on what sources of information may be considered in conducting that BPJ analysis, but also does not require that any particular source of information be considered. Given all the circumstances at hand, EPA considered the permit record and the Phase II Regulations in a reasonable and appropriate way in developing BPJ limits for this permit.

1. Draft Permit

In developing the Draft Permit's technology-based limits under CWA § 316(b) on a BPJ basis, EPA considered the permit application and supporting information, as well as other information collected for the permit record. EPA also considered the already signed, though not yet effective, Phase II Regulations as part of informing our BPJ determination. EPA found this to be reasonable because these regulations were developed to apply § 316(b)'s BTA standard to existing power plants with intake volumes of 50 MGD or more, such as MKS. Moreover, EPA (correctly) anticipated that the new regulations were likely to become effective soon after EPA issued the Draft Permit and well before we issued the Final Permit.[3] Indeed, it might have been unreasonable *not* to consider the Final Rule once it had been signed by the Administrator.[4]

The Final Phase II Regulations, 40 C.F.R. Part 125 Subpart J, identify five different options for achieving compliance with the regulations from which a Phase II facility may choose an approach. 40 C.F.R. § 125.94. Application requirements vary based on the compliance alternative selected and, for some facilities, include development of a Comprehensive Demonstration Study. 40 C.F.R. § 125.95. The main adverse environmental impacts associated with the CWIS operations are the impingement and entrainment of fish, fish larvae, fish eggs, and other aquatic organisms. Impingement and entrainment kill or injure the vast majority of the organisms involved. The Rule's performance standards require all regulated facilities to reduce impingement mortality (by 80 to 95 percent) and some regulated facilities to reduce entrainment

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[3] EPA discussed the expected timing and effective date of the future § 316(b) Phase II Regulations in Section 7.2 of the Determination Document for the Draft Permit. As discussed above, at the time the Draft Permit was issued, the final rulemaking package for the Final Phase II Rule, including the preamble and regulations, had been signed by EPA's Administrator and posted on the Agency's website, but had neither been published in the Federal Register nor become effective.

[4] Not considering the Final Rule would have been different from issuing a permit without considering the requirements of the Proposed Phase II Rule. The Proposed Rule was clearly subject to potentially substantial changes and expressly indicated that it was not to be used as guidance in the development of permits to be issued prior to the Rule's finalization.

(60 to 90 percent). See 40 C.F.R. 125.94(b). Whether or not entrainment must be reduced turns on several factors, including the type of water body on which the facility is located, the facility's capacity utilization rate, and the proportion of the water body's volume that is withdrawn by the facility. Id.

The Rule's performance standards can be met by design and construction technologies, operational measures, restoration measures, or some combination thereof. Id. The Rule also specifies that if a facility reduces its through-screen intake velocity to 0.5 fps or less, it will be deemed to comply with the Rule's impingement mortality reduction standard. 40 C.F.R. § 125.94(a)(1)(ii).

The greatest, most certain reduction in adverse environmental impacts would be achieved by the large-scale (i.e., as much as approximately 95%) intake flow reductions that would be associated with converting the power plant's open-cycle cooling system to a system using closed-cycle cooling. See, e.g., 69 Fed. Reg. 41601 (text and n. 44), 41612 (second column). Reductions in intake flow achieve proportional reductions in entrainment and impingement. Id. Thus, the Phase II Rule deems facilities using closed-cycle cooling to meet the Rule's impingement mortality and entrainment reduction standards without additional requirements. 69 Fed. Reg. 41601; 40 C.F.R. § 125.94(a)(1)(i).

For MKS, however, conversion to closed-cycle cooling has been ruled out as technologically impracticable due to space constraints at the facility. This is discussed in the Draft Permit Determination Document. The preamble to the Phase II Rule indicates that while closed-cycle cooling may yield the greatest reduction in adverse environmental impacts, cooling system conversion will not likely be practicable at all locations and space constraints are likely to be a problem in some cases. 69 Fed. Reg. 41605. Indeed, the preamble explains that this is one of the reasons that the Rule does not declare closed-cycle cooling to be the BTA for all existing power plants. Id.[5]

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[5] In its permit application, the permittee discussed the option of installing a "helper (cooling) tower" for cooling the heated once-through cooling water discharge. Although helper towers would require only a fraction of the space of a full-scale cooling tower, MKS also concluded that inadequate space was available for this option. Based on the record before the agencies, EPA and MassDEP also concluded that helper towers would not be feasible. In any event, it should also be understood that helper towers are not a technology for complying with CWA § 316(b) because they are useful only for reducing the temperature of thermal discharges and do not reduce cooling water intake volume. To the extent that any future decommissioning of one or both of MKS's jet engine peaking units freed up space on the permittee's property to accommodate one or more helper towers (or even full-scale cooling towers) these technologies could be reconsidered in the future, as appropriate.

Another reason that EPA did not make closed-cycle cooling a mandatory requirement of the Phase II Rule for all power plants is that the Agency concluded that certain types of screening systems could, in some cases, achieve a similar level of impingement mortality and entrainment reduction as closed-cycle cooling, but at less cost. See 69 Fed. Reg. 41599-600, 41602, 41605. One of these types of screening systems involves placing fine-mesh "barrier nets" in front of the CWIS to block organisms from being entrained and potentially make the process of being impinged and then returned to the water body gentle enough not to kill the organisms involved. See 69 Fed. Reg. 41602, 41605.

In its permit application, and supporting materials, Mirant indicated that it believed that its proposed barrier net technology could potentially reduce both impingement mortality and entrainment. The record for the Phase II Rule also suggested that the barrier net technology could potentially be effective enough to meet these standards. See 69 Fed. Reg. 41599, 41602.

Evaluating the information in the permit record, EPA also concluded that using the barrier net technology at MKS *might* enable the facility to meet the Rule's performance standard for reducing impingement mortality and achieve at least some level of entrainment reduction. EPA concluded generally that barrier nets can in some cases significantly reduce impingement mortality by reducing intake velocity so that adult and juvenile fish can avoid entrainment by swimming away, and by gently blocking organisms that do not swim away so that they are not drawn into the CWIS and can be gently removed from the nets and returned to the river. EPA concluded that barrier nets should be able to work in this way at MKS. The barrier nets also appear capable in some situations of significantly reducing entrainment. Their success in this regard turns on the relative size of the organisms in question and the openings in the mesh of the net. EPA's analysis for MKS determined that the barrier nets may be capable of reducing entrainment of fish larvae (and adult and juvenile fish), but that most or all fish eggs in the Lower Basin of the Charles River are likely to be too small to be blocked by the nets and would continue to be entrained.

While EPA concluded that the barrier net technology should yield reductions in both impingement mortality and entrainment, EPA also concluded that the exact percentage of the reductions that could be achieved could not be predicted for MKS in light of the limited available data (and the ambiguous results of MKS's pilot testing). Not only did it appear that the smallest organisms (e.g., fish eggs and certain larvae) were likely to pass through the barrier net mesh and continue to be entrained, but to the extent that the nets block eggs and larvae from being entrained, these organisms are necessarily impinged and the survival of these delicate organisms after impingement is uncertain.[6] Thus, reduced larval entrainment might simply lead to their

[6] MKS's comments on the draft permit suggest that the impinged larvae would not survive and should be "counted as lost to entrainment." MKS Comment H36. See also MKS

death by impingement.[7] See 69 Fed. Reg. 41599. Additional data will be needed to reasonably assess this issue and, as discussed below, the Final Permit seeks to require suitable monitoring to support such an assessment.

Finally, the record does indicate that use of the barrier net technology should reduce intake velocities sufficiently to meet the Phase II Rule's standard of 0.5 feet per second (fps) or less for through-screen intake velocity. Mirant has estimated that its proposed barrier nets will reduce the intake velocity to about 0.04 fps at the CWIS, but it is unclear whether this estimate represents through-screen velocity or some other metric. Nevertheless, EPA's assessment of the technology as it would be applied at MKS indicates that the 0.5 fps standard should be attainable. As discussed above, this should enable adult and juvenile fish to escape the intake flow and avoid being impinged.

That being said, Mirant did not propose that barrier nets would be implemented year-round at MKS. Mirant concluded that barrier nets could not be used when icing conditions prevailed in the river. EPA agreed with Mirant that it would be technologically impracticable to use the barrier nets under such conditions. Therefore, the Draft Permit did not require that the barrier nets remain in place at all times, and without the barrier nets in place, MKS's through-screen intake velocity was likely to be greater than 0.5 fps. There are still resident fish in the river that would be subject to impingement during these times (at the traveling screens) and the absence of the barrier nets would clearly increase the threat of impingement mortality during those periods.

In light of the above considerations, the Draft Permit included performance *goals* for the reduction of impingement mortality and entrainment that matched the standards included in the Phase II Rule, and included monitoring to define actual facility performance. The Draft Permit indicated that if the data showed that these performance goals were not being met, then steps would need to be taken at MKS to try to improve performance to meet the goals. Thus, failing to meet the goals would not be a violation of the permit, but would have consequences for MKS. The Draft Permit also required that the barrier net technology proposed by Mirant be implemented at least from February 15 (or as soon as icing conditions would allow) through

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Comment H31. If even the larvae blocked by the barrier nets should be counted as lost to entrainment, then no entrainment reductions would have been achieved. EPA and MassDEP have concluded, however, that it is *possible* that impinged larvae could be safely removed from the barrier nets and returned to the Charles River and are requiring that to be evaluated. *See* Comment/Response H31 and discussion of water quality-based requirements further below in Response H1.

[7] The impinged organisms could die either from the impingement itself or from the process of being removed from the nets after being impinged.

November 1 of each year. In addition, the Draft Permit EPA required that through-screen intake velocity be limited to 0.5 fps or less on the grounds that it appeared from the record that MKS could meet that standard with the barrier net technology installed. Finally, the Draft Permit also limited intake flow to no more than 70 MGD from April through June (the key anadromous fish spawning season), a flow level matching the facility's past average intake flow. EPA concluded based on BPJ that this approach represented the BTA for MKS under the current circumstances.

The Draft Permit's impingement mortality and entrainment monitoring requirements were developed under CWA §§ 308 and 402 and the Phase II Rule. In addition to providing data to measure performance against the permit's performance goals, EPA also intended that the monitoring results would provide necessary data to support the next permit renewal which would involve application of the Phase II Rule's substantive standards. This data would, therefore, support specification of actual compliance performance standards for the next permit renewal. Consistent with 40 C.F.R. § 125.95(a)(2)(ii), the Draft Permit also provided a schedule for development and submission of the required material to support future permit renewal under the Phase II Rule. Furthermore, EPA included the monitoring provisions to provide information that would support future permit determinations concerning limits required to meet state water quality requirements and limits needed to meet thermal discharge requirements in light of cumulative effects of such discharges viewed together with intake effects.

EPA's approach did not represent the actual application of the Phase II Rule to the Draft Permit, but EPA determined that this approach would be compatible with application of the performance standards of the Phase II Rule in future permits. EPA's BPJ was that this was a reasonable application of CWA § 316(b) to the Draft Permit taking into account that the Phase II Rule was not yet in effect, but had recently been signed by the Administrator and was expected to become effective in the near future and prior to issuance of the Final Permit.

2. Final Permit

In rendering its BTA determination for this Final Permit, EPA again considered the information in the permit record. This included public comments on the Draft Permit, the final Phase II Rule, which became effective on September 7, 2004, and other materials. As discussed below, this evaluation led to certain changes from the conditions included in the Draft Permit.

Having appropriately considered the Phase II Regulations in developing the § 316(b) limits for the Draft Permit, it is also proper for EPA to consider the now effective Phase II regulations in developing the BPJ-based § 316(b) limits for the Final Permit. While Mirant characterizes this as an improper "hybrid approach," there is nothing improper or arbitrary about it. Although the substantive requirements of the Phase II Rule are not *determinative* of the technology-based CWIS requirements for permit, it is reasonable for EPA Region I to *consider* both the substantive

requirements of the new Phase II Rule, and relevant information supporting those requirements from the rulemaking record, in shaping the BPJ-based limits for the MKS permit under CWA § 316(b). This consideration enabled the Region to inform its BPJ determination with relevant aspects of EPA's final national assessment of potential BTA technology alternatives. For example, as discussed above, this national evaluation provided additional support for conclusions regarding the potential effectiveness at MKS of the barrier net technology proposed by Mirant. See, e.g., 69 Fed. Reg. at 41599, 41602 (barrier net efficacy). See also Response H2, below. Indeed, in other comments, as discussed below, Mirant urges EPA to give close consideration to the performance standards and definitions of the new Phase II Rule in making its BPJ determination of BTA.

a. **Technology-Based Entrainment Reduction Requirements**

Mirant argues that it would be inappropriate to include entrainment reduction requirements in the Final Permit. Mirant's argument is based on the source water type classification applicable to the lower Charles River Basin under the Phase II Rule. Mirant argues that the lower Charles River Basin meets the criteria of a "lake or reservoir" as specified in 40 C.F.R. § 125.93 and points out that CWISs on such water bodies are required to meet performance standards for reducing impingement mortality, but not for reducing entrainment. See 49 C.F.R. § 125.94(b)(1) and (2). If, however, the water body were instead classified as an "estuary" or "freshwater river," then entrainment reduction standards would apply.

Determining whether the lower Charles River Basin should properly be classified as a "lake or reservoir" under the Phase II Rule presents a close question. This is because the lower Basin meets certain characteristics of more than one of the types of water bodies classified under the Rule, see 40 C.F.R. § 125.93 (definitions of "lake or reservoir," "estuary," and "freshwater river or stream"), and does not neatly fit into any single classification. (See Responses to C49 and D29). Moreover, because of the recent promulgation of the Phase II Rule, EPA does not yet have a significant basis of experience applying these water body classifications. EPA believes this leaves the Agency with the discretion to reasonably select one of the classifications for consideration in the context of this BPJ-based permit, but also believes that this classification could be subject to change in the context of future permits if an appropriate basis for such a change is identified.

Having noted the difficulty of the issue, EPA has decided that it agrees with Mirant that the lower Basin is best classified as a lake or reservoir at this time. The lower Basin is created by the downstream dam and locks that have been placed between the Charles River and its connection to Boston Harbor and the ocean beyond. At the same time, tidal effects and the periodic opening of the locks do result in the presence of salt water in the lower Basin. The Phase II Rule defines a lake or reservoir as follows:

> *Lake or reservoir* means any inland body of open water with some minimum surface area free of rooted vegetation and with an average hydraulic retention time of more than 7 days. Lakes or reservoirs might be natural water bodies or impounded streams, usually fresh, surrounded by land or by land and a man-made retainer (e.g., a dam). Lakes or reservoirs might be fed by rivers, streams, springs, and/or local precipitation.

40 C.F.R. § 125.93. The lower Basin seems to meet this definition because (1) it is an inland body of open water free of surface vegetation, (2) it is created by an impounded stream, (3) although it does not include solely fresh water, the definition only says that the water should "usually" be fresh, (4) the lower Basin is bordered by land on two sides and a downstream man-made retainer, while there is also an upstream dam in Watertown, and, thus, can be considered to be surrounded," (5) it is fed by a river (and the ocean), and (6) it has an average hydraulic retention time of more than 7 days (calculated on an annual basis).

While the lower Basin's average hydraulic retention time is greater than 7 days on an annual basis, EPA's analysis indicates that if calculated on a monthly basis, the average retention time would be less than 7 days in some months. EPA has decided at this time that it is reasonable to use the straightforward approach of calculating an average retention time on an annual average basis. Two significant (though potentially manageable) problems could arise with using a different averaging approach. EPA would have to decide whether the fact that the hydraulic retention time is less than 7 days in some months would mean that the Lower Basin should fall under a different classification only in those months or should do so throughout the year. Because the alternative classifications as an estuary or freshwater river would require imposition of entrainment reduction standards while the lake or reservoir classification does not, see 40 C.F.R. § 125.94(b)(2), the former approach would lead to different permit conditions applying during different parts of the year. While permits do in some instances include seasonal limits, such an approach would make the permit more complex, might result in the permittee fairly wanting to use technology during only some parts of the year which could raise implementation difficulties, and could alter and complicate the relevant costs and benefits that might need consideration in the permit development if site-specific limits were sought on a cost/benefit basis. See 40 C.F.R. § 125.94(a)(5). Alternatively, defining the water body as an estuary or freshwater river all year even though it met the lake or reservoir retention time criterion during some part of the year might be regarded as inequitable.

Meanwhile, the lower Basin also does not neatly fit into the other water body classifications in the Phase II Rule. First, the Rule defines an estuary as follows:

> *Estuary* means a semi-enclosed body of water that has a free

> connection with open seas and within which the seawater is measurably diluted with fresh water derived from land drainage. The salinity of an estuary exceeds 0.5 parts per thousand (by mass) but is typically less than 30 parts per thousand by mass.

40 C.F.R. § 125.93. EPA's analysis indicates that the salinity content of the water present in the lower Basin would meet this definition. Moreover, the lower Basin does provide spawning and nursery habitat and at certain times is home to free-floating icthyoplankton, which is a key biological characteristic of an estuary, see 69 Fed. Reg. 41599. The lower Basin does not, however, have a free connection to the open sea because of the downstream dam and locks.

Second, the Rule defines a freshwater river or stream as follows:

> *Freshwater river or stream* means a lotic (free flowing) system that does not receive significant inflows of water from ocean or bays due to tidal action. For purposes of this rule, a flow-through reservoir with a retention time of 7 days or less will be considered a freshwater river or stream.

40 C.F.R. § 125.93. The lower Basin does not appear to fit this definition completely, in part, because it has a retention time greater than 7 days on an annual average basis or in at least some months. However, while the lower Basin does receive contributions of water from ocean or bays due to tidal action, this is limited to when the locks are opened. On an annual basis the percentage of flow entering the Charles from Boston Harbor is low compared to the total flow from the upstream contributing watershed. Based on the USGS salinity study conducted for the period between June 19, 1998 and July 19, 1999, harbor water infiltration represented just 2 % of the total flow into the lower Charles. Because of the dam and locks the lower Charles is at times not a free flowing system. On the other hand, the lower Charles does become a free flowing system to Boston harbor every day when the tidal elevation in the harbor drops below the elevation of the inverts of the sluice gates and during storm events.

Thus, as stated above, EPA currently agrees with Mirant that the lower Basin should be classified as a lake under the Phase II Rule and has not set entrainment reduction performance goals and standards in the permit on a technology basis. EPA agrees that it would be unreasonable to impose entrainment reduction requirements as part of the BPJ application of BTA given that the Phase II Rule national determination of BTA does not require entrainment reduction by facilities located on lakes or reservoirs. (As discussed below, however, the Final Permit contains various entrainment reduction-related provisions based on state water quality requirements.) While EPA has not, strictly speaking, applied the full Phase II Rule compliance alternatives process to the MKS permit, it has concluded that it would be unfair, and therefore inappropriate, to impose

requirements under a BPJ-based application of the relevant technology standard to MKS when the fully effective and applicable Phase II Rule, which predates this permit, would likely not require such limits.

This is clearly an unusual circumstance. In most cases, a BPJ permit is developed in the *absence* of an applicable national standard. Here BPJ must be applied in the shadow of an effective, applicable national standard. The good reasons for developing the permit on a BPJ basis have been explained, but EPA also believes it makes sense to take the national standard into account in applying BPJ. Under these circumstances, it is one thing to render a BPJ determination believed to align fairly closely with the requirements for the national standard – as is the case here for impingement mortality controls – but it would be quite another thing to impose a limit that likely goes beyond the requirements in the national standards, as would be the case if EPA imposed an entrainment reduction requirement in the MKS permit. Doing so would subject the facility to technology-based compliance requirements that EPA on a national basis has concluded are not required for facilities situated on water bodies like the lower Charles River Basin. In issuing this permit, that fact cannot be ignored. EPA also believes that its discretion to take these issues into account in making BPJ determinations is supported by the decision of the U.S. Court of Appeals for the Ninth Circuit in NRDC v. EPA, 863 F.2d 1420, 1428 (9th Cir. 1988).

b. Technology-Based Impingement Mortality Reduction Requirements

Turning from entrainment reduction to impingement mortality reduction, EPA also reasonably considered the Phase II Rule, and other material in the record, in delineating technology-based conditions for the Final Permit. The Phase II Rule's substantive performance standards require *all* facilities covered by the Rule, including MKS, to reduce impingement mortality by at least 80-95 percent (unless the facility qualifies for alternative site specific standards). 40 C.F.R. § 125.94(b)(1). As discussed above, the preamble to the Final Rule indicates that barrier net technology may be capable of meeting this performance standard in some cases. As also mentioned above, Mirant itself has indicated that the barrier net technology may be able to meet the Rule's standard at MKS.

Yet, for several reasons already discussed above, unavoidable uncertainty remains about exactly how well the technology will perform at MKS. First, the record does not include a robust data set demonstrating barrier net performance under actual operating conditions at MKS. The data from pilot testing barrier nets at MKS yielded ambiguous results. Second, the barrier nets will not be able to be deployed during winter icing conditions in the river, but water will continue to be withdrawn by MKS's CWIS and impingement of fish residing in the water would be expected to occur. Given this fact, it is even more unclear what level of impingement mortality will be achieved at MKS on an *annual* basis. Third, it is unclear whether the barrier nets may increase impingement mortality by blocking small, delicate fish larvae from being entrained, or whether

these organisms will be able to be safely returned to the river.

In its comments on the Draft Permit, Mirant stated as follows:

> [a]s the data indicate, and as EPA acknowledges, the barrier net is highly effective at preventing impingement mortality, virtually eliminating impingement of organisms that otherwise could have been impinged on the traveling screens. It also reduced entrainment of organisms over approximately 6 mm for the representative species assessed. Over the three-month testing period, when the barrier net was being properly operated, it reduced entrainment of entrainable-sized organisms by 60-90%. The percentages of organisms not protected by the barrier net are largely reflective of the earliest life stages, as to which natural mortality is highest, and which the barrier net is not designed to protect. Although there were some days on which performance anomalies occurred, this happened primarily (1) during initial deployment of the net, when entrainable organisms remained "inside" the net, and (2) thereafter, on occasions when the anchoring system failed and the net shifted position, allowing intake water to come over, under, or around the net. Mirant Kendall understands that its final design, which does not incorporate the same type of anchoring system used during the test period, will need to address this type of issue.

Thus, Mirant also seems to be of the view that the barrier nets may well be able to achieve the Phase II Rule's impingement mortality reduction standard, but also seems to note some uncertainty about exactly how well they will perform.

Mirant also objected to EPA including in the Draft Permit an impingement mortality reduction goal of 80 to 95 percent, consistent with the Phase II Rule, coupled with the requirement that Mirant would have to make changes at the plant if the performance goals were not being achieved. Mirant felt that this was unfair in that it, in essence, enforced the Phase II Rule's impingement mortality standard without allowing MKS to avail itself of all the procedural options of the Rule, including the possibility of seeking alternative site-specific standards. See 40 C.F.R. § 125.94.

The Phase II Rule also dictates that a facility that maintains a *through-screen* intake velocity of 0.5 fps or less is deemed to have met the impingement mortality reduction standard and will not be required to further demonstrate that it meets that standard. 40 C.F.R. § 125.94(a)(1)(ii). As stated above, the permittee estimated that its proposed barrier nets would reduce "intake velocity"

to about 0.04 fps, but it is not clear whether the permittee's estimate is for a through-screen velocity or some other measure. In any case, EPA's review of the record indicates that the barrier net technology *should* result in through-screen intake velocities meeting the 0.5 fps standard in the Phase II Rule. Therefore, the Draft Permit included a requirement that through-screen intake velocities of 0.5 fps or less be maintained at all three CWISs at MKS. The Draft Permit also required that during the life of the permit the permittee measure or estimate to EPA's satisfaction that the through-screen velocity is equal to or less than 0.5 fps, consistent with the barrier net study required in Part I.A.14.d.7 of the Final Permit. Mirant did not object to these conditions in its comments on the Draft Permit.

In light of the above considerations, EPA's BPJ determination of technology-based impingement mortality reduction requirements for MKS under CWA § 316(b)'s BTA standard specifies the following requirements:

(1) implement a fine-mesh "barrier net" system ("BNS") in front of each of the three CWISs and locate the BNS within the Broad Canal, at the entrance to the Broad Canal, or outside of the Broad Canal; the barrier nets must remain in place except when icing conditions in the river reasonably preclude their deployment;

(2) design, install and operate the barrier nets so as to minimize impingement mortality to the extent practicable, recognizing that adjustments may be needed over time to optimize performance based on experience, with the ultimate performance goal being to reduce annual impingement mortality for adult and juvenile fish by at least 80% from a calculated baseline;

(3) monitor and report year-round on the impingement mortality reduction performance at each of the three CWISs;

(4) restrict the effective through-screen intake velocity at all three CWISs to 0.5 feet per second (fps) or less when the barrier nets are in place, including a requirement to demonstrate what the actual through-screen intake velocity is under both conditions (i.e., at the barrier nets when the BNS is in place and at the traveling screens when the BNS is not in place);

(5) restrict non-contact cooling water flow to a monthly average rate of 70 MGD during each of the primary spawning months of April, May and June; and

(6) design, install and operate the BNS to preclude bypasses due to circumstances within the permittee's control, to the extent practicable. If the permittee encounters unforeseen clogging or other operational difficulties with the BNS, or if

> necessary to perform routine maintenance, the permittee may pass water through its intakes without all of the water passing through the BNS for the shortest period of time sufficient to alleviate the problem.

EPA has determined on a BPJ basis that the above conditions represent technology-based CWIS requirements reflecting the BTA for minimizing adverse impacts at MKS. Given all of the above-discussed information, it is appropriate to require installation of the barrier net technology and to set a performance *goal* of reducing annual impingement mortality for adult and juvenile fish by at least 80% from a calculation baseline. In response to Mirant's comments, however, EPA has eliminated the provision *requiring* Mirant to make changes if the performance goal is not achieved. EPA was not intending to directly enforce the Rule's requirements in the way it had constructed the Draft Permit. Therefore, EPA agrees with Mirant's comment that it could be unfair to mandate changes to try to achieve the standard when the Phase II Rule might not ultimately require the same changes, such as if alternative site-specific standards were applied. EPA has added to the Final Permit, however, the requirement that Mirant design, install and operate the barrier nets to optimize their performance to the extent practicable. EPA concludes that this is entirely consistent with the BTA standard of § 316(b) and appropriately, on a narrative basis, puts the onus on MKS to do what it can to minimize adverse environmental impacts in the form of impingement mortality. By affirmatively recognizing that adjustments may be needed over time in light of operating experience, the Permit recognizes current uncertainties regarding precise performance levels while also reasonably requiring appropriate steps to improve performance in light of actual experience. At the same time, if the intake velocity is reduced below 0.5 fps during the times when the barrier net is installed, as both EPA and Mirant predict, then EPA agrees with Mirant that the facility is likely to be able to meet the performance goal for reducing the impingement mortality of adult and juvenile fish.

In addition, while the Draft Permit only required that the barrier nets be in place from February 15 (or as soon thereafter as icing conditions in the river would allow) to November 1 of each year, the Final Permit has been changed to require that the barrier nets be utilized at all times *except* when icing conditions in the river preclude their deployment. This provision continues to recognize that icing conditions are likely to render use of the barrier nets impracticable at times, but requires the facility to use the nets when they are actually able to do so. The Draft Permit allowed the nets to be removed as of November 1, despite the fact that icing conditions in the river do not always occur that early in the cold weather season. The condition in the Final Permit recognizes the icing issue, but is better tailored to require that impingement mortality is minimized (i.e., reduced as much as possible) as required by CWA § 316(b). Furthermore, because the Final Permit requires that CWIS performance be optimized toward the goal of reducing *annual* impingement mortality for adult and juvenile fish by at least 80% from a calculation baseline, MKS has an incentive to do the best it can to prevent mortality to impinged organisms even when the barrier nets are not in place.

Although the Phase II Rule does not require facilities that demonstrate that their through-screen intake velocities are no more than 0.5 fps to do anything more to show that they satisfy the impingement mortality reduction standard, EPA believes the set of requirements it has included in the Final Permit are appropriate. This permit is based on BPJ and is not strictly controlled by the requirements of the Phase II Rule. Moreover, while EPA believes that the barrier net technology may result in through-screen intake velocities of less than 0.5 fps, this has not yet been demonstrated based on empirical data. In addition, EPA's decision in the Phase II Rule that a facility meeting the through-screen intake velocity requirement need not do anything more to show that it is meeting the 80-95 percent impingement mortality reduction standard was based on the view that the data collected for the national rule indicated that this would be true. It is perfectly appropriate to impose performance goals and standards, and monitoring requirements on a BPJ basis, that will verify if this is true at MKS. Additional bases for requiring impingement mortality monitoring are discussed below.

Furthermore, as stated above, the barrier nets cannot be kept in place when icing conditions prevail in the river. Without the nets in place, the facility will likely not meet a through-screen intake velocity of 0.5 fps. Therefore, EPA has clarified the intake velocity limit to provide that it applies only when the barrier nets are in place. MKS will, however, need to demonstrate what its actual through-screen intake velocities are under both conditions (i.e., with or without the barrier nets in place).

Finally, EPA included the 70 MGD monthly average intake flow limit for April through June because it would help to limit the extent of impingement and impingement mortality, especially to spawning fish that may be in the water at that time of year (as well as reduce the threat of entraining fish eggs in the water). Furthermore, the record indicates that MKS can maintain such intake flows without operational problems, especially in light of the fact that peak electricity demand levels are not typically experienced during these months. Mirant did not object to this limit.

c. **Water Quality-Based Impingement and Entrainment Reduction Requirements**

In the Final Permit, EPA has included the conditions for design and operation of the CWIS that are discussed below based on the requirements of the MassDEP's CWA § 401 certification. These conditions are included in order to assure compliance with state WQS. The CWA and the Phase II Rule require that in addition to satisfying technology standards under CWA § 316(b), permits limits for CWISs must also include any more stringent provisions needed to satisfy state water quality requirements. See CWA §§ 301(b)(1)(C), 401(a)(1) and (d); 40 C.F.R. §§ 122.4(d), 122.44(d), 125.84(e) and 125.94(e). This means that permit conditions must satisfy any applicable water quality criteria and protect any relevant designated uses, including those for fish habitat, that may be set forth in the state's WQS. The CWA authorizes states to impose more

stringent water pollution control standards than dictated by the federal statute. See CWA § 510. See also 40 C.F.R. §§ 125.80(d) and 125.90(d). Therefore, the limits in EPA-issued NPDES permits that address CWISs must satisfy both CWA § 316(b) and any applicable state WQS, and whichever standards are more stringent ultimately determines the final permit limits.

The MassDEP has issued its water quality certification and has certified that the Final Permit's impingement mortality reduction-related limits identified above are consistent with state WQS. In addition, the Commonwealth's water quality certification also requires that the Final Permit contain certain entrainment reduction-related conditions in order to comply with state WQS. These conditions, and the rationale for them, are outlined in the state's certification letter and are hereby incorporated by reference into this Response to Comments. On the basis of this certification, these water quality-based entrainment reduction-related requirements are also included in the Final Permit in Parts I.A.11 and 14.d.11. See CWA §§ 401(a)(1) and 401(d).

d. **Schedule**

Under the Phase II Regulations, 40 C.F.R. § 125.95(a)(2)(ii), a final permit with BPJ-based limits under CWA § 316(b) should also include a schedule by which the permittee would provide the complete information submission required by the regulations as expeditiously as practicable, but not later than three years and 180 days from publication of the regulations. EPA's Questions & Answers document also indicates that the Director has the discretion to include a specific schedule in the final permit setting deadlines for submission of the required Phase II Rule information to support *the next* permit application submission. In the Final Permit for MKS at Part I.A.16, EPA has included a schedule for the permittee to complete the information gathering and permit application process described in 40 CFR § 125.95 of the new Phase II Rule.

e. **Monitoring**

There are several bases for the entrainment and impingement monitoring provisions in the permit independent of whatever the CWA § 316(b) Phase II regulations might require. These independent bases include (a) the need to assess cumulative adverse impacts, including those from the cooling water intake, in order to support analysis of the effects of the Station's thermal discharges and to support future permit determinations regarding thermal discharge limits under CWA § 316(a), and (b) the need to ensure that impingement and entrainment do not contribute to violations of applicable state water quality standards. In addition, in applying CWA § 316(b) on a Best Professional Judgment (BPJ) basis, as EPA has done for this permit, it is appropriate to set monitoring requirements for entrainment and impingement, especially given the dearth of existing data for the Station. Finally, these monitoring requirements are also authorized by CWA §§ 402(a)(1) and (a)(2), and 308(a). EPA notes that after adequate data is collected and assessed, it may be possible to reduce these data collection requirements in the future.

Comment H2: Mirant comments that it has not been given an opportunity to evaluate and select compliance options, including the use of a TIOP, under the Phase II Rule; rather, EPA has used a hybrid approach, guided largely by the 1977 Draft 316(b) Guidance, to develop draft permit requirements that are not consistent with the final Phase II Rule. Mirant seems to suggest that EPA has applied the Phase II Rule on a BPJ basis and complains that EPA did not apply the entire rule but rather picked and chose, considering some but not other aspects of the Rule by not giving the facility all the compliance options. Meanwhile, CLF comments that the permit's limits are not stringent enough to satisfy CWA § 316(b)'s standard of ensuring the CWISs reflect the BTA for minimizing adverse environmental impacts, noting that because of renovations at the facility, MKS could end up increasing its water withdrawals by as much as 40% due to facility renovations.

Response to H2: In addition to the response presented in H1, EPA offers the following response to this comment by Mirant. First, Mirant seems to misapprehend the nature of EPA's BPJ analysis. Rather than engaging in a BPJ application of the Phase II Rule, EPA has properly developed a BPJ-based determination of what CWA § 316(b)'s BTA technology standard requires at MKS. In the process of applying the statute, EPA has looked to certain aspects of the Phase II Rule to inform our BPJ evaluation (such as the performance standards in the regulations and the evaluations of practicable technologies, as discussed in the preamble to the final Rule). EPA believes its approach was entirely reasonable. (See also Response H8, below, discussing impingement mortality and entrainment reduction requirements).

Second, Mirant asserts that our approach to setting a BTA requirement in this permit for the CWIS somehow violates the letter and spirit of the Phase II Rule. As explained above, the letter of the Phase II Rule explicitly provides for EPA to issue this permit based on a BPJ determination of BTA for the intake structure. As to the spirit of the rule, EPA does not accept Mirant's suggestion that promulgation of the rule following notice of this draft permit should suspend progress toward setting a BTA requirement for this CWIS. Indeed, the *letter* of the Phase II Rule specifically contradicts Mirant's suggestion as to its "spirit" – 40 C.F.R. § 125.95(a)(2)(ii) specifically provides the basis for EPA to finalize a BPJ determination. Clearly the terms (and spirit) of the Phase II Rule intend that progress be maintained toward applying the BTA standard to CWISs, providing that BPJ will be utilized to develop permits for facilities whose existing permits will expire before they have time to submit a full demonstration to support a permit developed under the terms of the new Rule. Such facilities would be given sufficient time to develop such demonstrations for their next permit renewal. This approach is exactly what EPA is pursuing for this permit. While Mirant might prefer an approach that delayed permit reissuance until all the new procedures set forth in the Phase II Rule could be undertaken first – which would also have the effect of delaying development of a new permit and progress toward addressing the impacts on the Charles River ecosystem of MKS's water withdrawals and discharges of heat and

other pollutants – that is not the result EPA required or intended with the issuance of the Phase II Rule.

Mirant also appears to be troubled that EPA is looking to several sources of information and guidance in formulating its BPJ determination for BTA on this CWIS. Mirant chides EPA for looking to the Phase II Rule, looking to the 1977 Draft 316(b) Guidance, and looking to Mirant's submissions concerning its CWIS for guidance in support of its BPJ determination. Where Mirant indicts this approach as being a "hybrid," EPA would describe it as a responsible way to implement a BPJ determination. Indeed, most BPJ determinations are necessarily the result of culling relevant data and guidance from a variety of sources, precisely because the BPJ determination is necessary when there is no promulgated standard available to determine the technology required. EPA would be remiss if we did not examine the 1977 Draft Guidance, the predecessor to the Phase II Rule, for relevant information about applying the BTA standard here.

EPA also looked to elements of the rulemaking record supporting the Phase II Rule to inform our BPJ assessment; we are not *applying* parts of that rule selectively. The Agency did an extensive survey of CWIS technologies in developing the Phase II Rule, and it is reasonable for the Region to examine the materials and information collected in that survey as part of our BPJ determination. Finally, we evaluated, and did our best to factor in, all relevant information Mirant gave us as part of its permit application so that our BPJ determination would be as fully informed as possible and tailored to the specific circumstances of this facility and its CWISs. Calling this multi-part assessment a "hybrid" does little more that describe the process a permitting authority must undertake to make a responsible BPJ determination.

In response to CLF's comment, EPA notes that CLF is correct that the existing permit allowed MKS to operate at a monthly average of 70 MGD and a daily maximum flow of 80 MGD, despite the fact that it often did not actually operate at that level as electricity generation and associated cooling water flows have varied widely over the years. CLF is correct that if the plant ran at full capacity all the time, its actual flows would increase over actual historical levels. In our response to comments in section B, above, we extensively discuss the possibility that MKS will operate close to capacity for longer periods of time than in the past, especially prior to the upgrade. This prospect for increased operation is another reason we have included specific instream temperature requirements under section 316(a), as well as measures to reduce effects associated with impingement mortality under section 316(b), along with extensive water quality and biological monitoring. All of these new requirements apply regardless of whether MKS's actual intake flows increase. As explained extensively below, EPA believes it has correctly imposed BTA on the Station's CWIS using a BPJ determination. And in developing those requirements for the intake structure, we have taken into account the potential for increased cooling water intake noted in this comment. Furthermore, information will be gathered for future permit renewals that will reveal the nature of the actual intake flows through, and adverse impacts from,

MKS's CWISs. Thus, future permit conditions can take any increases into account, as appropriate.

Comment H3: Mirant asserts that it should be able to evaluate all compliance options available under the final Phase II Rule since BPJ requirements must be as close as possible to national, technology-based standards (i.e., Phase II standards) and EPA does not have carte blanche to impose requirements that vary from Phase II without justification.

Comment related to H3 from CLF: When making a section 316(b) determination, the Region must first look to EPA promulgated guidelines. Where EPA has not yet published such regulations or the regulations are not yet effective, the Region must, on a case-by-case basis make the determination using its best professional judgment ("BPJ"). Natural Resources Defense Council v. United States Environmental Protection Agency, 863 F.2d 1420, 1424-25 (9th Cir. 1988). Recent EPA Guidance on the application of the Phase II regulations clearly requires that in the present case, where the draft permit is proposed before the Phase II rule takes effect, but the final permit would be issued after it takes effect, and the applicant has not submitted the requisite information under the Phase II rule, BPJ is applicable.

In the present case, at the time of review there were no 316(b) regulations in effect. Therefore, EPA decided to use a BPJ standard for ensuring that the location, design, construction, and capacity of the CWIS reflect the best available technology ("BTA") for minimizing adverse environmental impact. *Id.* Anticipating the publication of the rule, EPA also determined the BTA for MKS's CWIS by applying the unofficial version of the Phase II section 316(b) regulations.

Response to H3 and related comment: EPA disagrees with Mirant's comment. Again, as discussed above, the Phase II Rule itself directs that CWA § 316(b) is to be applied on a BPJ basis for a permit such as MKS's. Such application must be reasonable and consistent with § 316(b). EPA Region I considered the Phase II Rule in a reasonable manner, as discussed above. EPA has provided justification for all of the requirements it has imposed in MKS's permit. At the same time, there is no requirement that Mirant be given the opportunity to evaluate all the options, and undertake all the procedures, in the Phase II Rule. That would be applying the Phase II Rule, rather than undertaking a BPJ review. EPA's permitting approach applied § 316(b) on a BPJ basis and is fully consistent with 40 C.F.R. § 125.95(a)(2)(ii).

In addition to our response to the comments in H1, EPA notes that CLF has mischaracterized EPA's use of the Phase II regulations in this permit. The Agency is not "applying the unofficial version of the Phase II section 316(b) regulations," as suggested at the close of CLF's comment. Rather, EPA is looking to the Phase II Rule's performance standards and the data and information the Agency used in developing those standards to help inform our BPJ in developing BTA requirements for this intake structure.

Comment H4: Mirant asserts that neither the final Phase II Rule or the Q&A Guidance requires EPA to impose new BPJ-based requirements at this time, and it would be far more reasonable to reissue the existing permit with no changes other than to include a schedule for MKS to complete the evaluation and application process specified in the Phase II Rule.

In a related comment, CLF asserts that, based on EPA guidance, BPJ is the appropriate basis for the permit's requirements. However, the BPJ-based requirements, and any Phase II-based requirements in the permit, should be more stringent than proposed in EPA's Draft Permit for MKS. Furthermore, CLF states that if EPA intends to alter conditions of the Draft Permit based on information not available during the public comment period (i.e., further material submitted pursuant to final Phase II Rule requirements), EPA should reopen the public comment period to ensure stakeholders have an opportunity to review and comment on such new information.

Response to H4: Developing permit limits governing MKS's CWISs is a necessary component of reissuing the facility's NPDES permit. This requires the determination of technology-based standards under CWA § 316(b), and any more stringent requirements necessary to satisfy state water quality standards or other state legal requirements, in light of current information at the time of permit reissuance. As discussed above, EPA is applying § 316(b) on a BPJ basis for MKS's permit, consistent with 40 C.F.R. § 122.95(a)(2)(ii). While Mirant is correct that the Phase II Rule does not *per se* require that the BPJ application of § 316(b) under 40 C.F.R. § 122.95(a)(2)(ii) lead to new, more stringent permit requirements, it is implicit that such BPJ determinations will be made based upon a reasonable consideration of any available new information. To ignore such information would be arbitrary and capricious and would not result in a proper BPJ application of § 316(b).

In this case, EPA has considered information made available since the last permit was issued in 1993. This includes information regarding adverse environmental impacts and threats to aquatic resources from CWIS operation at MKS. It also includes information regarding potentially available technological improvements that could reduce adverse environmental impacts from MKS's CWIS. On the basis of this consideration, EPA has concluded that the existing CWISs at MKS do not reflect the BTA as required by CWA § 316(b). EPA has determined, instead, that more stringent permit limits are needed to ensure that the design, capacity, location and construction of the CWISs at MKS reflect the BTA for minimizing adverse environmental impacts and satisfy applicable state water quality requirements. Indeed, the state's water quality certification imposes conditions requiring more stringent permit limits and such conditions must be included in the NPDES permit in accordance with CWA § 401(d).

In light of the above conclusions, EPA does not agree that it would be reasonable, or lawful, to simply reissue the permit by deeming the existing CWISs to represent the BTA under § 316(b) and including a schedule for the future application of the Phase II Rule requirements. Rather,

EPA believes that the proper approach is to include new, more stringent permits requirements for CWISs that reasonably apply CWA § 316(b) in light of new information and will satisfy applicable state law requirements, and to include a schedule by which Mirant will submit the information required by the Phase II Rule to support reissuance of the next future permit. Indeed, this is exactly what 40 C.F.R. § 125.95(a)(2)(ii) directs the permitting agency to do, and the Final Permit contains such a schedule in Part I.A.16.

In its DD (sec. 7.2.3), EPA also detailed several policy reasons that it made sense for EPA to properly reissue MKS's permit at this time, rather than simply delay any permit until such time as the company was ready to go through the permit development process under the Phase II Rule. These include preventing undue further delay of what has already been a very protracted permitting process (the permit expired in 1993), catching up to already expired deadlines for CWA technology-based requirements, addressing non-cooling water permit issues, and avoiding any reduced environmental protection due to potential Phase II Rule litigation-related delays. Moreover, this approach is also consistent with the CWA's goal of continued progress toward achieving the restoration and maintenance of the chemical, physical and biological integrity of the Nation's water bodies. *See* 33 U.S.C. § 1251(a)(1).

In making the BPJ determination for BTA for this Final Permit, EPA has considered many sources of information about technology for intake structures, including the information in the rulemaking record supporting the substantive requirements of the new, recently effective Phase II Rule. Notably, however, in this permit renewal EPA has also considered the requirements of the Massachusetts Surface WQS. As described more fully in response to H1 and elsewhere, EPA must ensure that operation of the CWIS is consistent with Massachusetts WQS. There are several elements of our BTA determination which are required not only as a result of EPA's BPJ determination as to the technology available to address the impacts of the intake, but also as a result of the requirement to protect the use of this water as a habitat for fish and other aquatic life. These water quality based requirements on the intake would apply to any permit that EPA issued now whether or not that permit left past technology-based determinations under CWA § 316(b) unchanged. Therefore, EPA saw no reasonable basis for further delaying the development and imposition of these intake requirements as Mirant suggests.

With respect to CLF's comments, EPA has developed the permit based on a BPJ application of CWA § 316(b) and believes that the permit's limits are appropriately stringent. EPA is not reopening the record on our BPJ determination for the CWIS, and we are not now reviewing a full information submittal from Mirant under the new Phase II regulations. Any potential future permit modifications will proceed according to EPA procedures and regulations, including any applicable public participation requirements. Also, see Response to H1.

Comment H5: Mirant does not agree with Region 1 that implementing the final Phase II Rule

requirements would result in a delay in the permitting process and suggests EPA should continue to use the existing BPJ requirements until information to support the final Phase II Rule is developed. CLF, on the other hand, comments that because key aspects of the final Phase II Rule have been challenged and may be overturned or stayed, reliance on the final Phase II Rule is inappropriate.

Response to H5: See responses to H1, H4 and H6.

In addition, with respect to Mirant's comment, it seems obvious to EPA that delaying the permit until the Phase II Rule requirements can be fully implemented *would* delay reissuance of the permit given that Mirant has yet to develop and submit all the information that would be required under the new Rule. With respect to CLF's comment, EPA disagrees that the Phase II Rule should not be relied upon *in appropriate ways* because of the litigation concerning the Rule. To date, neither EPA nor the courts have stayed the Rule pending resolution of the litigation and no part of the Rule, or the record supporting it, has been withdrawn by the Agency or remanded by the courts. As explained in other responses above, EPA has undertaken a BPJ application of CWA § 316(b) for this permit, consistent with 40 C.F.R. § 125.95(a)(2)(ii), and has supported this BPJ determination with a reasonable consideration of the requirements in the Phase II Rule and information from the rulemaking record.

Comment H6: Mirant asserts it has much of the information required under the final Phase II Rule but concedes that its submissions to date do not fully satisfy the requirements of the Rule. Mirant goes on, however, to state that it could develop the remaining information according to a reasonable schedule. Mirant identifies what it regards to be potentially reasonable time-frames for developing the necessary information – i.e., 3-6 mos. for submitting the Proposal for Information Collection (PIC); 8-18 mos. for conducting information collection (IC); 4-6 mos. for submission of the Comprehensive Demonstration Study (CDS) – but at the same time makes clear that it would want to further discuss scheduling issues with the regulatory agencies before any schedule would be set and that it believes that no schedule should commence until the effective date of the Final Permit.

Response to H6: See responses to H1, H4 and H5.

Mirant appears to suggest that EPA issue a new permit that addresses CWA § 316(b) by imposing nothing more than a schedule for information collection and submission under the Phase II Rule.[8] This suggestion is untenable, however, because EPA cannot issue a new NPDES permit to a

[8] This suggestion is evident from Mirant's view that the schedule would commence upon the effective date of the new, final permit.

facility with regulated CWISs without establishing permit limits for those CWISs under CWA § 316(b) and applicable water quality requirements in light of the information in the permit record. As 40 C.F.R. § 122.95(a)(2) indicates, for facilities such as MKS, the permitting agency should determine the BTA under § 316(b) on a BPJ basis *and* include a schedule for submitting the information required by the Phase II Rule to support the next permit reissuance. EPA cannot issue a permit that does nothing more than set a schedule for the future information submissions.[9] In this case, EPA's BPJ application of the BTA standard to the record at hand has concluded that certain CWIS-related permit conditions are necessary to satisfy CWA § 316(b) and applicable state water quality requirements.

To the extent that Mirant is not suggesting that EPA fail to make a BTA finding, but rather is suggesting that EPA find the *status quo* to represent the BTA at MKS,[10] this suggestion is also untenable because it would be inconsistent with EPA's conclusions based on the record at hand. As discussed above, EPA has found that the steps beyond the *status quo* represent the BTA in this case. Moreover, apart from EPA's conclusions regarding technology-based limits under § 316(b), Massachusetts water quality requirements also necessitate CWIS limits beyond the *status quo*.

Even if EPA could issue a permit that did nothing more than set a schedule for future CWIS-related information submissions, such as Mirant suggests, the Agency notes that Mirant's suggestion is unattractive because it would likely lead to substantial delays in achieving any real progress in addressing the impacts of the plant's intake. First, it is not clear to EPA how seriously the Agency should be taking Mirant's projected time frames for its information collection, since this comment itself includes the perplexing caveat that "[t]his is by no means a suggested schedule" and emphasizes that, at a minimum, Mirant would want to further discuss any schedule with the agencies. Thus, under Mirant's suggestion, additional time would be needed to discuss (or negotiate) any such schedule and then Mirant might decide to challenge the schedule in a permit appeal. Second, making the effective date of any permit the event that triggers

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[9] In this regard, EPA notes that while the Agency's goal is to reissue permits every five years, it is unable to meet this goal for many permits, especially complex ones. For example, MKS's permit was last issued in 1988. Moreover, new permits can get tied up in litigation for years at a time. Therefore, there is a risk that a permit that included nothing but a schedule for information submissions to support setting limits for the next permit could end up remaining in effect for significantly longer than 5 years.

[10] EPA could reach such a conclusion if, for example, the record demonstrated that the *status quo* represented the BTA or at least failed to support the conclusion that any set of conditions other than the *status quo* constituted the BTA. In such a case, a permit finding the *status quo* to represent the BTA and including a schedule for the required information submissions would satisfy 40 C.F.R. § 125.95(a)(2)(ii). That, however, is not this case.

commencement of this non-schedule would effectively delay the schedule by the amount of time it would take to complete any litigation surrounding the other elements of the permit beyond the 316(b) requirements. EPA must consider that, despite our best efforts, there may be issues, especially related to thermal discharges, that Mirant and/or other parties may choose to challenge in a permit appeal even if we were able to defer final action on a BTA requirement under section 316(b). Finally, EPA's experience with Mirant and our cooperating agencies to date in collecting and assessing the technical and biological information necessary to formulate the permit conditions required under section 316(a) suggests to EPA that the Agency should not plan on the somewhat similar process of information collection and assessment under 316(b) being as rapid or easy to predict as Mirant's comment suggests. In making this observation, EPA in no way means to impugn the good will of any party commenting on this permit or any consulting agency. Nevertheless, EPA's experience with the process of collecting and reviewing the extensive data necessary to support complicated technical and policy judgments about sensitive biological resources of great public interest, such as the Charles River Basin, makes it clear to us that the full review process under 316(b) will likely take longer than Mirant's optimistic suggested time frame.

Comment H7: Mirant comments that even though it proposed the barrier net technology, and such technology is expected to achieve compliance with the final Phase II Rule performance standards, it is entitled to an opportunity to evaluate other options under the final Phase II Rule. Mirant further asserts that re-evaluation of the walkway configuration, and issues concerning the screen face alignment, require additional time. Mirant also argues that:

> [a]s the data indicate, and as EPA acknowledges, the barrier net is highly effective at preventing impingement mortality, virtually eliminating impingement of organisms that otherwise could have been impinged on the traveling screens. It also reduced entrainment of organisms over approximately 6 mm for the representative species assessed. Over the three-month testing period, when the barrier net was being properly operated, it reduced entrainment of entrainable-sized organisms by 60-90%. The percentages of organisms not protected by the barrier net are largely reflective of the earliest life stages, as to which natural mortality is highest, and which the barrier net is not designed to protect. Although there were some days on which performance anomalies occurred, this happened primarily (1) during initial deployment of the net, when entrainable organisms remained "inside" the net, and (2) thereafter, on occasions when the anchoring system failed and the net shifted position, allowing intake water to come over, under, or around the net. Mirant Kendall understands that its final design, which does

not incorporate the same type of anchoring system used during the test period, will need to address this type of issue.

Response to H7: In many respects, EPA agrees with the underlying factual premises Mirant presents in this comment, but the Agency reaches a different conclusion about the appropriate course to take in the permit. As Mirant's comment indicates, EPA agrees that the barrier net is a promising technology which, when properly operated, should substantially ameliorate the I&E impacts of the Kendall Station's cooling water intake. It is EPA's BPJ that a barrier net is well suited to serve as BTA for the intakes at this particular facility on this particular type of waterway. EPA also agrees with Mirant that there are some refinements in the design and placement of the net that need to be worked out, both for the purposes of addressing any new security concerns the facility may have and to maximize the net's ability to meet the environmental goals of the permit. For example, in light of this, in the Final Permit EPA has clarified that the placement of the Barrier Net System (BNS) shall be in front of each of the three cooling water intake structures within the Broad Canal, at the entrance of the Broad Canal, or outside the Broad Canal. See Part I.A.11.a(1) of the Final Permit. It should be noted that, as required in the State's WQC, EPA and MassDEP have included in the permit a process to review the location, design, and operation of the BNS. See Part I.A.14.d.11. This process will provide an opportunity to derive the final details of the BNS. Furthermore, EPA has put impingement mortality reduction "goals" in the permit, rather than compliance standards, in light of the fact that the maximum performance capabilities of the barrier nets will be better able to be assessed after their implementation and operation is optimized based on experience at the facility.

That being said, EPA believes that Mirant's assessment of the likely capabilities of this technology supports EPA's permit limits. EPA does not agree with Mirant, however, that there is so much uncertainty about the value of the barrier net as BTA that the decision to require its installation should be postponed for what may prove to be many years. EPA also does not agree that the new Phase II Rule creates some sort of "entitlement" for a several years long delay in implementing BTA at this facility in this case. As discussed extensively in response to comment H1, above, the Phase II Rule specifically provides for the Agency to proceed with a BPJ determination where appropriate. The Agency has been studying the potential for a barrier net to address the impacts of this intake for several years, and it is EPA's best professional judgment that this permit should initiate that process for installing this technology. It is also worth noting that the CWA limits the term of an NPDES permit to five years, then requiring its reissuance. This contemplates that permit terms may require adjustment or alteration based on new information. Moreover, the Phase II Rule itself contemplates that technologies may be implemented with some remaining uncertainty regarding their performance and that future adjustments or changes may be needed to address any deficiencies. See 40 C.F.R. § 125.95(b)(4)(ii)(C) and (D) (Phase II Rule's CWIS technology efficacy assessment and adaptive management requirements). Thus, the possibility that alterations or changes to the permit

requirements may be necessary in the future after facility performance is assessed does not render the proposed permit conditions inappropriate or require, on the basis of this record, that permit issuance be delayed for still additional study.

Comment H8: Mirant comments that by imposing requirements for the reduction of impingement mortality and entrainment the Draft Permit is more restrictive than authorized under the final Phase II Rule, which would define the Charles River Basin as a "lake or reservoir" subject only to standards for the reduction of impingement mortality. Further, there are practical reasons why Mirant has limited flexibility to revisit in any meaningful way the requirements imposed in a BPJ-based permit (e.g., investment commitment, restrictions on backsliding, the burden of changing of "in place" technology). Therefore, Mirant argues that it is inappropriate to impose BPJ requirements beyond those that the Phase II Rule would impose.

To the contrary, CLF comments that even if the final Phase II Rule requirements are applicable, the impacts of MKS upon the already degraded lower basin warrant impingement mortality and entrainment reduction standards of 95 percent and 90 percent, respectively, and that an appropriate BPJ analysis supports stricter standards as well.

Response to H8: See response to H1. In addition, EPA responds to the comments with the following discussion.

As discussed above, the Phase II Rule at 40 C.F.R. § 125.95(a)(2)(ii) directs that a permittee situated like MKS should be issued a permit on a BPJ basis with a schedule for compliance with the information submission requirements of the Rule to support the next permit reissuance. BPJ permits represent a case-specific application of the CWA's technology standards which is not generally limited or controlled by future rulemakings; BPJ determinations may lawfully end up imposing more stringent limits based on a site-specific application of the CWA's general technology standards than the Agency might later develop in an industry-wide guideline. See NRDC v. EPA, 859 F.2d 156 (D.C. Cir. 1988) ("... in establishing BPJ limits, EPA considers the same statutory factors used to establish national effluent guidelines . . . [and] BPJ limits thus represent the level of technology control mandated by the CWA for the particular point source."). In this case, the Phase II Rule has been promulgated and is now effective, but the Rule itself directs EPA to issue this permit with a BTA finding on BPJ basis. Thus, the BPJ determination is not strictly governed by the Phase II Rule.

That being said, EPA believes it is entirely reasonable for the Agency to have considered the *already signed* Phase II Rule in making BPJ-based BTA findings for the Draft Permit, and now to be considering the *effective* Phase II Rule in making BPJ-based BTA findings for the Final Permit. See NRDC v. EPA, 863 F.2d 1420, 1426-28 (9th Cir. 1988). EPA notes that its final BPJ determination agrees with Mirant's proposed classification of the Charles River Basin as a "lake"

solely for the purposes of applying the Phase II Rule. Therefore, EPA is not including any entrainment performance goals *as part of our BPJ determination of technology-based standards under CWA § 316(b)*. This is because the Phase II Rule would not require such a facility to meet entrainment performance goals as an technology-based requirement. Given that the Rule is now in effect, EPA does not believe it would reasonable in this case to impose technology-based compliance requirements that the Rule would not require.[11]

The permit, however, must also assure attainment of applicable state WQS and, according to CWA § 401(d), must include conditions required by a state water quality certification under CWA § 401. In this case, MassDEP has included performance requirements for the CWIS in its 401 certification that go beyond EPA's determination of technology-based requirements under the BTA standard of CWA § 316(b), including measures to address entrainment. These water quality based requirements do not derive from EPA's BPJ determination and are not derived from the technology requirement of § 316(b). Notably, these water quality based requirements would apply whether or not the BTA requirements for the intake were derived from a BPJ determination or a direct application of the Phase II Rule. Nothing in the final Phase II Rule alters such state certification requirements where EPA issues a NPDES permit. Section 125.94(e) provides authority for a Director to impose more stringent requirements when compliance with applicable requirements would not meet applicable state and tribal, or other federal law. Therefore, it is not accurate to claim that this permit is "more strict" than would be required under the Phase II Rule. This permit is enforcing all the Act's requirements, both a BTA technology standard and limits to protect water quality, consistent with the Phase II Rule.

EPA understands Mirant's hypothetical concern that proceeding with the Agency's BPJ based determination of BTA might somehow limit the compliance options Mirant could explore by undertaking the review process in the Phase II Rule. But the Phase II Rule specifically provides for EPA to proceed with permits situated like this one, without waiting for a full analysis under the rule. In deciding whether to proceed, the Agency must balance the utility that further analysis under the Phase II Rule might yield against the need for a prompt amelioration of environmental impacts from the intake and other aspects of facility operations, such as the thermal discharge, that would be addressed by a new permit. It is EPA's technical and policy judgment, in light of the considerable time the parties have devoted to analyzing this issue to date, that the balance here

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[11] The Phase II Rule *does* impose impingement mortality reduction requirements for facilities such as MKS. Therefore, EPA's determination of technology-based requirements for the permit does include various provisions that EPA concludes on a BPJ basis will represent the BTA for reducing impingement mortality. In so doing, EPA is not directly applying the Phase II Rule requirements and requiring compliance with them in this permit; rather, EPA is setting limits on a BPJ basis recognizing the requirements that will later be applied under the Phase II Rule.

tips in favor of proceeding with permit issuance based on our BPJ-based BTA determination, among other things. This conclusion to proceed with our determination of the best technology is further bolstered by the fact that several of the most important permit conditions governing the intake derive from water quality based requirements that would not change as a result of Mirant first completing the full review process under the Phase II Rule.

With respect to CLF's comment, EPA disagrees with CLF on how to structure the performance provisions in our BTA determination for the intake. The Agency has concluded that as a technical matter, the performance standards articulated in the draft permit for impingement and entrainment should be treated as performance goals. While the Agency is reasonably confident that a barrier net is the best technology to require for this intake – in light of information pertaining to use of the technology at MKS specifically, as well as information from the national rulemaking record indicating in general that barrier nets can be effective for facilities located on water bodies like the Charles River Basin – EPA also believes it will require further study of the performance of the system at MKS before we are prepared to impose an enforceable performance standard in the permit. The Agency will require that MKS measure the performance of the barrier nets to determine the levels of impingement mortality the system can reliably achieve and expects that these data will provide a solid basis for imposing specific performance standards pursuant to the Phase II Rule at the next renewal. Therefore, for the purposes of this permit, the issue of the exact percentage that EPA chooses to apply to MKS from the performance range suggested by the Phase II Rule is not relevant.

Comment H9: Mirant is concerned that after it complies with the draft BPJ-based permit it may be required to develop additional information and/or comply with additional requirements to meet the final Phase II Rule requirements and believes this is wasteful, inefficient, unfair and unnecessary.

Response to H9: See Responses H1 and H8.

EPA believes that Mirant's comment identifies no flaw or problem with the new permit for MKS. The Phase II Rule clearly contemplates that under some circumstances, such as those applicable to MKS, facilities would receive BPJ permits, would then have to develop additional information under the Phase II Rule, and then might receive additional permit requirements. Once again, this is evident in the terms of 40 C.F.R. § 125.95(a)(2)(ii). The CWA is a technology-forcing statute with a goal of continued progress toward restoring and maintaining the biological, chemical and physical integrity of the Nation's waters. The statute also requires that permit terms be limited to five years and that new technology standards be applied to permit renewals, unless specifically exempted in some way. Moreover, the Act also allows the possibility that a BPJ permit could be more stringent than a later-issued permit under a subsequently applicable regulation. Thus, there is nothing unusual or improper about the fact that Mirant will have to develop new information

under the Phase II Rule for its next permit and that later permit requirements could be somewhat different than the requirements in the current permit. Nevertheless, given the material in the record here, and the nature of the requirements included in the permit, we believe the chance of the facility undertaking wasteful expenditures now has been reasonably minimized. First, there are significant impingement and entrainment issues that are being addressed by this permit. Second, there is substantial information in the record, including information submitted by Mirant, that suggests that the barrier net technology should have significant beneficial effect at MKS. Third, on a technology basis, the permit imposes only an impingement mortality reduction goal, which aligns the permit's technology-based requirements with the requirements that would apply under the Phase II Rule given that the Rule would not require entrainment reductions of MKS and that there is still some actual uncertainty regarding the exact performance that the barrier nets will achieve at MKS.

Finally, regardless of what the CWA § 316(b) requires now, or may require in the future, on a technology basis for MKS, the permit's CWIS requirements (including those directed at reducing entrainment) are required by state WQS. Therefore, EPA could not decline to include these permit requirements at this time even if it wanted to. The permit's CWIS limits are simply not unfair, inefficient, wasteful or unnecessary. Indeed, it is worth noting that MKS is still operating under a permit issued in 1988 and that expired in 1993. The company cannot reasonably complain that regulators have not waited long enough to develop this new permit.

Comment H10: Mirant disagrees with the following aspects of EPA's interpretation of its authority under 316(b):

- In the absence of the final Phase II Rule, EPA is not authorized to look to the best performing plant in the industry to establish BTA because, given the goal of 316(b), it is not possible to identify the best performance for a particular facility;

- EPA lacks the authority to restrict the flow or operation of a facility since neither restriction involves CWIS technology;

- Applying new plant technology to existing plants ignores the limitations such plants encounter in adopting new technology;

- EPA incorrectly presumes any impact is adverse and only asks whether costs are wholly disproportionate to benefits. Some impacts benefit other organisms, some species have high natural mortality (e.g., advection), compensatory effects protect populations, and one relevant judicial decision looked at population level impact alone.

- Mirant agrees that 316(b) compels consideration of costs (and benefits), but asserts the "significantly greater" cost test is applicable here, not the wholly disproportionate test.

- EPA lacks authority to define capacity as the volume of cooling water withdrawn over time (i.e., a rate) , instead of as the volume the CWIS can hold at one time.

Comment related to H10 from CLF: The Costs of Requiring a Technology Superior to Once Through Cooling are not Wholly Disproportionate to the Environmental Benefits: In light of the significant environmental improvement that would result, the public uses protected, and the public and private investments that have been directed toward the protection of the Charles River over the last decade, $14 million is a relatively small price to pay. Only where the costs of the technology are wholly disproportionate to environmental benefit can cost even be considered. In this instance, there is no question that the costs of even the most expensive technology (closed-cycle cooling) are insignificant compared to its environmental benefits.

Response to H10 and related comment: EPA addresses the several elements of these comments in turn:

Best performing plant: MKS's permit requirements are not based on the best performing plant in the industry; rather they are based on a BPJ application of the BTA standard to MKS specifically. As discussed above, that BPJ determination was informed by a variety of factors, including an appropriate consideration of the Phase II Rule. Nevertheless, EPA is well within its authority in applying CWA §§ 316(b) to look to CWA §§ 301 and 306 for guidance in discerning the factors Congress intended the EPA to consider in determining BTA. See, 69 Fed. Reg. 41,582/3 - 41,583/2, and *Riverkeeper v. EPA*, 358 F.3d 174 (2nd Cir. 2004). In setting BAT standards under CWA § 301, EPA looks to the "best performing plant" in the industry for a benchmark for setting national effluent guidelines. Thus, it is also appropriate to consider that factor in setting BTA limits under § 316(b). At the same time, however, in setting BPJ limits for a particular existing facility it is also necessary to consider individual plant circumstances that might affect whether a particular technology is practicable (or available), or will achieve a level of performance that minimizes adverse environmental impacts, for that facility. EPA's discussion in the preamble to the Phase II Rule simply noted this point. See 69 Fed. Reg. at 41,600. This preamble discussion did not state, as Mirant implies, that the Agency was ruling out any consideration of the best performing plants. Indeed, EPA did consider the best performing plants in promulgating the Phase II Regulations. See 69 Fed. Reg. 41601, 41606 (Rule considered closed-cycle cooling but did not require it as BTA on a national basis because implementation problems may exist in some instances and other, less costly technologies can achieve comparable performance).

In any event, at present, EPA has not imposed CWIS limits in the MKS permit based on the best performing plants in the industry. First, intake flow reductions based on closed-cycle cooling have been ruled out at MKS on impracticability grounds, based on EPA's current understanding of facility space constraints. Second, numeric performance compliance standards have not yet been set for MKS because it is not yet clear exactly what actual performance levels will be achieved by the barrier nets. For impingement mortality reduction, the permit requires the installation of barrier net technology and limits intake flow velocity. This is exactly the technology that Mirant proposed. While it appears that this technology will be able to meet the performance standards in the Phase II Rule, and thus achieve performance on par with the best performers in the industry, no numeric performance requirement has yet been set in the Final Permit. Instead, the permit requires the barrier nets to minimize impingement mortality to the extent practicable, with the ultimate performance goal being to reduce annual impingement mortality for adult and juvenile fish by at least 80% from a calculated baseline. This approach recognizes that adjustments may be needed over time to optimize performance based on experience. In addition, the impingement mortality reduction provisions of the permit could not be relaxed without running afoul of state WQS. Finally, with respect to entrainment reduction, the permit's requirements are based on state water quality requirements. Thus, Mirant's comment is essentially irrelevant to the current permit.

Flow curtailment: With regard to the assertion that EPA lacks the authority to restrict the flow or operation of a facility, EPA disagrees. EPA's longstanding interpretation of CWA § 316(b) has been that authority to ensure that CWIS capacity and design reflect the BTA encompasses the authority to regulate the intake flow. See 66 Fed. Reg. 65256, 65273 (December 18, 2001) (preamble to Final Phase I Rule); *Decision of the General Counsel No. 41 (In re Brunswick Steam Electric Plant)*, at 197, 20001 (June 1, 1976). See also 69 Fed. Reg. 41,630 - 31 ("EPA is authorized to set performance standards for intake flow based on closed-cycle cooling technology, as it did in the Phase I rule, which was upheld in *Riverkeeper v. EPA* [358 F.3d 174 (2nd Cir. 2004)]").

New source performance standards as a transfer technology: Mirant's comment seems to assume that EPA was proposing blindly to impose technology suited for a new facility to an existing facility without examining any of the issues presented by retrofitting that technology to the existing plant. This argument is a strawman that targets a position EPA never took. EPA readily acknowledges that there may be limitations encountered by existing facilities in some cases. In this particular case, however, MKS has not demonstrated that the proposed technology cannot be implemented because of MKS's status as an existing facility. Indeed, MKS itself proposed the use of a barrier net, which can be used in the existing configuration and does not require the acquisition of new land or significant construction, and only minimally affects the surrounding area. Thus, the permit requirements based on this technology obviously and reasonably accommodate MKS's status as an existing facility. Furthermore, EPA also accounted

for the most important argument Mirant made concerning the limitations presented by the existing configuration of the Kendall Station. EPA agreed that the significant space limitations and the crowded urban fabric around the plant ruled out a requirement for closed-loop technology.

Adverse environmental impact: EPA sees no reason for revisiting the approach to assessing "adverse environmental impacts" which we articulated in the Determination Document. This precise issue was not squarely before the EAB in the Dominion Energy appeal, because there appeared to be no dispute that was adequately preserved on the record over whether the environmental impact of the intake was substantial. Nevertheless, the EAB generally upheld the Region's approach to interpreting the Seabrook case in the context of a section 316(b) BPJ determination. See Dominion Energy at 228-230. Furthermore, in the litigation over the Phase I CWA § 316(b) Rule, the Second Circuit upheld EPA's focus on entrainment and impingement as *per se* adverse environmental impacts to be minimized without requiring the sort of evaluations that Mirant appears to suggest. The court explained as follows:

> [w]e think that the EPA's focus on the number of organisms killed or injured by cooling water intake structures is eminently reasonable. *See* Final Rule, 66 Fed. Reg. at 65,262-63, 65,292. As discussed above with respect to restoration measures, Congress rejected a regulatory approach that relies on water quality standards, which is essentially what UWAG urges here in focusing on fish populations and consequential environmental harm.

Riverkeeper, 358 F.3d at 196. In any event, while Mirant is free to speculate about the possibility that there may exist a level of adverse environmental impact so low, or "de minimis," that it would merit no further response or analysis under section 316(b), this case does not present such a de minimis scenario.

EPA will respond more extensively below to Mirant's technical arguments that the impact of Kendall Station's intakes is not adverse, or only minimally adverse. Here, it suffices to note that Mirant's argument that the impacts of its intakes may actually be beneficial appears hypothetical in nature and not supported by any substantial evidence. As a general response, EPA cautions that this type of active management of an aquatic system through removal or reduction of a species should only be attempted after rigorous study of the many interactions among co-existing species. There is no evidence on the record that the plant's intake entrains less beneficial species to the advantage of more beneficial species. And there is very little reliable evidence on the record that there are compensatory effects at the overall population level that offset the "cropping of organisms" through the intake. One can speculate equally that the loss of organisms to the intake, as well as to high temperatures in the Zone of Dilution resulting from MKS's thermal discharge, threatens to use up or eliminate any compensatory reserve that resident species

maintain to deal with natural fluctuations in populations or environmental conditions. See 69 Fed. Reg. 41589. Indeed Mirant's remaining argument about the minimal impact of its intake cuts against any speculation that "compensatory effects at the population level" make the intake's impacts unimportant. Mirant notes that advection to Boston Harbor of species in their early life stages causes high mortality rates and argues that any impact from the intake will have little effect on the already high mortality rates that exist in the Basin. This issue is discussed in Responses C23 and C25. If anything, this observation inclines EPA to be especially diligent in addressing the impacts of the plant's intake, given the already stressed state of the populations in this ecosystem. A smaller impact from an intake on a stressed population may be more important to address under section 316(b) than a larger absolute impact on an otherwise robust population.

Economic considerations: Mirant argues that EPA should not be using the "wholly disproportionate test" for weighing the costs and benefits of a technology, but should instead be applying the "significantly greater"cost-benefit test included in the new Phase II regulations. The EAB in the Dominion Energy case squarely addressed the Region's use of the "wholly disproportionate" test in making a BPJ-based BTA determination under section 316(b), and the EAB clearly upheld the continuing validity of this approach. Dominion Energy at 230-232. Here, EPA has considered whether permit requirements are economically practicable, and whether costs would be wholly disproportionate to benefits. The permit requirements, elements of which were proposed by the permittee and do not constitute the most expensive alternative considered, meet both tests. That being said, EPA also concludes that given the importance of the public environmental resources at stake here, and the relatively modest costs involved in complying with the permit's CWIS technology-based limits, the cost of such compliance is not significantly greater than the benefits it will provide. Finally, Mirant's argument here is essentially moot because EPA cannot make the intake limits less stringent due to state water quality requirements, which are not limited by any comparison of costs and benefits.

Capacity: Finally, regarding defining capacity, the Phase I section 316(b) rule requires a reduction in flow commensurate with closed-cycle cooling, in part based on a dynamic definition of capacity, and such requirements were not disturbed in the Phase I litigation. See 65 FR 49,078/2-3 for proposed Phase I rule discussion of EPA authority to impose limits on the volume of flow of water withdrawn through a cooling water intake structure as a means of addressing capacity. The Phase II Rule similarly identifies reducing flow as an acceptable compliance alternative. Also see response to "flow" comment above.

Comment H11: Mirant asserts that EPA's assessment of impingement and entrainment is flawed because in this permit MKS's flow will not increase appreciably over historical levels, the relationship between power generation and cooling water use is not strictly linear (MKS must withdraw cooling water when not generating power to maintain its pumps and condensers), and EPA has focused on MKS's periods of peak operation when entrainment and impingement are

concentrated due to the seasonal presence of river herring.

Response to H11: EPA and MassDEP disagree with the permittee's depiction of their expected once through cooling water usage. Monitoring data collected for Kendall Station since the permit application was submitted support EPA and MassDEP's position that cooling water usage at the facility has increased over historical levels. In Section 5.3 of the DD, it is noted that "The observed historical monthly average water use from 1992 through 1998 was 50 MGD", based on Figure 3.3.1-1 of the DD. Data complied from Kendall Station's Discharge Monitoring Reports documented an average monthly water use of 65.3 MGD from January through December of 2005. This is an increase of water use of approximately 31% over historical levels. The average monthly water use for April through August of 2005, the warmer spring and summer months highlighted in Mirant's comment, was 68.4 MGD. Based on an inspection of Figure 3.3.1-3 of the DD, average monthly water use for the spring and summer months from 1992 through 1998 appeared to remain in the 50 MGD range, which is contrary to Mirant's position that historical water use increased at Kendall Station during the spring and summer months. The 50 MGD monthly average range in the spring and summer did not approach the appreciable increase in cooling water use of approximately 37% reported in the spring and summer of 2005.

It must be noted that in Kendall Station's permit application, the permittee requested a change in the water usage calculation from a monthly average of 70 MGD to a yearly average of 70 MGD. This request, which was granted by EPA and MassDEP, but accompanied by protective limits during spawning season, effectively allows the facility to increase their monthly average water use up to 80 MGD during some months (excluding the spawning months of April, May and June), as long as their overall 12 month average is 70 MGD or less. EPA and MassDEP maintain that if the permittee did not expect to use more cooling water, then their request for the revised water use calculation would not be necessary.

As indicated in the Phase II Rule, the withdrawal of a large volume of cooling water has the potential to affect a large numbers of aquatic organisms and increase environmental impacts associated with a CWIS (See 69 Fed. Reg. 41,586 – 41,590). In this permit, EPA has focused on the level of cooling water use reasonably expected, and documented to date, based on upgrades at the facility. Further, EPA has examined periods of peak operation during spawning periods because any increase in cooling water use beyond historical rates during these months is expected to further increase impingement rates and the total number of organisms entrained at the CWIS for a given year.

Finally, an analysis of impingement rates at Kendall Station from 1999 through 2005 revealed that impingement takes place during most months and is not concentrated in the spring and summer months, as Mirant stated in their comment. See Response H14 for a detailed review of impingement at Kendall Station. For example, in a ranking of average monthly impingement

from 1999 through 2005, the month of February ranked as the third highest.

Based on this analysis, likely impingement and entrainment effects characterized by EPA and MassDEP are fundamentally reasonable.

Also, see Responses B1, B2, B3, C1 and C3 for further information related to this comment.

Comment H12: Mirant asserts that EPA's concern regarding impacts to benthos lacks supporting data, that white suckers are not resident in the Broad Canal, and that from 1999 through November 2000 only eight benthic fish were impinged.

Response to H12: EPA and MassDEP maintain that the location and design of the CWIS (withdrawing water within three feet of the bottom of the canal) has the potential to impact benthic fish. Based on Kendall Station impingement data collected in 1999 and 2000, as well as impingement data from 2001 through 2005 (submitted in April 2006), resident benthic species were impinged in every year that impingement sampling was conducted. While as Mirant points out in its comment, no white suckers were collected during impingement sampling events, other benthic species collected included channel catfish, white catfish, brown bullhead and yellow bullhead catfish, carp, and goldfish. While no species appeared in large numbers in the impingement sampling record, this data set clearly documents the presence of benthic species in the Broad Canal (Mirant Kendall Application 2001; Mirant Kendall 2006). Kendall Station's CWIS withdraws water to a depth of 12 feet, which is approximately within three feet of the bottom of the Broad Canal. Considering the available information and the location and design of the CWIS, there is a reasonable opportunity for continued impingement of benthic species. This remains a legitimate point of concern to EPA and MassDEP. EPA and MassDEP would note, however, that the permit requirements do not focus solely or primarily on reducing impacts to benthic organisms. Rather, they focus on reducing total impingement mortality at the facility.

Comment H13: Mirant asserts that there is no evidence that approach velocities at MKS are attracting fish to the CWIS and suggests that the data indicate the fish in the canal are neither concentrated near the intake nor more abundant than fish outside the canal in nearby habitat.

Response to H13: In the Determination Document, EPA and MassDEP make the following statement: "Typically, the greater the approach velocity, the greater the potential for impingement. Some species of fish actually cue to water movement and will be attracted to fast moving water." (DD, Section 8.1.1b) Migratory fishes in particular possess a strong behavior that leads them 'up-stream' (rheotaxis). In the case of the MKS CWIS, where the flow of water into the Station is so large compared to the flow of the river, the fishes' natural behavior may lead them to water movement caused by the 80 MGD withdrawal of water into the CWIS, and short circuit the fishes' upstream migration. Thus, while there is no direct evidence that fish are

attracted to the Kendall Station CWIS as Mirant contends, an interruption in upstream migration likely due to increased water movement has been documented at the discharge from Kendall Station in an underwater video provided by the permittee. This indirect evidence in the lower Basin suggests that fish have been attracted to moving water. Therefore, it is possible that intakes with high approach velocities may artificially attract fish to the CWIS. In addition, high approach velocities reduce the ability of a fish to escape, once it is pulled into the structure. Once impinged, the pressure of the high flowing water holds the fish and other organisms in place against the screens, causing injury and possibly death." This was intended as a general statement regarding the nature of impingement at CWISs, not as a statement regarding the nature of impingement at this particular facility. The available gill net data, with the exception of the limited sampling effort in 1999 and 2000, was not collected in the Broad Canal. Because of this, it is not possible to state with confidence whether or not fish densities in the Canal are greater than in surrounding areas of the river.

It is debatable whether, in the absence of sufficient data collected with gillnets or other means, impingement mortality data is a reasonable indicator of the relative concentration of fish in the Broad Canal. In June of 2000, a large number of blueback herring (1428) were impinged at the Station's intake and this coincided with a time of low flow in the Charles River. Other low flow periods did not, however, coincide with impingement events of this magnitude.

The permittee also stated that EPA and MassDEP provided no citation to support the position that the approach velocities for the existing CWIS are "considered well within the likely approach velocity range to result in fish impingement." Kendall Station operates three intake structures in the Broad Canal, each with an approach intake velocity (estimated by the permittee) at between 0.57 to 0.76 feet per second (fps). This is considered well within the likely approach velocity range to result in fish impingement. This position is based on available fish swim speed data noted below that indicate approach intake velocities higher than 0.5 fps would likely not be protective of most fish. The Phase I and II Rule set an intake velocity performance standard of 0.5 fps. These studies are discussed in the 316(b) Phase II Rule as follows: "As EPA discussed in the proposed rule at 67 FR 17151 and Phase I final rule at 66 FR 65274, intake velocity is one of the key factors that can affect the impingement of fish and other aquatic biota, since in the immediate area of the intake it exerts a direct physical force against which fish and other organisms must act to avoid impingement and entrainment. As discussed in that notice, EPA compiled data from three swim speed studies (University of Washington study, Turnpenny, and EPRI) and these data indicated that a 0.5 fps velocity would protect at least 96 percent of the tested fish. As further discussed, EPA also identified federal documents (Boreman, DCN 1–5003–PR; Bell (1990); and National Marine Fisheries Service (NFS)(1997)), an early swim speed and endurance study performed by Sonnichsen et al. (1973), and fish screen velocity criteria that are consistent with this approach (FR 69 Page 41601)." As a result, EPA set an intake through-screen velocity performance standard in the Phase I and Phase II Rules such that a facility with an intake velocity

at or below 0.5 fps is considered to satisfy the impingement mortality reduction standard. 40 C.F.R. § 125.94(a)(1)(ii).

Thus, the current Mirant Kendall Station intake velocities of 0.57 to 0.76 fps are within the range of approach velocities expected to result in impingement. In its application, Mirant estimated that the approach velocity with the installation of barrier nets would be about 0.043 fps. However, the velocity that is discussed in the Phase II Rule is the through-screen velocity, which will be higher than the approach velocity as the water passes through the small openings in the screen's mesh.

As a State Certification requirement, Part 11 of the Final Permit restricts the effective through-screen intake velocity at all three CWIS to 0.5 fps or less when the barrier nets are in place, including a requirement to demonstrate what the actual through-screen intake velocity is under both conditions (i.e., with and without the barrier nets in place).

Comment H14: Mirant asserts that some inter-annual variability is to be expected since it is a function of several factors that affect the number of organisms near the CWIS, including high flow. Mirant also states that a large percentage of the impingement of adult river herring occurs during its annual spring spawning run. EPA's concern about assessing the impingement of juvenile river herring is misplaced, according to Mirant, since juvenile river herring have not been impinged in any significant numbers since 1999. (Mirant also states that if EPA meant to refer to *adult* river herring, its concern is not well-founded and likely results from an error in taxonomic identification during the early 1999 sampling that was later identified and corrected.)

Response to H14: EPA and MassDEP recognize that the seasonal abundance of fish and other creatures affects the quantity of organisms impinged. Impingement numbers may increase during certain times of the year for select species (or select life stages) as a result of seasonal peaks in abundance (e.g., due to movements or migrations) or seasonal stressors. For example, juvenile fish may be more susceptible to impingement than adults because they are generally present in greater numbers than adults and are weaker swimmers. Also, fish that are stressed upon the completion of spawning (spring), or are exposed to abnormally cool (winter) or abnormally warm (summer, industrial thermal discharge) water conditions are more susceptible to impingement. This variation warrants monthly sampling requirements for impingement characterization studies.

Factors that influence impingement can also vary between years (i.e., inter-annual variation) due to natural environmental variation (e.g., flow, temperature), fish population dynamics (e.g., recruitment), and facility operations (e.g., increased or decreased withdrawals). This fact is acknowledged by the permittee in the above comment. As EPA and MassDEP reviewed impingement mortality at Kendall Station, both adult and juveniles life stages impinged are of concern. Furthermore, the level of impingement documented at MKS in 1999 is of concern even

after the misidentification of the life stages of river herring was taken into consideration.

The first impingement data collection occurred in 1999. Mirant Kendall's impingement data for 1999 and 2000 show very high levels of variation between the two years. Impingement totals in 2000 were more than 5 times greater than those recorded for 1999. Furthermore, in 1999, river herring and white perch accounted for 53% of all impinged fish, whereas in 2000, 86% of all impinged fish were blueback herring. Although life stage data was not provided by the permittee, considering the time of year that these fish were impinged, EPA and MassDEP assumed that they were juveniles. Even if these fish were adult herring (as suggested by Mirant Kendall), it would not eliminate EPA and MassDEP's concern for impingement impacts on river herring. Furthermore, given the various reasons for inter-annual variability in impingement numbers noted above, the fact that impingement totals have decreased since 1999 does not mean that impingement of river herring is not a concern or that monitoring of such impingement is not appropriate.

In April 2006, the permittee provided impingement sampling data collected at Kendall Station from the years 2001 through 2005. During this time period, the highest number of fish impinged was in 2001 (970 fish) and the lowest number was in 2004 (129 fish), with the average number of fish per year being approximately 641. This variability is much less than the overall inter-annual variability documented in the 1999 – 2000 impingement data set initially submitted by the permittee. A seven year dataset of site-specific MKS impingement information allows a better record of the overall impingement profile at the facility compared with the two years submitted initially. During the 2001 to 2005 time period, impingement of river herring ranged from a high of 385 fish in 2002 (approximately 53% of all fish impinged that year) to a low of 6 fish in 2005 (approximately 1%). In all cases, the majority of river herring were made up of blueback herring. While alewife were impinged every year, the highest number of alewife impinged between 2001 and 2005 was 31 fish in 2002 (approximately 4 % of all fish that year). It is interesting to note that the number of river herring impinged in 2004 and 2005 was noticeably lower than in previous years (12 fish in 2004 and only 6 in 2005). Impingement of all fish was relatively lower in 2004 (129 fish), which may explain the 2004 river herring total, but total impingement in 2005 (519 fish) approached the average number seen from 2001 through 2005. Impingement data from 1999 through 2005 are presented in Table H14-1 and summarized in Figure H14-1.

During the same period of low river herring impingement, Mirant Kendall Station has withdrawn more water, based on an examination of monthly average water withdrawal, in 2004 and 2005, compared with historical operation. It is uncertain why river herring were generally absent from Station impingement in 2004 and 2005, despite higher water withdrawals. See Response C3 for more information about the distribution of river herring in the lower Basin.

Although the additional impingement data submitted in April 2006 does not reveal large spikes in impingement (especially related to river herring), the data set does document ongoing impingement at the Station. CWA § 316(b) requires that the design, location, capacity and

Table H14-1 Number of fish impinged at Kendall Station Circulating Water Intake Structure by month and year. 1999 through 2005. (Source: Mirant Kendall Station)

Year	Jan	Feb	March	April	May	June	July	August	Sept	Oct	Nov	Dec	Yearly Totals	Monthly Average
1999				7	120	135	22	19	3	1	1	3	311	34.6
2000	4	12	15	19	529	1485	9	5	1	0	2	64	2145	234.9
2001	90	104	130	84	287	201	16	37	11	5	2	3	970	71.8
2002	15	26	9	33	137	367	31	28	15	9	17	47	734	76.0
2003	110	82	123	44	65	344	9	40	20	3	2	13	855	60.0
2004	0	12	9	24	49	12	5	6	9	2	1	0	129	12.0
2005	23	312	66	41	43	20	7	4	1	2	0	0	519	13.1
Total # of Fish	242	548	352	252	1230	2564	99	139	60	22	25	130	5663	
Average # of Fish	40.3	91.3	58.7	36.0	175.7	366.3	14.1	19.9	8.6	3.1	3.6	18.6	69.7	
Monthly Rank	5	3	4	6	2	1	9	7	10	12	11	8		

Total Number of Fish = 5663 fish Monthly Average = 69.7 fish Yearly Average = 809.0 fish

construction of the facility's CWIS reflect the BTA for minimizing adverse environmental impacts, including impingement mortality. In addition the permit's limits must satisfy applicable water quality standards. As explained in various responses above, the permit's requirements with respect to reducing impingement mortality and monitoring for impingement are needed to satisfy the technology requirements of CWA § 316(b) and state WQS, and are also authorized by CWA §§ 402(a)(2) and 308(a).

Comment H15: Mirant comments that it should be no surprise that many impinged fish are on the Kendall Station List of Priority Species given that the list is comprised of fish that are important to and abundant in the Charles River Basin. Relying on a population estimate in the range of 200,000 adult river herring, Mirant further asserts that EPA's concern regarding the total number of impinged organisms is misplaced, given that there is impingement of only 1 percent of the river herring population. Based on this analysis, Mirant maintains that such impacts would not have a meaningful effect on this population.

Response to H15: In this comment, Mirant uses an estimated river herring population value to project the percentage of the fish population impinged. At the outset, EPA does not consider the population estimate used by Mirant as reliable. EPA and MassDEP point out that Mirant's comment is inconsistent with its Comment I11, also included in this document. In Comment H15, Mirant relies on a specific river herring population estimate to support its point, whereas in Comment I11, Mirant asserts that it is not possible to develop a reliable fish population estimate. While EPA and MassDEP do not agree that it is not possible to develop a reliable fish population estimate (see Response I11), the permitting agencies have determined based on the information submitted by the permittee that reliable population estimates for river herring or other fishes in the lower Charles River have not been developed yet. Estimates vary widely, and the monitoring data provided by the permittee to EPA and MassDEP to date do not provide sufficient information upon which to base firm conclusions regarding the proportion of a given species' population that is being impacted by impingement at this facility.

In any event, the technology standard requirement of CWA § 316(b) requires that the design, location, construction and capacity of the cooling water intake structure reflect the BTA for minimizing adverse environmental impact, including impingement mortality. This requirement applies generally and is not limited to cases where some threshold is crossed regarding the percentage of a species population that is being affected by impingement. See *In re Public Service Company of New Hampshire (Seabrook Station, Units 1 and 2)*, 10 ERC 1257, 1261-62 (NPDES Permit Application No. NH 0020338, Case No. 76-7; June 17, 1977) (Decision of the Administrator); *Decision of the General Counsel No. 63*, pp. 381-83; *Decision of the General Counsel No. 41*, at 203. Furthermore, the adverse effects of impingement must also be considered in the context of the overall effects of the power plant, including its effect from its thermal discharge and entrainment. See *Public Service Company of New Hampshire*, 10 ERC at 1262. Finally, although this permit is being based on a BPJ application of § 316(b) rather than a strict application of the performance standards in the CWA § 316(b) Phase II Rule, it is worth noting that the Phase II Rule sets a performance standard requiring that impingement mortality be reduced by 80-95 percent without regard to whether any particular percentage of a species population has been harmed (i.e., there is no population percentage threshold).

EPA and MassDEP continue to be concerned with the impingement mortality rates at this facility. The CWA Section 316(b) Phase II Rule states that, "EPA continues to believe that any impingement or entrainment would be an adverse environmental impact, but has determined that 316(b) does not require minimization of adverse environmental impact beyond that which can be achieved at a cost that is economically practicable" (FR 69 Page 41627). Impingement mortality is an easily quantified measure of CWIS impact on source waters. As indicated in the Phase II Rule, "As in the Phase I rule, EPA is setting performance standards for minimizing adverse environmental impact based on a relatively easy to measure and certain metric—reduction of impingement mortality and entrainment. Although adverse environmental impact associated with

cooling water intake structures can extend beyond impingement and entrainment, EPA has chosen this approach because impingement and entrainment are primary, harmful environmental effects that can be reduced through the use of specific technologies. In addition, where other impacts at the population, community, and ecosystem levels exist, these will also be reduced by reducing impingement and mortality. Using impingement mortality and entrainment as a metric provides certainty about performance standards and streamlines, and thus speeds, the issuance of permits" (69 Fed. Reg. 41600). Reducing impingement mortality from the facility's cooling water intake structures will also improve the quality of the Lower Charles River basin as a habitat for fish and, thus, contribute to the water body attaining its designated use under state water quality standards. EPA and MassDEP believe that the barrier nets required in the permit, and proposed by Mirant, will significantly reduce impingement mortality and, in any event, the permit requires that impingement mortality be minimized to the extent practicable.

Comment H16: Mirant comments that given its through-plant temperature differential and the densities of larvae in the ichthyoplankton samples near the discharge, assuming 100 percent entrainment mortality is highly conservative and provides a wide margin of safety.

Response to H16: The basis for the assumption of 100% mortality of entrained organisms is found in the supporting documentation for the Phase II Rule (See 69 FR 41620). The presence of larvae in ichthyoplankton samples near the discharge is not convincing evidence of larval survival without addressing the condition of the collected larvae or providing evidence that these larvae had previously been entrained. Ichthyoplankton samples collected near the discharge could have captured some drifting larvae that did not pass through the Station's cooling water system at all, but rather, drifted downstream directly into the collection nets. The permittee did not submit a well-constructed, site-specific entrainment survival study. Absent such data, the survival of organisms entrained at this facility must be assumed to be zero.

Comment H17: Mirant asserts that EPA has no basis or authority for requesting additional site-specific ichthyoplankton data. The affects of advection have not been considered and must be considered to apply an entrainment standard under the final Phase II rule. EPA has not established a basis for an entrainment standard given the Basin is a freshwater lake under the Phase II rule.

Comment related to H17 from CRWA: The Charles River Watershed Association (CRWA) assert that authorizing Mirant to withdraw 80 MGD will kill millions of organisms and be contrary to making the river fishable by 2005. In addition, according to CRWA, under the draft permit thermal pollution would be five times greater than historic levels and have dramatic impacts on aquatic life.

Response to H17 and related comment: Based on data submitted by the permittee, Kendall

Station has entrained millions of fish eggs and larvae. EPA and MassDEP have received comments that likely future entrainment of ichthyoplankton is in conflict with the overall goal of protecting the Charles River fish community. As explained above, EPA cannot reasonably impose on a BPJ basis entrainment reduction requirements in the permit as technology-based requirements under CWA § 316(b), in light of the requirements set forth in the Phase II regulations for facilities located on water bodies like the lower Charles River Basin. See Response to H1. As also discussed above, however, the Commonwealth of Massachusetts' certification under CWA § 401 requires certain permit conditions geared to reducing entrainment in order to ensure that the permit limits are consistent with state WQS. There is a monitoring, sampling and modeling plan submission required under the State's Water Quality Certification (WQC). Mirant will be required to provide quantitative data on the magnitude and diversity of icthyoplankton in the Broad Canal and the effectiveness of the BNS or alternative entrainment reduction system in minimizing entrainment and maximizing the survivability of fish larvae and eggs. The protocol for conducting the sampling and analysis will be developed in the course of the plan review to generate data related to the WQC's performance standards and entrainment reduction system evaluation. To the extent feasible, the data collection and submission requirements under the WQC and the permit have been integrated and are compatible. These required conditions have been included in the permit and should result in reduced entrainment and foster conditions that will allow the Class B designated use of "fish habitat" to be attained in the river in the vicinity of the power plant.

In addition to the WQS as a basis for the ichthyoplankton monitoring, such monitoring is also included in the Final Permit to document that the river is not impacted by the thermal discharge to a degree that it affects the protection and propagation of the BIP. These effects include blocking fish passage, disrupting spawning and lethal effects on ichthyoplankton. See also Response to H1. Therefore, the ichthyoplankton monitoring required in this permit is warranted and within the authority of EPA and MassDEP under CWA §§ 308(a) and 402(a)(2).

EPA and MassDEP's consideration of advection of ichthyoplankton in assessing adverse environmental effects is discussed in Responses to H18, C23 and C25.

Comment H18: According to Mirant, all of the entrainment analyses fail to properly account for advection of eggs and early life stages of larvae from the basin to the harbor. Mirant states that the 2000 year-class experienced a major flushing event. Mirant argues that since organisms subject to advection are unlikely to remain in the basin and are less likely to survive, they are not properly part of the calculation baseline and the baseline must be further adjusted.

Response to H18: This comment assumes that mortality due to entrainment at MKS is the ecological equivalent of these same organisms traveling out of the lower Charles River and into the Boston Harbor. However, the permittee has not provided evidence that organisms subject to

removal from the lower Charles River to the Harbor experience similar (e.g., 100%) mortality to those entrained by the facility. Further, the action of natural processes that may move plankton out of the lower Charles River are not ecologically equivalent to entrainment of those same organisms by the MKS. Eggs and larvae flushed out of the Charles River are likely available as a food source for aquatic organisms present in Boston Harbor and some may survive to become juvenile or, ultimately, adult fish. Thus, they still are of value to the ecosystem. Once eggs and larvae are entrained by MKS, subjected to sheer stress from the intake pumps, heated up by 20˚ F, and discharged back to the river, not only are they killed but it is far from clear if they would be identified as a food source by aquatic organisms. When an ichthyoplankton entrainment baseline calculation is required, it would be appropriate to include in the entrainment baseline calculation any organisms that drift past the facility and could potentially be entrained.

Finally EPA maintains that it is not protective to diminish or discount entrainment mortality from Kendall Station based on the premise that greater ichthyoplankton mortality occurs from other sources, such as the advection. It is the permittee's responsibility to minimize impacts from entrainment even if there are other stressors on fish populations. Simply because eggs and larvae may be flushed out of the Basin without first being entrained is not a valid reason to lessen this responsibility. This issue of advection is discussed in Response C23 and C25.

In any event, the permit does not contain technology-based entrainment reduction requirements under CWA § 316(b) or the Phase II regulations. As a result, the calculation baseline requirements of the Phase II regulations do not apply here. The permit does, however, have entrainment reduction and monitoring requirements based on MassDEP's interpretation of the state WQS as specified in their Water Quality Certification.

Comment H19: Mirant asserts that, with regard to the entrainment assessment, EPA erred in adding the estimated number of eggs entrained for river herring and white perch to the estimated number of larvae entrained, and then comparing this total to number of larvae in the basin to assess entrainment effects. According to Mirant, since there is high natural mortality (exceeding 90 percent) between the egg and larval stage (compounded here by advection), it is inappropriate to include eggs in this analysis.

Response to H19: EPA and MassDEP agree that fish eggs should not be considered equivalent to fish larvae for the purpose of assessing impacts on populations. In making such an assessment, the rate of survival of the species in question between the egg and larval stage should be considered and the number of eggs adjusted accordingly. However, the entrainment assessment cited by Mirant in this comment and the data used by EPA and MassDEP were provided by Mirant and simply included in the DD's analysis (Table 8.1.2-1 in the Determination Document). The DD specifically states, "This table was presented in its entirety from the permit application (Table 5-4; Mirant Kendall, February 2001)." Thus, any data-use errors made in summarizing

these data were made by Mirant and simply cited by EPA and MassDEP without suggesting that the importance of eggs and larvae to protecting a population are equivalent.

Regardless of these distinctions, EPA and MassDEP have determined that the data presented in Table 8.1.2-1 of the Determination Document were presented appropriately. The data summary clearly distinguished the differing abundance of fish eggs and larvae in the entrainment samples. These values were combined to estimate the percent species composition for all entrained organisms in a given year. This use of the data is appropriate as it is simply a summary of entrainment and not an adult-equivalent analysis of impacts to a population in the source water body.

Comment H20: Mirant reasserts the comment in H19, and further asserts that EPA's analysis of entrainment effects as a percentage of equivalent adults is flawed because EPA provides no basis why entrainment effects of 3.41-12.88 percent (white perch) and 0.00 - 5.5 percent (rainbow smelt) are of concern given the life history and population status of these species.

Response to H20: Contrary to Mirant's statement, EPA and MassDEP did not perform an analysis of entrainment as a percentage of Equivalent Adults of white perch and rainbow smelt. Once again, the analysis regarding white perch and rainbow smelt was provided by Mirant. The DD states, "To further assess the environmental impacts of entrainment from Kendall Station, adult equivalent analysis was also submitted by the permittee as part of their permit application. Table 8.1.2-3 is based on the information submitted by Mirant Kendall. The entire adult equivalent analysis and protocol used can be found in Section 5 of the permit application (Mirant Kendall, February, 2001)." Any flaw in the data presentation identified by the permittee is from its own document.

The DD goes on to point out that a more refined estimate of adult fish populations in the lower Basin is necessary and that the white perch and rainbow smelt adult equivalent losses, as presented by the permittee, are of concern and these impacts should be addressed in the determination of BTA. Furthermore, entrainment losses are not only a direct concern, but are a concern in light of their interaction with other adverse effects on affected organisms, such as from impingement and habitat alteration from thermal discharges.

This approach to adverse effects is entirely consistent with CWA § 316(b) and the approach taken in the Phase II Rule. EPA has not set a limit or threshold to identify entrainment losses that are "of concern" and losses that do not merit concern, as the permittee implicitly demands in this comment. Neither the statute nor the Rule compels EPA to do this. Consistent with CWA § 316(b), EPA has identified killing aquatic life as a result of entrainment or impingement as adverse environmental impacts that must be minimized to the extent practicable consistent with the application of the Best Technology Available. This requirement is subject to the limitation

under the longstanding BPJ analytical framework that the costs of minimizing impacts not be wholly disproportionate to their benefits. The Phase II Rule sets a cost/benefit comparison standard indicating that steps need not be taken if their cost would be significantly greater than their benefits.

Regarding entrainment effects, the preamble to the Phase II Rule is clear that, "[w]ith the implementation of today's final rule, EPA intends to minimize the adverse environmental impacts of cooling water intake structures by minimizing the number of aquatic organisms lost as a result of water withdrawals associated with these structures [CWISs]…" (FR 69 Page 41586). Further, "EPA has selected reductions in impingement and entrainment as a quick, certain, and consistent metric for determining performance at Phase II existing facilities" (FR 69 Page 41586). Thus, the abundance of a given species in the source water relative to the proportion of that population entrained or impinged by the operation of the CWIS does not directly factor into determining the required performance standards for impingement mortality or entrainment reductions, except to the extent that the issue came up in considering the potential development of site-specific standards on cost/benefit grounds. See 40 CFR § 125.94.

In any event, the permit does not impose any technology-based entrainment reduction requirements. The entrainment reduction requirements are, instead, based on state water quality standards, which are not subject to the type of cost/benefit criteria discussed above. Instead, the state has based these water quality-based requirements on the need to reduce impacts in order to allow for the attainment of the Class B designated uses of the Charles River, including the provision of a quality fish habitat.

Comment H21: Mirant comments that EPA erred in comparing the river herring equivalent adult entrainment estimates from 1999 and 2000 with the adult river herring entrainment estimate for 2002. According to Mirant, this approach is flawed because (a) instream values of river herring vary widely from year to year, (b) it compares hydro-acoustic pilot sampling with the results of a back calculation based on larval densities, and (c) anadromous fish returning to the Basin via two (other) boat locks at the dam were not included in the estimate.

Response to H21: EPA and MassDEP did not intend for the discussion of river herring estimates (between 1999/2000 and 2002) to be construed as a comparison, but rather as a discussion of the divergent estimates that have been made for river herring populations. Issues associated with comparing the data between years, as pointed out by the permittee in the comment above, are explicitly noted and discussed in the DD. These data issues support the statement by EPA and MassDEP that, "although adult alewife have been collected in the lower basin, the population size of this anadromous species has not been determined with confidence." The DD explicitly points out that the 2002 estimate was based on a hydro-acoustic pilot study sampling protocol that requires revision and refinement. It was also noted that anadromous fish potentially entering the

river from two smaller boat locks at the dam were not included in the estimate. The DD also states that information from anadromous fish in-migration counting programs from nearby rivers reflect a wide degree of variability in the number of returning adult fish from year to year. In light of these limitations in the data, it is especially clear that the monitoring requirements included in the Final Permit designed to provide estimates of in-migrating river herring are necessary to establish a more reliable population estimate and characterize year-to-year variability.

Comment H22: Mirant Kendall comments that because of the position EPA proposes to take with respect to the diffuser, EPA declines to include in its BPJ analysis any consideration of the potential benefits to fish populations of that diffuser (DD at p. 214). Mirant Kendall reiterates here its arguments in favor of the diffuser and its objections to EPA's current rejection of the diffuser. See Section D of these comments. In particular, the diffuser would, according to Mirant, enhance the survival prospects for those eggs and larvae that sink below the upper water column (where advection takes place) but today die near the bottom in the absence of dissolved oxygen.

Response to H22: EPA and MassDEP have clearly documented the substantial concerns that remain to be addressed before the deep water diffuser can be approved. These are fully discussed primarily in Response to comments E1 through E4 and E7. As a result, it is entirely appropriate that EPA's development of permit limits has not been based on the assumption that the diffuser will be installed and will achieve the benefits suggested by Mirant Kendall.

In the DD, EPA and MassDEP acknowledged certain potential improvements to the aquatic habitat if the diffuser was installed and it performed in accordance with the assumptions made by the permittee.(Sections 2.5, 5.4.9, and 5.4.10). In this comment, however, the permittee specifically suggests a potential increase in survival of fish eggs and larvae if the diffuser reduced or eliminated a near-bottom layer of the lower Charles River Basin deficient in dissolved oxygen. Yet, while fish eggs and larvae occur in the lower Basin in the spring and early summer, water quality data does not identify this as a time period when a large layer of water in the lower Basin is devoid of dissolved oxygen (DO). For example, in mid-May of 2004, when river herring egg and larval density was at a peak at the Charles River Station, DO levels at this Station were greater than 5.0 mg/l from the surface to the bottom (approximately 15 feet). Even at the Deep Diffuser Station, the bottom depth of 36 feet recorded a DO of 5.4 mg/l (Mirant Kendall Exhibit C3, October 14, 2004: May 18, 2004 Field Data).

It may be the case that during some years of unusually low flows in the Charles River there may be sufficient pronounced early stratification or a remnant area of water that did not fully mix during the previous winter to result in a measurable layer of near bottom water devoid of DO. However, under most conditions, the loss of river herring eggs and larvae to deeper waters devoid

of DO is not considered an important source of ichthyoplankton mortality. Therefore, the specific example of a potential benefit of a diffuser to fish eggs and larvae that would offset the peril to these organisms from entrainment is not particularly persuasive.

Comment H23: *Evaluation of BTA Alternatives*
(a) **Introduction:** Mirant argues that after EPA concluded without any meaningful substantive analysis that current levels of impingement mortality and entrainment were of concern and incorrectly assumed that they were likely to increase, the Agency went on to evaluate alternative cooling water intake structure technologies for application at Kendall Station, but that Mirant's comments in H2 demonstrate that the final Phase II Rule makes this analysis unnecessary. Assuming for the sake of argument, however, that this was not the case, Mirant goes on to comment on EPA's assessment of alternatives.

(b) **Re-circulating Cooling System**: With respect to EPA's analysis of the potential applicability of either wet or dry re-circulating cooling to Kendall Station, Mirant agrees with EPA's conclusion that neither technology is technologically practicable due to site constraints (DD at pp. 217-222). Mirant also argues that EPA specifically concluded, as part of its Phase II rulemaking, that retrofitting re-circulating cooling should not be used as the basis for setting BTA performance standards. Mirant further submits that, based on the data in the record, such technologies are not economically justified for this site, because their costs are significantly greater than their benefits.

(c) **Generation Curtailment**: Mirant comments that although it does not plan to withdraw more than a monthly average of 70 MGD during April, May and June, and would find a 70 MGD monthly average discharge limit acceptable for this period, it wishes to note for the record that EPA has not identified any "cooling water intake structure technology" on which it bases this proposed permit limit. Determination Document at p. 222. Mirant argues that EPA's proposed flow limit targets not the intake structure, but the generating facility as a whole, and that EPA has identified no CWIS "technology" that will be used to meet it. Thus, according to Mirant, EPA lacks authority to impose this type of intake limit.

(d) **Location**: Mirant indicates its belief that neither the statute nor the Phase II Rule allow EPA to dictate the location of the MKS CWIS, as Mirant feels EPA's analysis of issues regarding CWIS location appears to assume (DD at p. 227). Rather, Mirant concludes that the Phase II Rule makes clear that EPA's charge is to set standards for minimizing adverse environmental impact and base those standards on the "best technology available" with respect to location and the other statutory factors. Permittees may then, according to Mirant, meet those standards in any way they choose.

Still, Mirant agrees with EPA's conclusion that the location of the Kendall Station CWIS in the

Broad Canal reflects BTA. Id. Mirant comments that EPA's own analysis shows that any attempt to move the CWIS to another location outside the Canal, such as the Boston Inner Harbor, would involve not only high costs, but construction effects and other adverse environmental effects that are likely to far outweigh any environmental benefits of such a change.

In response to the suggestion that the BNS could be installed across the entrance to the Broad Canal, so as to prevent aquatic organisms from entering the Canal in the first instance, Mirant indicates that it considered this option but rejected it for the following reasons. First, it would effectively preclude any public access to the Broad Canal. Second, it would make the Broad Canal unavailable for use by aquatic organisms, even those which are not, according to Mirant, particularly vulnerable to the CWIS. Those include apparently viable sub-populations of centrarchids (sunfish and largemouth bass) which reproduce in the Canal, and other species which feed there, such as carp, none of which are adversely affected by the CWIS. Third, it would expose any technology to greater risk of damage from passing vessels. Fourth, Mirant argues that the proponents of such a change provide no support for their key assumptions, which include the following points: (1) if the net is located in the Broad Canal, a substantial number of organisms will become impinged on the net; (2) of those organisms, many will remain long enough to be freed; (3) moving the net to the mouth of the Broad Canal would allow deployment of an "airburst" system for cleaning the net; and (4) using an airburst system at that location would result in the organisms' long term survival. Mirant submits that none of these assumptions is likely to prove true.

(e) **Economic Consideration:** Mirant argues that in evaluating alternatives, EPA incorrectly applied a "wholly disproportionate" test for assessing the relationship between compliance options and their costs (DD at p. 227-228). According to Mirant, EPA should have used the "significantly greater" test that was utilized in the final Phase II Rule, since that test reflects the Agency's latest interpretation of the statute, informed by a rulemaking, as well as over 30 years of precedent and experience. *See* 125.94(a)(5), 69 Fed. Reg. at 41,685. Mirant further states that although EPA does not appear to have given cost considerations much weight, or to have attempted to place an economic value on the environmental benefits likely to be attained, it remains important for EPA to apply the appropriate standard.

Response to H23:

(a) To begin with, EPA disagrees with Mirant's conclusory claims about the inadequacy of EPA's assessment of entrainment and impingement impacts. These issues are discussed in more detail in Response H1 and in other responses in Section H, but it is sufficient here to reiterate that entrainment and impingement of aquatic organisms are adverse environmental impacts and that CWA § 316(b) requires the location, design, construction and capacity of CWISs to reflect the Best Technology Available for minimizing these (and other relevant) adverse environmental impacts. EPA's Phase I and Phase II CWA § 316(b) regulations are consistent with this

understanding of adverse environmental impact under § 316(b), which was expressly upheld by the Second Circuit Court of Appeals in Riverkeeper, 358 F.3d at 196. See also 69 Fed. Reg. 41612 (stating in preamble to Final Phase II Rule that "EPA believes that it is reasonable to interpret adverse environmental impact as the loss of aquatic organisms due to impingement and entrainment"). Furthermore, it is entirely reasonable to assume that if Mirant increases its intake flows, as it is proposing to do, it will result in increased impingement and entrainment. Even if future intake flows remain approximately the same for some months, there are no reductions in flow proposed for any months that would offset the times when increased flow is expected. That said, EPA will turn to Mirant's more specific concerns.

(b) Recirculating Cooling System: EPA notes that Mirant agrees with EPA's conclusion that conversion of Kendall Station's cooling system to a recirculating system using cooling towers would be impracticable due to site constraints. As a result, Mirant's additional arguments related to recirculating cooling systems are moot and do not need to be addressed. Nevertheless, EPA offers the following responses to these points. Mirant incorrectly asserts that EPA specifically concluded in the Phase II rulemaking that retrofitting re-circulating cooling should or could not be used as the basis for setting BTA performance standards. EPA's rulemaking concluded that retrofitting closed-cycle cooling to existing power plants would not be required *on a national basis* as BTA for all plants. At the same time, however, EPA specifically recognized that closed-cycle cooling would be practicable and might constitute BTA at some plants and there is nothing in the Rule that expressly precludes the use of closed-cycle cooling to meet the Rule's performance standards for the reduction of impingement mortality and entrainment. Indeed, the Rule specifies that facilities that use recirculating systems are automatically deemed to satisfy the Rule and its performance standards because this technology is the clearest, most certain way to meet those standards. Of course, as discussed above, this permit is being developed on a BPJ basis and is not strictly based on the substantive provisions of the Phase II Rule. Therefore, these issues regarding the interpretation of the Phase II Rule's substantive requirements do not determine the appropriate limits for this permit. Finally, Mirant also argues that conversion to a recirculating system would be inappropriate for Kendall Station because the cost of such a conversion would be significantly greater than the value of the benefits it would provide. During development of the Draft Permit, EPA ruled out such a cooling system conversion on grounds of impracticability and, as a result, did not need to reach the question of weighing the costs of such a conversion against its benefits. There is similarly no need to reach that issue to support the Final Permit.

(c) Generation Curtailment: Since Mirant indicates that the permit's monthly average water withdrawal limit of 70 MGD during April, May and June is acceptable to it, EPA regards the rest of its comments on this topic to be essentially moot. That being said, we offer the following responses to the points raised by the company.

Mirant argues that EPA has improperly failed to identify a "cooling water intake structure technology" upon which it has based the proposed permit intake flow limit. Mirant argues that EPA's proposed flow limit targets not the intake structure, but the generating facility as a whole, and that EPA lacks authority to impose an intake limit on this basis. EPA disagrees with Mirant's characterization of the basis for EPA's permit limit and the company's apparent view of EPA's authority under CWA § 316(b). Under § 316(b), the "capacity" of a facility's CWIS is supposed to reflect the BTA for minimizing adverse environmental impact. The term "capacity" as used in this context has long been understood to encompass the volume of water withdrawn through or by the CWIS. See 66 Fed. Reg. 65256, 65273 (December 18, 2001) (preamble to Final Phase I Rule); *Decision of the General Counsel No. 41 (In re Brunswick Steam Electric Plant)*, at 197, 200-01 (June 1, 1976). EPA has also long held the view that it can impose operational restrictions on CWIS use to ensure that the standard of § 316(b) is satisfied. *See, e.g.,* 40 C.F.R. § 125.94(a)(2); 125.93 ("operational measures" is defined to include "reductions in cooling water intake flow . . . and seasonal flow reductions"). Furthermore, Kendall Station uses pumps and related technology to withdraw water from the Charles River through the facility's CWISs. See 40 C.F.R. § 125.93 (definition of "cooling water intake structure" pumps" includes the "intake pumps"). Thus, MKS can use its CWIS pumps to meet the permit's intake flow limits.

The permit sets a flow (or capacity) limit on withdrawals through the CWIS based on several factors to ensure that the CWIS capacity will reflect the BTA for minimizing adverse environmental impacts. While this limit was set on a BPJ basis for this permit, this is exactly the type of operational restriction that the Phase II Rule authorizes EPA to impose. Furthermore, the limit is appropriate because it will help prevent any increase in adverse impacts from entrainment and impingement, as compared to what would occur under higher intake flows. This is especially true because the three-month period when the flow limit applies coincides with the period of maximum egg and larvae entrainment. Moreover, the impacts will be reduced, but not eliminated, by the deployment of the barrier nets. (Impacts will not be eliminated by the nets because they will not block all aquatic life from being entrained (e.g., fish eggs and some larvae), and because drifting organisms blocked from entrainment will, instead, be impinged and the extent to which these impinged organisms may be injured or killed still needs to be assessed.) It is also clear that EPA *did* set this "operational measure" requirement taking into account the facility's current CWIS technology, including the facility's pumps, as well as the barrier net technology. See 40 C.F.R. § 125.93 (definition of "cooling water intake structure" pumps" includes the "total physical structure" including the "intake pumps"; and definition of "operational measure" includes intake flow restrictions). Finally, EPA took into account that meeting the proposed limits would be practicable, given existing technology and operations at Kendall Station.

(d) Location: Mirant argues that neither the statute nor the Phase II Rule allow EPA to dictate the location of that CWIS. EPA disagrees with Mirant's comment. CWA § 316(b) indicates that

the "location" of a CWIS must reflect the BTA for minimizing adverse environmental impacts. Thus, if necessary, the location of a CWIS *can* be specified in a permit if a particular location is necessary to reflect the BTA. See, e.g., 40 C.F.R. § 125.93 and 125.94(a)(2) and (3) (adequate "design and construction technologies" are one way to comply with the Phase II Rule's performance standards and "[d]esign and construction technologies include, but are not limited to, location of the intake structure . . .."). While it is true that a facility may meet the test of § 316(b) in any way it chooses, it does not have the option of failing to meet that test. Thus, EPA may specify a location for the intake if necessary to ensure that the BTA test is met.

For the Draft Permit, EPA concluded that the barrier net system should be located within the Broad Canal. While Mirant's comments indicate agreement with this conclusion, other commenters disagreed. Some commenters, such as CLF and CRWA, argued that a barrier net system inside the Broad Canal, where Mirant's intake is located, will not be effective for reducing impingement and entrainment of river herring and/or American shad eggs and larvae. In addition, some commenters stated that a barrier net system deployed within the canal would be ineffective unless a counter-current system was installed within the canal to move fish eggs and larvae past the front of the intake and back out to the river. These commenters point out that the canal is a dead-end projection of the Charles River and contend that, when the station is operating, the current location of the intake results in water flowing into the canal (and from there into and through the plant) and allows no egress to larvae and/or eggs. They also point out that these life stages are not able to move against the current and out of the entrance to the canal. According to this analysis, the uni-directional flow into the canal (and the facility) results in a constantly increasing egg and larval population within the canal, until it is reduced either by predation from the centrarchid community within the canal or by impingement or entrainment by Mirant. As a result, these commenters do not believe that a barrier net system would be successful if located within the Broad Canal.

Mirant argues that EPA's own analysis shows that any attempt to move the CWIS to another location outside the Canal, such as the Boston Inner Harbor, would involve not only high costs, but construction effects and other environmental effects that are likely to far outweigh any environmental benefits of such a change. This is discussed in Section 8.2.6 of the DD. EPA agrees that this would be the case for some, but not necessarily *all*, alternative locations.

The Draft Permit required the installation of a BNS, proposed and pilot tested by the permittee, and established a 60% entrainment reduction objective. These technology-based requirements were based on EPA's BPJ derived, in part, from the entrainment metrics set out under the BTA standard of the Phase II Rule (see Response to H10). At that time, limited and highly variable field information from 1999 and 2000 sampling and analysis was available for estimating the magnitude of the facility's entrainment of eggs and larvae and its potential impact on adult fish populations was indeterminate. Given EPA's CWIS technology alternatives analysis, the lack of

any existing impingement or entrainment controls, and the absence of data necessary to model the CWIS's impacts, MassDEP concluded that the installation of a BNS, a 60% entrainment reduction objective, and other conditions relating to the survival of impinged eggs and larvae would be adequate to protect the lower Basin's designated use.

For the Final Permit, EPA has determined that in light of the terms of the Phase II Rule, it will not impose a technology-based quantitative entrainment reduction standard. See Response to H1. The CWIS requirements of the Final Permit, however, must also assure compliance with Massachusetts WQS and include any conditions required by MassDEP in its WQC. The MassDEP has concluded in its WQS determination that the uncontrolled entrainment of river herring and perch larvae associated with the current design and operation of the CWIS is inconsistent with maintaining the designated use of the lower Charles River Basin as a healthful fish habitat. By killing the larvae, or substantially reducing their potential to mature into breeding adults, entrainment contributes to the other adverse and cumulative impacts to the lower Basin, affecting the viability of this habitat as a fish spawning area and nursery.

Since issuance of the Draft Permit, updated and reliable icthyoplankton entrainment and adult population data, or an approved model that would project the impact of the facility's cooling water activities on the life stages of river herring and perch, is still lacking. Furthermore, the Draft Permit's 60% entrainment reduction objective was based on EPA's application of the CWA § 316(b) Best Technology Available ("BTA") standard. In comparison, MassDEP has no state BTA technology standard that it applies to a CWIS. Instead, MassDEP evaluates the impact of the CWIS on the receiving waters as it relates to their designated use as a healthful fish habitat and determines whether the CWIS permit requirements will allow for the attainment of the designated uses. Taking into account the above referenced information gaps, and consistent with the requirements of the WQS, the WQC addresses the need to protect the lower Basin's designated use as a healthful fish habitat by requiring Mirant to design and operate the BNS, or alternative entrainment prevention system, in a way that minimizes larvae entrainment and maximizes their survival to the extent practicable.

As noted above, comments were received on the extent to which the permit should specify the details of how the entrainment prevention system should operate and where it should be located. MassDEP has determined that the best means to achieve both its impingement and entrainment reduction objectives is to use the plan review process to work with its federal and state agency partners and the permittee to determine the details of how the entrainment reduction system can be effectively and efficiently located, designed and operated. A barrier net study conducted by the permittee in 2000 for its permit application provided some data on how such a system would function and led to preliminary follow-up technical discussions between the permittee and state agencies that can be built upon. This process will allow the parties to consider issues such as the most recent biological and hydrologic data, technological innovations, and the physical

constraints of the Canal, while balancing public access, system effectiveness, facility security and integrating the impingement-related permit requirements. The plan approval process also facilitates revisions in light of operational experience and technological advances.

A specific concern was expressed by several commenters related to entrainment prevention systems with integrated mechanisms designed to free impinged eggs and larvae and return them to receiving water. While there are clear advantages to such systems, several factors led MassDEP not to mandate this specific type of technology at this time in the WQC. First, at the draft permit stage, EPA concluded that there was insufficient experience with such systems at other locations to determine it was BTA for the CWIS at this site. Second, through the plan review process, MassDEP can revisit the technological feasibility of incorporating such mechanisms into the final design and placement of the system. While the barrier net system piloted by the permittee in 2000 lacked mechanisms to automatically free impinged icthyoplankton, it is anticipated to function extremely well in preventing the impingement of juvenile and adult fish. MassDEP considered the near term environmental gains of juvenile and adult fish impingement reduction to be achieved by being able to promptly install the BNS to offset the potential advantages of a more complex system that could take appreciably longer to design and obtain all the necessary approvals for allowing installation at that location. MassDEP also believes that before determining whether the permittee's approach to addressing entrainment of larvae complies with the WQC, sufficient information should be available to relate the performance of an innovative technology for preventing adverse impacts or improving icthyoplankton survivability to the environmental quality and designated use of the receiving water. The current lack of adequate information will be addressed through the monitoring program required through the final permit and WQC, which can be used to better evaluate the facility's environmental impact and determine whether the entrainment reduction system needs to be modified.

Several other concerns regarding the location of the BNS were raised and are addressed below.

Concern of Public Access: Flexible materials are available that could be attached to the top of the BN that would allow passage for non-motorized, small boats into and out of the canal.

Concern of the increased risk from passing vessels: EPA and MassDEP agree that there would be an increased risk to the BN from motorized vessels, but feel strongly that these risks would be more than offset by the environmental benefits of such a system. This risk could be minimized by design features that allow for clear identification and avoidance of the BNS.

Concern, expressed by Mirant, that the agencies have no support for the assumption that a substantial number of organisms will be impinged upon the net within the canal.

There is a general problem with the absence of significant and reliable data relating to the relative

density of eggs and larvae in the Canal, the magnitude of potential future entrainment and potential impingement on a BNS. The information gap was compounded by operational problems that occurred during the BNS pilot. However, icthyoplankton sampling data associated with the pilot documented substantial levels of entrainment of both eggs and larvae. See Section 8.1.2i and Section 8.2.5.(B).i.a of the DD. It is a reasonable assumption that even with anticipated reduction in the through screen velocity from the BNS, the intake flow is sufficient to carry and impinge or entrain free floating icthyoplankton on a BNS functioning as required by the final permit. MassDEP intends to examine the issues related to impingement and survivability of as part of the design and operational plan review process for the BNS or alternative entrainment reduction system.

Concern, expressed by Mirant, that the agencies have no support for the assumption that if the BN is within the canal, of those organisms impinged, many will remain long enough to be freed.

EPA and MassDEP are unsure what is being asked in this question, but will address the general concepts involved in BNS design. In general, impingement rate depends on a number of factors including the area of the net, the size of the pores in the net, the size and buoyancy of the larvae and/or eggs, their abundance, the flow of the intake and the flow of the river past the net. All these factors are considered in a well-designed net system. If the flow from the river moves in one direction, into the Canal and through the barrier nets and CWIS into MKS's cooling system, then it is reasonable to assume that drifting organisms that are impinged on the barrier nets will remain there long enough to be freed. This would be so unless the impinged organisms are ultimately pulled through the net and entrained as a result of the intake water or they are removed from the net and Canal in some other way.

Concern, expressed by Mirant, that the Agencies have no support for the assumption that moving the net to the mouth of the Broad Canal would allow deployment of an "airburst" system for cleaning the net.

The permittee seems to be discounting its experience at its own facility at Lovett Station (NY) on the Hudson River, which employs an airburst system. Gerald Szal, MassDEP (personal. communication to Larry Wilson, NY Division of Fish, Wildlife and Marine Resources, Albany, NY) spoke with NY state personnel involved with intake screening systems in the Hudson River. Lovett Station (which was owned by Mirant at the time of the communication) has an airburst system that is in a much more challenging environment than that in the Charles. Although there were initially problems with the deployment, these problems have apparently been worked out to the satisfaction of NY state personnel. Because of the relatively large intake (390 MGD) at the Lovett Station, the Gunderboom Net System at that site is 1400 feet in length. A much shorter system would be needed in the Charles. In any event, the details of the BNS, including any

components intended for the safe removal of impinged larvae, will be resolved in the MassDEP plan approval process.

(e) **Economic Considerations:** EPA disagrees with Mirant's comment that EPA incorrectly applied a "wholly disproportionate" test and should, instead, have used the "significantly greater" test that was utilized in the final Phase II Rule for assessing the relationship between compliance options and their costs. The EAB in the Dominion Energy case squarely addressed the Region's use of the "wholly disproportionate" test in making a BPJ-based BTA determination under section 316(b), and the EAB clearly upheld the continuing validity of this approach. Dominion Energy at 230-232. While the Dominion Energy permit was issued on a BPJ basis prior to the Phase II Rule taking effect, the Kendall Station permit's § 316(b) limits are also based on BPJ and the Draft Permit was issued before the permit took effect, and EPA concluded that it made sense to continue to apply the existing wholly disproportionate test used in BPJ permitting for decades, rather than to apply the new undefined "significantly greater than" test from the new regulations. Here, EPA has considered whether permit requirements are economically practicable, and whether costs would be wholly disproportionate to benefits. The permit requirements, elements of which were proposed by the permittee and do not constitute the most expensive alternative considered, meet both tests. While Mirant notes that EPA did not estimate a monetary value for the benefits of reducing entrainment and impingement in this case, neither did Mirant, and it is perfectly appropriate for EPA to consider such benefits in a qualitative sense under CWA § 316(b). See In re Dominion Energy Brayton Point. LLC, NPDES Appeal No. 03-12, slip op. at 259 - 60 (EAB, Feb. 1, 2006).

Moreover, EPA does not believe using that test in this case would result in any change to the permit. EPA concludes that given the importance of the public environmental resources at stake here, and the relatively modest costs involved in complying with the permit's CWIS technology-based limits, the cost of such compliance is not significantly greater than the benefits it will provide.

Finally, Mirant's argument here is essentially moot because EPA cannot make the intake limits less stringent due to state water quality requirements, which are not limited by any comparison of costs and benefits. See Response to H1.

Comment H24: Mirant comments that having selected the fine mesh barrier net as "BTA," EPA went on to develop permit requirements which it says are based on Mirant Kendall's proposal, but which, in fact, go far beyond a simple requirement that Kendall Station install and properly operate and maintain the barrier net proposed by Mirant Kendall. Instead, according to Mirant, EPA proposes to apply a variety of performance standards to the barrier net, including: (1) a maximum through-screen velocity limit of 0.5 fps; (2) a 10% limitation on the amount of time during the required deployment period (February 15 to November 1) that water may bypass the

nets; (3) an impingement mortality reduction goal of 80%, compared to a baseline condition; and (4) an entrainment reduction goal of 60%, compared to a baseline condition. Mirant further states that the Draft Permit also includes numerous other provisions governing the design, operation, and maintenance of the barrier net, the methods for calculating the baseline and assessing technology performance, and the requirements for monitoring and reporting.

Comment related to H24 from CRC: CRC expresses concern that seasonal deployment of barrier nets may not do enough to reduce the already alarming rates of impingement and entrainment that occur even at current intake levels and which already result in significant mortality to fish and other species.

Comment related to H24 from MA DMF: MA DMF comments that it believes that the barrier net (BN) design, with a specified approach velocity of 0.05 fps and through-net velocity of 0.5 fps, no passive return system for impinged organisms, the net location within Broad Canal which does not prevent re-impingement, along with the absence of a safe, alternative method to return impinged organisms to the water column other than spray washing the panels, does not constitute BTA. Instead, MA DMF recommends that the draft barrier net requirement be replaced with the mandate to deploy a Gunderboom Marine Life Exclusion System (MLES), including airburst technology to passively dislodge impinged organisms, at a location beyond the Broad Canal. MA DMF states that the BN performance standard should be an 80% reduction for both impingement and entrainment and should be designed to meet the reduced approach velocity and through net velocity seen at Mirant's Lovett (New York) station.

MA DMF further argues that based on the results of a test program by the applicant, a previous BN design was unable to prevent entrainment of fish eggs and larvae. According to MADMF, the proposed modified design that EPA considers BTA in this draft permit has not been field tested and effects on ichthyoplankton, normally discussed in the context of entrainment through the plant, have not been adequately addressed for impingement and re-entrainment on the BN. Therefore, MA DMF concludes that the BTA determination is premature.

Comment related to H24 from CLF: CLF comments that aquatic filter barriers with booms may be a potential solution for minimizing impingement and entrainment from Mirant Kendall's CWISs. According to CLF, these booms may minimize or completely eliminate the impingement and entrainment of aquatic organisms and may also address the concerns about public boat access expressed at the Cambridge public hearing on September 13, 2004. Gunderboom Inc., a firm that builds and installs boom apparatuses, has communicated to CLF that it has encountered boat access issues before and has designed both submerged boom systems and boom systems that can be raised and lowered.

Response to H24: See Response H1 and H29 through H34 below for further information regarding the barrier net. As explained in various responses in Chapter H, the Final Permit contains certain changes to the Draft Permit's CWIS-related permit requirements. As also explained, however, EPA has concluded that any remaining requirements in the Final Permit that may go beyond Mirant's original barrier net proposal by specifying more detailed conditions concerning the system's implementation are necessary to ensure that Kendall Station's CWISs will meet the requirements of CWA § 316(b). The goal of the Final Permit's technology-based requirements is to assure that the BNS reflects the BTA for minimizing impingement mortality. While these requirements should also reduce entrainment, the Final Permit's conditions requiring entrainment reduction steps are based on Massachusetts WQS.

Response to Comments related to H24 From CRC and MA DMF: EPA maintains that the barrier net requirements are a component of BTA for MKS. The permit allows the permittee flexibility regarding the location of net deployment because of uncertainty regarding the optimal location for minimizing impingement mortality and entrainment. In addition, the WQC notes that there is insufficient technical feasibility data to mandate the installation of an entrainment prevention and return system at the entrance to or outside of the Canal at this location.

While the Final Permit does not specify a specific numeric requirement for impingement mortality or entrainment reduction, again due to uncertainty regarding the exact performance levels that will be practicable with this technology at MKS, the Final Permit identifies at least an 80 percent impingement mortality reduction as a performance *goal* and specifies a narrative requirement that the system be optimized to minimize impingement mortality to the extent practicable. Response H18, among other responses in Section H, details that the permit does not contain technology-based entrainment reduction requirements under CWA § 316(b) or the Phase II regulations. The permit does, however, have entrainment reduction and monitoring requirements based on MassDEP's interpretation of the state WQS as specified in its WQC.

While the barrier net is not required to be deployed at all times due to the infeasibility of such deployment when the river is frozen, the permit does require that the barrier nets be deployed when it is practicable to do so. When the BNS is not deployed or there is a reasonable expectation that adult and juvenile fish have the potential to be impinged on the traveling screens of the Kendall CWIS, a method must be employed to return these fish back to the receiving water in a manner that prevents re-impingement on the intake screen. Finally, EPA has also concluded that it would not be appropriate for the permit to command that the Gunderboom technology be used at MKS. Barrier net (or boom) systems, including this particular use of the Gunderboom system, are clearly emerging technologies which have been only rarely deployed and whose performance capability at various locations is unclear. The sole large-scale application of the Gunderboom technology for the reduction of CWIS impingement mortality and entrainment is at Mirant's Lovett Station power plant, and even this installation has required continued

modification and assessment to overcome operational problems (Presentation by A. McCusker of Gunderboom, May 2, 2005 in Gloucester, MA). Due to the uncertainty associated with this technology, MassDEP has determined that the best means to achieve both its impingement and entrainment reduction objectives is to use the plan review process to work with its federal and state agency partners and the permittee to determine the details of how the entrainment reduction system can be effectively and efficiently located, designed and operated. In Response H31, EPA and MassDEP discuss the BNS submitted by the permittee and how it was considered when determining the barrier net component of BTA.

Response to Comment related to H24 from CLF: EPA and MassDEP have included permit requirements that give the permittee the flexibility to install a BNS that would minimize impingement mortality and entrainment as well as to accommodate boat traffic in the Broad Canal. The details of the BNS will be determined through the MassDEP plan approval process.

Comment H25: Mirant asserts the relevant source waterbody, the Charles River Basin, meets the Phase II definition of "lake or reservoir" and, thus, MKS should be required to meet performance standards for reducing impingement mortality only.

Response to H25: See Response H1 for a complete discussion of how the Phase II 316(b) Rule was involved in the writing of the permit. The permit does not contain technology-based entrainment reduction requirements under CWA § 316(b) or the Phase II regulations. The permit does, however, have entrainment reduction and monitoring requirements based on MassDEP's interpretation of the state water quality standards as specified in their Water Quality Certification. With respect to the "lake or reservoir" definition issue, see Responses to H1 and H8.

Comment H26: Mirant comments that the Phase II Rule also provides that a permittee may demonstrate compliance with impingement mortality standards by showing that it has reduced, or will reduce, its maximum design velocity (defined by § 125.93 as the through-screen velocity) of 0.5 fps or less. According to Mirant, EPA developed this alternative because it believed it had developed a clear record on the relationship between reduced velocity and reduced risk of impingement showing that a through- screen velocity of 0.5 fps would protect at least 96 % of the tested fish, thus clearly meeting the performance standard. In light of this record, Mirant states that it would have been unnecessary and unreasonable for EPA to impose additional monitoring and administrative costs. Mirant further states that EPA Region I itself has drawn the connection between reduced velocity and reduction in impingement. DD at pp. 202, 223. In this case, Mirant argues that straightforward engineering calculations, which can easily be confirmed upon construction, indicate installation of the barrier net (assuming that design issues can be appropriately addressed) reduce the through-screen velocity not to 0.5 fps (EPA's safe threshold), but to about 0.07 fps, which is more than <u>seven</u> <u>times</u> <u>lower</u> than EPA's threshold.

Mirant concludes that under the circumstances, assuming EPA were to proceed with permit conditions based on the barrier net, it would be inappropriate for the Agency to impose any conditions beyond the requirement that Kendall Station demonstrate that it has in fact achieved a design (i.e., through-screen) velocity of 0.5 fps or less. Yet, Mirant objects that the Draft Permit includes not only a requirement that the barrier net achieve a through-screen velocity of 0.5 fps or less, but also a host of other requirements that EPA does not have authority to impose.

Comment related to H26 from Roger Frymire: If there is any problem with velocities going through the net as planned, simply making the net itself wider should be able to present a large enough area to reduce flow velocities adequately.

Comment related to H26 from MA CZM: MA CZM comments that EPA states that the applicant's proposed BN system is predicted to reduce approach velocity in front of the intakes to 0.04 fps. MA CZM further states, however, that EPA also correctly states that the applicant has not completed a comprehensive test of the BN and the intake velocity across it. MA CZM expresses discomfort with the precedent that might be set by allowing permit applicants to propose technology based on intake velocity reductions which have not been validated and to have them accepted by EPA as BTA. MA CZM strongly recommends that future BTA assessments be made only after the applicant has documented that its proposed technologies reduce intake velocities and rates of I&E to appropriate levels.

Response to H26: EPA and MassDEP understand that the through screen intake velocity at the barrier net may indeed meet the estimate of 0.07 fps as the permittee describes in this comment. EPA and MassDEP look forward to the permittee's complete assessment in this regard once the BNS has been installed. EPA and MassDEP have the authority in the BPJ-based CWIS limits of this permit to include other operating and monitoring conditions regarding the BNS in order to assure that it is performing as designed and that when the BNS is installed it filters all intake water for the greatest amount of time practicable. EPA believes that these conditions are critical components of the BNS, which is one element of the BTA determination for MKS. It also should not be forgotten that the barrier nets will not be in place throughout the year – as they will be removed when precluded by icing conditions in the river – and that the performance capabilities of the barrier net system have yet to be fully documented or established. See Responses H29 through H35 for a full discussion of the rationale for the additional barrier net conditions included in the permit.

Response to Comment related to H26 from Roger Frymire: EPA and MassDEP also recognize the relationship between the surface area of any barrier net system and the resulting through net velocity. Based on direct communication with the permittee, EPA and MassDEP are confident that the permittee is aware that, assuming the amount of water being withdrawn and the pore size of the net remain constant, increasing the amount of barrier net used to filter the intake

water will reduce flow velocities. At the same time, of course, there are limits to how broad the barrier net system can be without creating potentially problematic impediments to navigation in the river.

Response to Comment related to H26 from MA CZM: MA CZM is concerned that the performance of the barrier net system has not been adequately demonstrated. EPA agrees that it is preferable to rely on well-proven technology where possible. Given the constraints of the MKS site, and the difficulty of using closed-loop cooling at this plant, EPA has concluded that the barrier net appears to be the most promising technology available for minimizing adverse environmental impacts from impingement mortality (as well as entrainment) at this specific facility. When implementing a "technology-forcing" provision like 316(b), there may often come a point when the Agency will not be able to rely on well-proven systems for meeting applicable requirements. The identification of new technologies for meeting these requirements may be necessary and serves to advance the evolution of the relevant compliance technologies. In this case, EPA has studied similar microfiltration systems to the proposed barrier net and, based on admittedly limited information (e.g., the Lovett Station power plant's system in New York), has concluded that they show promise, especially in environments like the Lower Basin of the Charles River that are not subject to major tidal effects and are relatively sheltered. Given that conversion to closed-cycle cooling has been determined infeasible at MKS for the present time, the other option for achieving significant impingement mortality and entrainment reductions would be to require substantial generating unit shutdowns to enable cooling water withdrawal reductions. While EPA did not conduct a detailed economic analysis of this option, it appears likely that the costs of such shutdowns would likely be wholly disproportionate to their benefits, and EPA decided that given the promise of the barrier net system at MKS it was not necessary to give more detailed consideration to the shutdown option at this time.

At the same time, the Final Permit will require a monitoring regime to assess the effectiveness of the barrier net, and for its next permit renewal the facility will be undertaking the full process under the Section 316(b) Phase II rule to assess BTA. Therefore, although EPA expects the BNS to perform well in this setting, EPA should be in a good position to assess and adjust the intake requirements if necessary. EPA believes this approach is reasonable, appropriate, and well supported.

Comment H27: Mirant asserts that 316(b) performance standards must be applied to appropriate biological metrics, over an appropriate averaging period, and that EPA has not provided clear and reasonable guidance (rather, the permit provisions are confusing) on the metrics MKS may use or a sufficient averaging period for assessing performance (Mirant suggests a 5-year averaging period). Further, Mirant argues that the impingement and entrainment reduction goals must be applied cumulatively, and for entrainable organisms, the goal should apply to equivalent adults (accounting for advection of eggs and young larvae).

With respect to performance assessment, Mirant states that EPA clearly acknowledges that the barrier net performs well for larger larvae but will not exclude eggs and very small larvae (*i.e.*, those smaller than about 6mm). DD at p. 225. Nevertheless, Mirant expresses concern that EPA has included a confusing welter of provisions requiring Mirant Kendall to produce data and analysis that could be interpreted (or misinterpreted) to require application of the performance standard individually to each life stage of each species.

Comment related to H27 from MA Riverways: The requirements for barriers to reduce impingement and entrainment (I/E) of fish and other organisms is also a necessary addition to permit requirements. With the substantial increase in operating times, both spatially and temporally, that are expected by the facility, the possibility of significant fish mortality rises. The fish barriers and requirements to reduce I/E are a sound addition to permit requirements and are definitely justified. While the operation, inspection, and maintenance requirements appear adequate, it would be wise to review data as it is received to assess the actual functionality of the barrier system.

It is unclear how the percentage reductions of 80% and 60% were derived for I/E reductions. While these numbers might be reasonable targets for the Charles River system, much would depend on the size of the fish and aquatic species populations. MA Riverways hopes that there will be some level of review and consideration given to the strength of the anadromous fish runs over time relative to I/E. If the fish populations in the system see further reductions, even a 20 % to 40% mortality related to the intakes will be too large a taking and further discussion on how to reduce mortality at this facility should occur.

Comment related to H27 from NOAA: In order to further reduce adverse impacts on river herring (from the effects of I/E), we recommend that entrainment should be reduced by 80 percent, equal to the reduction in impingement.

Comment related to H27 from MA CZM: MA CZM recommends that the applicant be held to a standard at the higher end of the range of 60-90% entrainment reductions required by the Phase II rule. Kendall's intake structures are, according to MA CZM, located in an area of the Charles River that is a documented spawning and nursery ground for river herring species which are of commercial, recreational and ecological importance, as well as harboring seventeen other important species. MA CZM states that the station's withdrawal will equal the flow of the entire Charles River basin in August and may be close to five times the river's flow rate under low flow conditions.

Response to H27 and related comments: Mirant requests clarity, reasonableness and consistency in the methods Kendall Station will use to assess performance in achieving

impingement and entrainment goals. In addition, Mirant and other commenters suggest changes and/or interpretations regarding the specific numeric performance standards for the impingement mortality and entrainment reductions specified in the Draft Permit.

EPA and MassDEP have modified the Draft Permit to remove the specific numeric performance standards for the reduction of impingement mortality and entrainment. See response to H1. Instead, for impingement, the Final Permit contains BPJ technology-based conditions requiring installation of a BNS to minimize impingement mortality to the extent practicable, while working toward a *goal* of reducing annual impingement mortality for adult and juvenile fish by at least 80% from a calculated baseline. For entrainment, the Final Permit does not impose a technology-based entrainment reduction requirement, but does include certain water quality-based conditions related to entrainment reduction. These conditions also do not, however, impose a numeric entrainment reduction performance requirement. Rather, these conditions provide that the BNS, or an alternative system, minimize the entrainment of river herring and perch larvae to the extent practicable.

Regarding guidance specifying which life stage of each species must be considered in accessing impingement mortality reductions and entrainment (I/E) reductions, the requirement in the Draft Permit that "the permittee shall calculate a baseline of aquatic species of every life stage to use in calculating the I/E value in each ARM at a minimum," has been modified. For impingement mortality reductions, the Final Permit specifies in Part I.A.11.a.2 that the impingement mortality reductions are to be measured as annual impingement mortality of adult and juvenile fish with the ultimate performance goal of reducing impingement mortality by at least 80% from a calculated baseline. Thus, all adult and juvenile species are to be considered. Further, in Part I.A.11 the Final Permit clarifies that for the purposes of impingement reduction, only juvenile and adult life stages of fish are to be considered. For entrainment reductions, in Part I.A.11.b.1, the Final Permit specifies that the BNS, or an alternative system, minimizes the entrainment and impingement mortality (i.e., maximizes the survival) of river herring and perch larvae to the extent practicable. Thus, consideration of larvae impingement shall be assessed and factored into measuring the effectiveness of entrainment reductions.

The details of the BNS and associated monitoring that are not directly addressed in the specific provisions of the Final Permit, including the appropriate averaging period for evaluating entrainment reductions, will be addressed in the MassDEP plan approval process described on Parts I.A.11 and I.A.14.d.11 of the Final Permit.

In comments related to H27 from MA Riverways, NOAA and MA CZM, EPA and MassDEP note that the numeric technology-based impingement mortality reduction and entrainment reduction performance standards have been deleted from the permit. See Response to H1 and the Massachusetts WQC statement. Technology-based narrative impingement mortality reduction

requirements have been retained, while the permit's narrative entrainment reduction-related requirements are now based solely on state water quality requirements. Numeric impingement mortality and entrainment reduction performance standards may be required in future permit reissuances to the extent required by the application of the specific, detailed requirements of the Phase II § 316(b) Rule. Meanwhile the permit does require impingement mortality reductions and entrainment reductions to the extent practicable as well as monitoring to inform the development of future permit limits, and other relevant information, such as the future condition of fish runs and populations, which will also be taken into account. The details of the BNS monitoring requirements will be addressed in the MassDEP plan approval process. See Part I.A.14.d.11 of the Final Permit.

Comment H28: Mirant asserts that it is difficult to understand what EPA intends regarding calculation of the baseline. Mirant believes that it is required to determine the number of organisms it would entrain without the net by measuring the number organisms within the canal and the percentage of entrainment absent the net (e.g., 100 organisms, 80 percent entrained, results in 80 percent entrainment), and that this percentage is then to be applied to the densities in the canal once the net is put in place (e.g., 500 organisms, 400 would be entrained absent the net). Mirant asserts that if this is correct, it is problematic because not all organisms are susceptible to entrainment and accurate assessment of entrainment is burdensome. A better approach, according to Mirant, is to compare entrainment levels inside and outside the net.

Comment related to H28 from MA DMF: MA DMF comments that the method used to calculate the annual aggregated exclusion rates (% reduction) for impingement and entrainment (I&E) should be refined to include an exclusion rate for individual species and life stages on a weekly and monthly basis. MA DMF indicates that it is concerned that smaller eggs and larvae may be selectively entrained and/or impinged and urges that EPA should reserve the authority to require BN modifications should the exclusion rate not be met for an individual species at any life stage.

Comment related to H28 from MA CZM: MA CZM recommends that in calculating the impingement reduction attributable to the installation and operation of the BN, the applicant be required to discount the calculated benefit of the BN by an amount equal to any impingement of juveniles, eggs and larvae on the BN. According to MA CZM, EPA's Phase II Rule clearly states that impingement mortality reductions must be made for all stages of fish and shellfish.

MA CZM also recommends that reductions in I&E be calculated on a weekly basis, that they be calculated for each species that has the potential to be entrained at Kendall Station, and that the applicant be required to meet reductions of 80%. MA CZM states that there is great disparity among species in the size of the eggs and larvae and the burst speed required to escape Kendall Station's intakes. Given that the applicant will be quantifying the abundance of larvae at the

species level, MA CZM suggests that it will be relatively easy to calculate species-specific reductions in I&E. Because previous sampling has shown that the density of eggs and larvae, as well as the abundance of adult fish, can vary quite extensively on a weekly basis, MACZM also comments that the most rigorous, protective and biologically meaningful evaluations of impact reductions will be those that occur on a weekly basis.

MA CZM further urges that while a more rigorous O&M plan and evaluation of the applicant's proposed BN is needed, the net's ability to reduce entrainment by greater than 60% should not be ruled out. MA CZM strongly recommends that a reduction in entrainment of 80%, commensurate with the reduction in impingement mortality, be required.

Response to H28 and related comments: EPA and MassDEP received a number of different and contradictory comments regarding how to assess Mirant Kendall Station's impingement mortality reduction and entrainment reduction performance. For example, while Mirant opposes species-by-species standards, MA CZM supports them.

As discussed in other responses in Section H, such as H1 and H27, the Final Permit does not contain numeric performance standard requirements for the reduction of either impingement mortality or entrainment. Rather, the permit includes a technology-based narrative performance requirement under CWA §316(b) for reducing impingement mortality and a water quality-based requirement for reducing entrainment under Massachusetts WQS. This does not rule out that the Barrier Net System might achieve greater than a 60% reduction in entrainment, but it also does not require it at this time. Specific numeric standards may be imposed for future permit renewals under the Phase II Rule and state water quality standards.

See Response to H27 for clarifications in the means required in the Final Permit to assess the permittee's performance in achieving impingement and entrainment goals. For example, in the absence of numeric performance standards, it is not currently necessary that EPA and MassDEP take a position on MA CZM's proposal that impingement reductions resulting from the barrier net be "discounted" by any larvae and eggs that get impinged on the barrier nets. At present, it is sufficient to indicate that EPA and MassDEP agree that the mortality of impinged larvae and eggs (that were formerly entrained) should be assessed and factored into the assessment of the entrainment reduction effects of using the Barrier Net System. This assessment will then influence future permits. Also, see Response H17, which discusses the requirement pursuant to the State WQC for the permittee to submit information regarding the effectiveness of the BNS or alternative entrainment reduction system in minimizing entrainment and maximizing the survival of larvae and eggs.

Regarding Mirant's concern with the difficulty understanding what the Draft Permit requires for the calculation of baseline entrainment, the Final Permit no longer references a calculation of

baseline entrainment. Rather, the details of evaluating the performance of the BNS are required in a plan to be submitted by Mirant and approved by MassDEP as described in the State's Water Quality Certification statement and Part I.A.14.d.11 of the Final Permit. Monitoring and performance evaluations associated with the BNS that are not directly addressed in the specific provisions of the Final Permit will be addressed in the MassDEP plan approval process described on Parts I.A.11 and I.A.14.d.11 of the Final Permit.

Comment H29: Mirant comments that a point that requires some clarification is the requirement that Mirant Kendall install the net "prior to or upstream of all three intake structures." Given the configuration of the CWIS within the Broad Canal and the proposed design of the barrier net, Mirant suggests that it would be more appropriate to describe the barrier net as "in front of or surrounding" the CWIS.

Response to H29: EPA and MassDEP deliberately chose the language cited by the permittee to describe the placement of the barrier nets in order to provide the permittee with the necessary flexibility needed to choose the best location for the placement of the net. Thus, instead of being limited to installing the Barrier Net System directly in front of the intakes, as more restrictive permit language would require, the permittee is granted the flexibility to consider, for example, installing the Barrier Net System at the entrance to the Broad Canal. This location, where the Broad Canal meets the Charles River, could be chosen by the permittee and still meet the requirements specified in the permit. To clarify that this flexibility is included in the permit, the provision that "the barrier nets shall be installed prior to or upstream of all three intake structures..." has been changed in the Final Permit, omitting "prior to or" and including "within the Broad Canal, at the entrance to the Broad Canal, or outside of the Broad Canal." See Part I.A.11 of the Final Permit. As stated previously, the details of the Barrier Net System will be addressed in the MassDEP plan approval process.

Comment H30: Mirant asserts that the requirement to "preclude any pass through of water around, or under the nets" is too absolute to be technically reasonable. Mirant suggests nets should be designed to preclude by-passes "due to circumstances within the permittee's control, to the maximum extent practicable."

Response to H30: The language that the barrier net should be designed to preclude by-passes "due to circumstances within the permittee's control, to the maximum extent practicable" is consistent with EPA and MassDEP's intent in the draft permit and has been inserted in the final permit. The allowance in the Draft Permit for the net to bypass water up to 10% of the time was included to provide for precisely the relief from the absolute nature of the requirement that the permittee has identified. However, the Final Permit has been revised to eliminate the specific 10% bypass requirement. A full discussion of the bypass provision of the Final Permit is found in Response to H34.

Comment H31: Mirant comments that the permit's requirements for the facility to evaluate, remove from the net, and safely return to the Basin eggs and larvae that have the potential to survive are unreasonable because such organisms are few in number and are not likely to survive, even absent CWIS effects. Furthermore, Mirant states both that EPA has not identified any feasible method for safely removing and returning such fragile organisms to the Basin and that no such method exists.

Comments related to H31 from CRWA, CLF, NOAA and MA CZM: These organizations comment that the barrier net should be placed at the mouth of the Broad Canal to allow eggs and larvae a better chance to be freed from the net, to avoid re-impingement, and to use Basin flow to help reduce impingement. CRWA adds that a mechanism to safely dislodge organisms should be added. CLF adds that the net is not BTA given data that is inconclusive at best (only 52 percent of larvae and eggs were excluded across all species and sampling dates; more eggs and larvae were identified behind the nets than in front of them). Furthermore, CLF argues that if the nets are to be used, they should be kept in place all year.

Comments related to H31 from the City of Cambridge and Roger Frymire: These commenters assert that the location of the barrier net specified in the draft permit is appropriate and they favor it because it will maintain public access to the canal.

Response to H31 and related comments: EPA and MassDEP agree that the safe removal and return of impinged eggs and larvae to the river presents a challenge, particularly in the lower Charles River Basin, where there is little or no lateral current to "wash" the organisms off the barrier nets. EPA and MassDEP do not, however, agree with the permittee that current information clearly demonstrates that no method exists to meet this challenge. Indeed, an air burst system is reportedly incorporated into the barrier net installation at Mirant's Lovett Station (NY) on the Hudson River for the purpose of safely dislodging impinged eggs and larvae from the net. Thus, it is possible that this may be one suitable method for addressing this issue.

Ultimately, survival of the organisms that are impinged and then removed from the nets is likely to depend on many site specific factors. These may include the following: (1) the type of eggs and larvae impinged and how fragile they are; (2) the length of time they are impinged; (3) the quality of the water they are exposed to during the time they are impinged and once they are returned to the river (e.g., water temperature, chemical concentrations); (4) the hydrodynamics of the area around the nets, which may influence whether the eggs and larvae can be washed off the nets and allowed to drift to safe habitat, or whether they end up being re-impinged; (5) whether ecological factors, such as the presence of predators or unfavorable water quality conditions (e.g., the presence of chemicals or sub-optimal temperatures), make it less likely that damaged eggs or larvae will survive their injuries; and (6) other factors. The details of the barrier net system,

including any components intended for the safe removal of impinged larvae, will be addressed in the MassDEP plan approval process.

Specifying that the BNS be located at the entrance of the Broad Canal, as advocated in comments by CRWA, CLF, NFS and MA CZM, is another potential modification that may help to address the challenge of maximizing impingement survival. The permit does not, however, specify a particular location for installation of the barrier net. Rather, the permit provides for a plan approval process required by the state's WQS. This process will evaluate the most appropriate location of the BNS.

At present, EPA and MassDEP simply do not believe the record demonstrates that one location is clearly superior to another for the purpose of minimizing adverse environmental impacts from the CWIS. If EPA and MassDEP did think so, the agencies could prescribe a location for the nets as part of the permit's technology-based requirements under CWA § 316(b) (the "location" of the CWIS is one of the factors that must reflect the BTA) and its water quality-based requirements, in order to ensure attainment of the water body's designated uses. EPA also notes that the comments of the City of Cambridge and Mr. Frymire favor the currently proposed location for the barrier nets, rather than placing them at the mouth of the Canal, in order to maintain public access to the Canal. Such recreational interests are also relevant to the MassDEP's consideration of appropriate permit requirements necessary to attain designated uses, since primary and secondary recreation are also designated uses of the River. Of course, if a particular location is required as a regulatory matter by another agency, such as the MA CZM office acting pursuant to the Coastal Zone Management Act, then the permit will need to include permit conditions consistent with those requirements.

EPA and MassDEP have also received comments noting concern over the performance of the barrier net at Kendall Station. In particular, CLF pointed out the inconclusive nature of the Barrier Net Study conducted by the permittee and submitted as part of their permit application (Mirant February 2001). EPA and MassDEP acknowledge that performance of the net detailed in the study was inconsistent. For example, one test recorded more ichthyoplankton within the area protected by the barrier net compared with the area outside of the barrier net. EPA and MassDEP also recognize, however, that this study was designed to deploy the net in a short term, temporary manner. The permittee detailed the failure of this temporary net to maintain a "tight seal" around the CWIS, especially along the bottom, which may have led to the performance issues noted above. While the main objective of this study was to determine the site-specific performance of the net under full operations, a pilot study of this kind also may identify weaknesses in the original design and the need for particular adjustments. Mirant documented the problems encountered in this study and has discussed steps to strengthen the barrier net design to correct these deficiencies. Indeed, the permit requires that the nets be deployed to filter all water entering the CWIS, except under strictly limited conditions. EPA and MassDEP maintain that, when in

place, the barrier nets appeared capable of preventing impingement of adult and juvenile fish and entrainment of some fish larvae, and that the Barrier Net Study was useful for confirming this fact and for identifying design problems to be corrected.

EPA and MassDEP also acknowledge, of course, that the permit does not require the barrier nets to be in place year-round. This is because it was not deemed practicable to keep the nets in place when the river freezes over. CLF comments that the barrier net should be kept in place all year. This comment is understandable when one recognizes that non-trivial impingement has been documented in the winter months (See Responses to H14 and H31). For example, in a ranking of average monthly impingement from 1999 through 2005, the month of February ranked as the third highest. The need to reduce impingement, however, cannot overcome the practicability problems associated with keeping the barrier nets in place during times when ice forms in the Charles River during the winter. The formation and movement of ice in the Broad Canal could seriously damage the barrier nets and make routine maintenance impossible and even dangerous. Based on comments from CLF, language in the permit has been clarified to better address these competing concerns. While the Draft Permit had specified that the barrier nets only needed to be in place from February 15 to November 1 of each year, the Final Permit has been revised to specify that the barrier nets must remain in place except when icing conditions in the river preclude their deployment. (See H1 above.) This condition recognizes the practicability issue but also recognizes both the variability of when icing conditions will occur in the river from year to year and the fact that impingement occurs even during cold weather months (see Table H14-1 and Figure H14-1). EPA and MassDEP believe that the Final Permit's requirement is better tailored to comply with CWA § 316(b).

Comment H32: Mirant asserts the schedule for installation of the barrier net and walkway (60 days after effective date of final permit) is unreasonable and without basis. Mirant suggests that, instead, it should submit a schedule within 60 days and install the net in an expeditious manner.

Response to H32: MassDEP has determined that the best means to achieve both its impingement and entrainment reduction objectives is to use the plan review process to work with its federal and state agency partners and the permittee to determine the details of how the BNS can be effectively and efficiently located, designed and operated. This process is specified in the State's WQC. Additional time has been included in the permit language to allow for this review process and BNS installation. The Final Permit has been changed to require the permittee to install a BNS no later than one hundred and twenty (120) days after the effective date of the permit, or consistent with the time frame included in the MassDEP plan review process described in the Part 11.b.(1) and (2) of the Final Permit, whichever is later, unless icing conditions preclude such deployment.

Comment H33: Mirant comments that the permit includes several confusing and apparently inconsistent provisions governing deployment and maintenance of the barrier net. To the extent

these provisions are authorized at all, Mirant states that they must be clarified and streamlined so that they make operational sense.

Mirant first points to Part I.A.11, on p. 12, which provides that each barrier net must have several removable panels, but that before a panel may be removed for cleaning or other maintenance, an impermeable barrier must be placed behind the section to be removed, thereby limiting the amount of flow that may come through the intake without first going through the barrier net. Mirant then states that later in this same section, the Draft Permit requires that all intake water must pass through the nets for the entire deployment period, unless the permittee encounters unforeseen clogging or other operational difficulties. In that case, Mirant comments that the permit provides that Kendall Station may pass water through the intake "without the use of the nets" for the shortest period of time necessary to alleviate the problem, but not more than 10% of the time the facility is drawing intake water in any calendar month for all intake structures combined.

Later in the same section, the Draft Permit lays out yet another set of design, operating, and maintenance requirements for the barrier net. See Draft Permit pp. 13-14. Mirant states that that paragraph instructs Kendall Station to "minimize the amount of time that a barrier net is not in place, as described above," and goes on to say that the permittee shall remove one barrier net section at a time under normal replacement and maintenance conditions, so as to minimize any increase in velocity of water deflected off the barrier that then passes through the remaining screens.

Mirant suggests that it is clear that the 10% restriction applies only during the deployment period (Feb.15-Nov. 1), but that it is not clear whether the phrase "without the use of the nets" in the second provision is intended to refer to (1) any circumstance in which all of the net panels are not in place (as, for instance, where one or more impermeable panels is in place to allow for routine cleaning or maintenance of the barrier panels), or (2) only to those circumstances in which the entire barrier net assemblage for one or more Units has been removed and cooling water is reaching the Unit(s) without passing through the barrier net system. If the phrase were interpreted broadly, as in the first interpretation, the 10% restriction would encompass even routine maintenance activities, when water in fact is passing through the barrier net, but one or more panels is not in operation. Mirant Kendall does not believe this is reasonable, nor does it believe that this is what EPA intends.

Thus, assuming a restriction of this kind is reasonable, Mirant Kendall requests that EPA clarify the requirements to ensure that routine maintenance events in which the barrier net is in use with one or more impermeable panels do not fall within the circumstances contemplated by this provision, nor are reportable under it.

Response to H33: EPA and MassDEP disagree that there was an inconsistency between the various provisions cited it the comment above. The permitting agencies do agree with Mirant that the agencies' intent for these provisions is consistent with the interpretation of the permit Mirant offers at the end of the comment. EPA and MassDEP's intent is that to the extent practicable all intake water must first pass through the barrier nets before being withdrawn by the facility intake during periods when barrier net deployment is practicable. The 10% barrier net bypass allowance that was included in the Draft Permit has since been revised as described in response to H34 below.

EPA and MassDEP have removed from the Final Permit any specific reference to removable barrier net panels (and associated maintenance procedures) – though Mirant proposed such a design, *see also* "Technical Development Document for the Final Section 316(b) Phase II Existing Facilities Rule," Chapter 4, Attachment A (Fact Sheet 11) – in order to allow Mirant more flexibility in the final design of the BNS. Further explanation of this requirement is found in Response H34.

Comment H34: Mirant asserts the 10 percent monthly limit on intake water bypassing the barrier nets (when the nets are deployed) lacks any technical or biological foundation. According to Mirant, EPA has not shown this is needed to meet the applicable performance standards and Mirant requests that it be deleted. In addition, Mirant questions the need for the barrier net 10% restriction for all months during which the net is required when in Mirant's estimation all of the record data indicate that the vast majority of the impingement mortality and entrainment are likely to occur between May and July.

Comment related to H34 from CLF: The provision in the draft permit that would allow MKS to operate without barrier nets for 10 % of the year, is most likely to be utilized when impingement is highest. This provision should be eliminated, being replaced by engineering that will ensure that barriers are in place at all times.

Response to H34 and related comment: In the Final Permit, EPA has changed the language relative to bypasses of the BNS. The revised language requires that MKS operates the BNS to preclude bypasses due to circumstances within its control, to the extent practicable. If the permittee encounters unforeseen clogging or other operational difficulties with the BNS, or if necessary to conduct routine maintenance, the permittee may pass water through its CWIS without all of the water passing through the BNS for the shortest period of time necessary to alleviate the problem. This language recognizes that there are times when components of the BNS may need to be removed for cleaning, maintenance or repair, but also recognizes that during such times, the BNS will not be performing their function of reducing the adverse environmental impacts of impingement mortality and entrainment. Thus, in place of the Draft Permit's

conditions allowing bypass of the BNS for up to 10% of the time that the BNS is deployed, the Final Permit limits the time when water could bypass the BNS and be drawn directly into the CWIS to the times when such bypass is actually necessary due to technological problems or issues, including the need for periodic routine maintenance. As the final design for the BNS is worked out through the BNS plan review process specified in the MassDEP WQC and the Permit, practicable measures for minimizing bypass conditions will be identified and required.

Thus, the condition in the Final Permit does not actually provide an allowance for a regular monthly bypass of the BNS, but rather allows water to be bypassed around the BNS when it cannot reasonably be prevented for the above reasons. With daily intake flows between 70 and 80 MGD, bypassing the BNS could result in significant levels of impingement (and entrainment), especially if bypasses occur for more than a few days in a short period of time. Impingement events are typically concentrated and sporadic so that a relatively large number of fish are impinged over the course of a few days, which are then followed by periods of relatively low fish impingement. The short-lived but intense nature of impingement events has been evidenced at other power plants utilizing once-through cooling systems. Site-specific impingement data from Kendall Station in 2003, for example, recorded 344 fish impinged (approximately 81% were blueback herring) in the month of June. Summary impingement data submitted by the permittee in April of 2006 did not present raw numbers of fish impinged each day, but it is likely these 344 fish were not impinged at a constant rate throughout the month. A periodic high impingement event coinciding with a net bypass period could, therefore, allow a sizable level of impingement mortality to occur over a relatively brief period. Considering the intake flows of this facility and the importance of the source water body, net bypass for extended periods (e.g., beyond just a few days) could result in significant impingement (and entrainment).

EPA and MassDEP have also concluded that precluding bypasses due to circumstances within the permittee's control to the extent practicable will both allow adequate time for performing necessary operational maintenance on the nets or managing a breech in the nets or other unanticipated problems, while still providing a high level of fish protection and precluding bypasses when it is practicable to do so. Mirant has neither commented or demonstrated that meeting the draft permit’s 10% limit on bypasses would have been impracticable nor proposed any alternative limit on BNS bypassing, appearing to prefer *no limit* on its ability to bypass the BNS. EPA and MassDEP have concluded, however, that providing no limitation on BNS bypasses would be unreasonable in light of the adverse environmental impacts that could occur, the technological capacity to avoid bypasses in many circumstances through sound design and operation of the BNS, and would not comply with CWA § 316(b). By including an enforceable requirement in the permit that prohibits BNS bypassing to the extent practicable, the Final Permit puts an upper limit on the adverse impacts that could occur from bypasses and creates an incentive for Mirant both to closely address its regular maintenance needs and to institute any needed repairs as promptly as possible.

It should also be pointed out that the permit's "General Requirements" in Part II include provisions addressing both "bypass" and "upset." See Part II.B. 4 (bypass) and Part II.B.5 (upset). Bypass refers to the "intentional diversion of waste streams from any portion of a treatment facility," whereas upset refers to an "exceptional incident in which there is unintentional and temporary noncompliance with technology-based permit effluent limitations because of factors beyond the reasonable control of the permittee." Neither of these provisions directly applies to the BNS issues, however, because, among other reasons, both provisions are written to address effluent discharges rather than cooling water intake structure screening technologies. Nevertheless, these provisions address analogous issues for effluent discharges and EPA and MassDEP will look to them by analogy in addressing the issue of bypasses of the BNS. First, Part II.B.4.b requires that effluent treatment equipment may be bypassed if it does not cause effluent limitation violations <u>and</u> the bypass was needed for "essential maintenance to assure efficient operation." Similarly, EPA and MassDEP would expect to allow maintenance-related bypasses of the BNS only if it is necessary for "essential maintenance to assure efficient operation" of the BNS. Second, with respect to other types of anticipated or unanticipated bypasses, Part II.B.4.d prohibits them unless various conditions are met, including that "bypass was unavoidable to prevent loss of life, personal injury, or severe property damage," there were "no feasible alternatives to the bypass," and specific notice provisions are satisfied. Again, EPA and MassDEP will use these provisions by analogy to determine when bypasses (i.e., the intentional diversion of the intake stream around the BNS) may be acceptable. Upsets refer to unintentional failures of treatment equipment. An example of an upset of the BNS might be, for example, if a boat ran into the BNS and breached the net so that water flowed through the BNS without being filtered by the net. EPA and MassDEP intend to use the "upset" provisions in Part II, Section B.5 of the Final Permit by analogy to help define when a bypass of the BNS that is beyond the permittee's control has occurred and what steps the permittee should take to minimize any such bypass and inform the regulatory agencies of its occurrence. See Conditions II.B.5.a, II.B.5.c.4, II.B.3, and II.B.5.c.3. For example, if the permittee does not take reasonable steps to terminate a bypass of the BNS that was initially beyond the permittee's control, then as of the time such reasonable steps could have been implemented, the continued bypass would no longer be beyond the permittee's control.

Meanwhile, CLF comments that no bypassing of the BNS should be allowed and that, instead, the permit should require that the BNS be engineered to prevent all bypasses. Identifying a design and operational measures that would prevent all bypassing of the BNS will, of course, be a goal of the plan review process for the BNS. It may, however, be impracticable to achieve that result. The BNS system is an emerging technology likely to have many site-specific implementation issues. The previous pilot testing of a BNS system at Kendall Station was not able to prevent all BNS bypassing, though this experience is expected to contribute to design improvements that will reduce the problems encountered in the pilot testing. Thus, EPA and MassDEP cannot now conclude that it would be practicable for the permittee to achieve a standard that prevented *all*

bypasses. The condition in the Final Permit, however, should limit such bypasses to those that could not practicably be avoided.

Finally, EPA and MassDEP disagree with the permittee's statement that "all of the record data indicate that the vast majority of the impingement mortality and entrainment are likely to occur between May and July." Response to H14 contains a table and figure of impingement data from 1999 through 2005 (Table H14-1, Figure H14-1). Impingement in the month of February ranked third overall, and non-trivial impingement occurred in other months besides May, June and July. Based on this data, the requirement to pass water through the BNS to the maximum extent practicable for any time that the BNS is deployed is reasonable and necessary.

Comment H35: Mirant comments that the Draft Permit (at p. 12) requires that Kendall Station operate the traveling screens for a given unit "[f]or any continuous period during which intake water does not pass through any of the barrier nets for any intake structure for more than four hours . . . ." Mirant states that this provision suffers from the same ambiguity as the provisions the company discussed in Comment H33.

Mirant also comments that Part I.A.2 of the Draft Permit (at p. 8), like Part I.A.11, requires that "[a]ll live fish, shellfish, and other aquatic organisms collected or trapped on the intake screens or any barrier net shall be returned back to the receiving water in a manner that prevents re-impingement on the intake screens, except for those that need to be enumerated as part of the impingement sampling detailed in Section 14.e.9." Mirant states that it has in other comments explained its objections to this provision as it applies to the barrier nets, and that for several reasons it is equally objectionable when applied to the traveling screens. According to Mirant, EPA has not met its burden of identifying a technology capable of achieving this requirement and it is unlikely that this could be accomplished at a cost that is not significantly greater than any environmental benefit. Mirant also states that unlike the provisions in Part I.A.11, the requirements in Part I.A.2.e are not clearly limited to the period during which the nets otherwise would have been deployed, which Mirant argues fully encompasses, and indeed exceeds, the period during which virtually all impingement is likely to occur. At the very least, this inconsistency would need to be resolved in favor of limiting application of such requirements to the barrier net deployment period.

Comment related to H35 from MA CZM: MA CZM recommends that the permit establish a strict timeline during which the applicant is required to consult with the resource agencies to design an appropriate return system for impinged organisms and a schedule for testing and implementing the proposed system.

Response to H35 and related comment: As discussed in other responses to comments in Section

H, it is understood that the barrier nets will be in service much, but not necessarily all, of the time that Kendall Station is withdrawing water from the Charles River. When the barrier nets are in place and operating properly, assuming that the traveling screens were also operating, no impingement of organisms on the facility's traveling screens (which have a larger mesh size than the barrier nets) would be expected because either the barrier nets would block the organisms prior to their reaching the traveling screens or the organisms would have been small enough to pass through the barrier nets, in which case they would also be small enough to pass through the traveling screens. (Such very small organisms would, therefore, be entrained rather than impinged by the facility's cooling system.)

EPA and MassDEP do not agree that the permit provision quoted above by Mirant is ambiguous. The requirement for continuous operation of the traveling screens is clearly intended to address periods when Kendall Station is withdrawing water from the Charles River that bypassed the barrier nets. If a barrier net panel has been removed and replaced with an impermeable barrier (for example), then water is not being withdrawn through that location. If water *is* being withdrawn without first passing through the barrier nets either because the nets are not deployed (e.g., due to river ice) or because of a bypass of the barrier nets, then the traveling screens must be operated. The requirement to rotate the traveling screens within four hours of a particular barrier net section being bypassed has been changed. The Final Permit now requires that the rotation of the traveling screens for any such affected CWIS begin as soon as practicable after the permittee becomes aware that intake water is bypassing the barrier net and that such screen rotation be conducted at least once per eight hour shift and for a time sufficient to dislodge any impinged organisms.

EPA and MassDEP have addressed the issue of measures for safely returning organisms impinged on the barrier nets to the Charles River in other responses to comments, including Response to H31. During periods when any BNS components are not in place, only the larger organisms, such as the adults and juveniles of various species of fish, are likely to be impinged on the traveling screens, given their larger mesh size. Since these life stages should be less fragile and delicate than the egg and larval life stages, depending on the extent of the damage done to the organism by the impingement event, it should generally be easier to return these larger organisms impinged on the traveling screens to the River in a manner that permits their survival. EPA has determined that a "fish return" system that maximizes the survival of organisms impinged on the traveling screens – which includes returning fish to the river in a manner that prevents or minimizes their re-impingement – is a component of a CWIS design reflecting the BTA for minimizing adverse environmental impacts under CWA § 316(b). MassDEP has determined that such a system is also needed to ensure that applicable WQS are satisfied.

Thus, while it is clear that effective fish return systems are an important component of the BTA for minimizing the adverse environmental impacts of cooling water intake structures generally,

see 69 Fed. Reg. 41599, 41602,[12] it is also clear that optimal fish return systems for particular power plants must be designed taking into account the particular characteristics of that power plant, such as the location of the intake structure screens relative to the source water body and the features of that water body (e.g., currents, depths, etc.). It is understood that the location of the CWIS at Kendall Station and various man-made obstacles, such as roads and sidewalks, raise certain challenges that a system for the safe return of impinged organisms to the Charles River at Kendall Sation must address. While the burden is on EPA under CWA § 316(b) for selecting the BTA, EPA also prefers to set performance standards based on the existence of practicable technologies rather than to mandate the use of a specific technology. This leaves the facility the discretion to develop alternative methods of achieving or bettering the applicable performance standards. With respect to fish return systems, an array of different technologies exists to minimize adverse environmental impacts. These include low pressure spray washes to more gently remove impinged organisms from the traveling screens, fish buckets to transport fish from the screens, and various types of troughs for facilitating the return of the fish to their source water. *See, e.g.,* "Technical Development Document for the Final Section 316(b) Phase II Existing Facilities Rule," Chapter 4 § 2.1 and Attachment A.

Rather than specify precise technologies for Kendall Station, EPA believes it is adequate and appropriate to set narrative standards on a BPJ basis designed to minimize impingement mortality effects and then leave it to Kendall Station to select technologies and design a system, subject to regulatory agency approval, that achieves the narrative standards of the permit. *See, e.g.,* 69 Fed. Reg. 41612-613. The standard set by EPA requires that "live" organisms be returned to the Charles River in a manner to prevent their re-impingement. This is both reasonable and appropriate. Organisms already killed by the impingement event are not covered by this requirement. And for the live organisms, it makes sense to have them returned to the river in a manner that minimizes the chance that they will be injured again or killed by being impinged repeatedly by the facility's CWIS. Mirant Kendall's comments do not provide specific information establishing that it is impracticable to meet the permit's requirements in this regard, and EPA concludes that available technologies should make this possible.[13]

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[12] It should be noted that EPA's Phase II Rule sets a performance standard for reducing impingement *mortality* by 80 to 95 percent, rather than for reducing impingement *per se*. *See, e.g.,* 40 C.F.R. § 125.94(b)(1). This reflects the Agency's view that it should be possible in many cases to return impinged organisms safely to the source water body.

[13] If it was impossible to take fish that have been impinged on the traveling screens but are still alive, and return them to the Charles River in a manner that prevents their re-impingement, then it would mean that all fish impinged on the traveling screens would essentially be killed as a result since they could not ultimately be expected to survive the injuries of repeated re-impingement.

EPA and MassDEP also disagree with the permittee's statement that the time period the BNS is likely to be deployed fully encompasses, and indeed exceeds, the period during which virtually all impingement is likely to occur. A review of impingement data from Kendall Station from 1999 through 2005 reveals that non-trivial impingement can be expected when the BNS may not be in place. For example, it is possible that due to icing conditions, the BNS would not be in place for some part of the month of February. Yet, February ranked as the third highest month of overall impingement, according to the impingement monitoring program conducted by the permittee. See Response to H14 for a full discussion of impingement data from 1999 through 2005 from Kendall Station. This data supports EPA and MassDEP's position that the return of all live fish, shellfish, and other aquatic organisms collected or trapped on the intake screens back to the receiving water in a manner that prevents re-impingement on the intake screens must not be limited to only the deployment period of the barrier net.

Finally, Mirant offers the conclusory comment that it is "unlikely" that the permit's fish return requirements could be satisfied at a cost that is not significantly greater than any environmental benefit. EPA disagrees. Given the relatively low cost of fish return technologies, *see* "Technical Development Document for the Final Section 316(b) Phase II Existing Facilities Rule," Chapter 2 §§ 2.1, 2.2, 2.3, and the importance of enhancing the survival of impinged fish in the Charles River, as discussed in other responses to comments as well as the Massachusetts water quality certification, EPA is confident that the costs of the necessary measures will neither be significantly greater nor wholly disproportionate to their benefits.

Regarding MA CZM's comment to establish a schedule for the permittee to consult with the resource agencies regarding a fish return system, this activity will take place within the schedule for the plan review process established in the permit to meet impingement reduction objectives.

Comment H36: Mirant comments that the Draft Permit includes a separate Fine-Mesh Barrier Study (Part I.A.14.e.7, Draft Permit p. 31), as well as entrainment and impingement sampling programs discussed below, and that the Barrier Net Study, which applies during the first year of the permit only, must commence within sixty (60) days after the effective date of the permit. Mirant Kendall objects to this study arguing that it duplicates other studies EPA is proposing and that an unreasonable deadline has been proposed for it. Mirant suggests that EPA appears to have based this deadline on the assumption that Kendall Station would be able to complete construction of the barrier net within sixty (60) days of the permit's effective date, but, as Mirant has commented previously, it does not agree that this is appropriate. Mirant states that it would be more reasonable for EPA to require Mirant Kendall to submit a study plan for review and approval by the Agencies within sixty (60) days after the permit's effective date.

Mirant also expresses the view that some of the elements of the proposed study are simply infeasible. One example cited by Mirant is the requirement to develop a technique "to enumerate

and evaluate the condition of fish eggs and larvae impinged on the barrier net. . . .” According to Mirant, the organisms are too small and too fragile for an evaluation of their condition, though their numbers can be estimated and counted as lost to entrainment. Mirant also comments that the specifications regarding equipment and sampling methods need to be revisited and that this is particularly the case with respect to the specification of pumped samples, as opposed to net tows. Mirant states that pumped samples bring with them biases that should be avoided when alternatives are available. Once the final configuration of the net and supporting structures, or other compliance option(s), has been established, Mirant Kendall indicates a willingness to work with EPA to develop an appropriate protocol for any required study of the efficiency of the net or other compliance option.

Response to H36: See Response H32 concerning the deadline for the Barrier Net System installation.

The Barrier Net Study requirement has been retained in the Final Permit with less specificity as to its details. As part of the monitoring, sampling and modeling plan submission required under the State WQC, Mirant will be required to provide quantitative data on the effectiveness of the BNS or alternative entrainment reduction system in minimizing entrainment and maximizing the survivability of larvae and eggs. The protocol for conducting the sampling and analysis will be developed in the course of the plan review to generate data related to the WQC’s performance standards and entrainment reduction system evaluation.

In consideration of Mirant’s comment and changing in the timing requirements for the installation of the BNS (see H32), the schedule for starting and submitting the Barrier Net Study has been modified in the Final Permit without altering the intent of the Study or its timing. The Final Permit (Part I.A.14.d.7) requires that the Barrier Net Study begin within the May through July period following the installation date of the BNS and be submitted in the annual monitoring report for that period.

Comment H37: Mirant comments that the entrainment sampling proposed in the permit appears excessive and inappropriate. According to Mirant, a well-designed study of exclusion by the barrier net should provide all the necessary information on ichthyoplankton losses and would be more defensible without attempting to reconcile it with samples collected in the discharge. Mirant states that EPA proposes to require discharge samples as the basis for assessing entrainment, but that such samples always contain a mix of discharged water and ambient river water entrained by the initial mixing of the plume. Mirant states that the larval densities in such samples are, therefore, likewise mixed.

Response to H37: MassDEP, in the state’s WQC, has established a plan review process to work with its federal and state agency partners and the permittee to address the specific issues raised by

the permittee regarding entrainment sampling. During this process, Mirant will have the opportunity to offer their entrainment study for review.

Comment H38: Mirant comments that Part I.A.14.e.9 of the Draft Permit establishes an unreasonable schedule for commencing impingement sampling, requiring establishment of an impingement sampling program within 90 days of the permit's effective date. Mirant states that this schedule is too short and requires modification for the same reasons explained above in the discussion of barrier net study requirements.

Mirant also comments that the proposed impingement sampling requirements are excessive. Mirant states that if their purpose, as stated, is "to provide an estimate of the number and species of finfish impinged," then that is all that should be measured. Mirant states that life stages can be described, but measurement to the nearest millimeter is excessive, as is internal examination of each river herring to determine gonad condition. According to Mirant, EPA simply cannot provide any plausible need for such data which would justify their cost, and can provide no justification for imposing the impingement monitoring requirements throughout the entire permit term, regardless of the initial sampling results. Mirant Kendall believes that once the barrier net is installed, a two-year impingement sampling period should provide sufficient information on which to base an assessment of the barrier net's performance.

Response to H38: EPA and MassDEP are aware that Mirant conducted a continuous impingement sampling program at Kendall Station from 1999 through 2005. While it is unclear whether this program is ongoing in the year 2006, it is reasonable to expect that an impingement monitoring program that has been conducted for several years at a facility and does not involve a large investment in new equipment can be restarted within the total 150-day time period from the signing of the final permit (60 days before permit becomes effective) to the requirement for impingement sampling (additional 90 days). See Response H32 for a discussion of the timeliness for BNS installation included in the permit. Therefore the impingement sampling schedule has not been modified.

EPA and MassDEP maintain that once a fish is collected in an impingement sample, obtaining a total length measurement of the organism is a reasonable and appropriate data collection activity. This information will provide documentation of whether the impinged fish was a juvenile or adult, or document if all impinged fish over a given time period were from the same size class, for example. Also, depending on the condition of the impinged fish, a field description of gonadal condition (for example: ripe female, spent male, immature) is a routine data collection activity in the hands of biologists with even the most rudimentary level of training. This will provide important information regarding the impact of the impingement. For example, if impinged fish are documented to have already spawned, their removal from the lower Charles River Basin has a different impact than impinged fish determined to be removed before spawning. EPA and

MassDEP do not judge the cost of this routine and minimal data collection to be excessive relative to the amount of important information obtained.

The impingement program must be conducted for the entire permit term in order to document impingement levels over the life of the permit. Over the five years of the permit term, it is expected that a range of flow conditions, fish species densities (strong and weak year classes), and even facility operating conditions will provide a range of conditions over which the performance of the barrier net will be documented.

Based on this response, all requirements of the impingement program have been maintained in the Final Permit.

Comment H39: Mirant asserts that in authorizing the Commissioner to make changes to the permit, EPA has improperly ceded NPDES authority to a non-delegated entity. In addition, Mirant states that the permit neither requires EPA or MassDEP to show cause to change the nets nor provides for public participation with respect to any such proposed changes, which violates the APA and MGL c 30A and is inconsistent with EPA's NPDES regulations concerning permit modifications.

Mirant Kendall therefore requests that this provision be revised to ensure that EPA (1) provides a reasoned basis for any proposal to require a change in the CWIS technology, and (2) provides Mirant Kendall an opportunity to be heard and to raise other relevant factors that the law and the Rule require the Agencies to consider.

Response to H39: EPA and MassDEP agree that the Draft Permit's provisions regarding permit modifications related to the barrier nets were confusing. First, Condition I.A.1.e provides that permit conditions may be modified based on various types of information and consistent with the provisions of 40 C.F.R. § 122.62. Second, Condition I.A.11 provides that under certain circumstances, "the Regional Administrator and the Commissioner may direct the permittee to alter the barrier nets . . .." Consistent with Mirant's comment, EPA has revised the language for the Final Permit to make clear that any permit modifications will follow the process and satisfy the criteria of 40 C.F.R. §§ 122.62 and 122.63, whichever is applicable. EPA and MassDEP disagree that the Draft Permit in any way has improperly "ceded" EPA authority over permit conditions to the MassDEP, a non-delegated state agency. Instead, EPA will retain its authority over any permit modifications within its jurisdiction. At the same time, mentioning that the state may also need to approve proposed permit modifications is appropriate for at least three reasons: (1) any changes to the permit still must satisfy state WQS and the MassDEP is responsible for applying these state standards in the first instance; (2) in addition to being an NPDES permit under the federal CWA, this jointly issued permit is also a state permit under the Massachusetts Clean Waters Act, so that for a permit change to have effect under state law, the MassDEP would

also need to approve the change; and (3) the item in question, the design of the BNS, is the subject of specific conditions in the state's WQC.

Comment H40: Mirant comments that at p. 179-180 of the DD, EPA explains that the Commonwealth may determine that more stringent CWIS requirements are needed, based on state water quality standards, and that EPA anticipates that MassDEP would address that issue in its certification under CWA §401.

Mirant indicates that it does not believe that the Massachusetts has any applicable laws that govern the Kendall Station CWIS and that, as a result, the MassDEP has no law to apply to the CWIS via § 401 certification. Mirant further states that even if that were not the case, that is not the end of the inquiry. According to Mirant, even if Massachusetts could show that its water quality standards, for example, could be interpreted so broadly as to authorize it to regulate CWIS (as EPA implies), the Commonwealth also must show that it has an applicable standard that applies to the CWIS and before it could impose a more stringent standard, it would have to show that the technology requirements are insufficient to assure attainment of the state standard. See § 125.94(f), 69 Fed. Reg. at 41,687; compare 40 C.F.R. § 122.44(d)(1)(vi). Mirant Kendall submits that no such standard exists, nor could such a showing be made, even if EPA were not to require the proposed barrier net.

Comment related to H40 from CLF: CLF comments that the CWA and its regulations are clear that section 316(b) cooling water intake requirements for a NPDES permit must comply with state WQS. According to CLF, the requirement that permits comply with state WQS allows no exceptions for cost or technological feasibility. CLF states that pursuant to section 401 of the CWA, Massachusetts's certification of the permit must include any conditions necessary to ensure compliance with state WQS. CLF also states that it is well established that MassDEP has authority under state law to impose conditions based on narrative WQS on Petitioner's non-discharge related activities.

CLF suggests that EPA generally defers to all conditions imposed during the certification process, but where the conditions imposed are not sufficiently stringent to meet state WQS, EPA must independently impose conditions to ensure that the permit complies with state WQS. CLF points to the EPA Environmental Appeals Board's decision in *In re City of Moscow, Idaho,* which stated that "when the Region reasonably believes that a state water quality standard requires a more stringent permit limitation than that specified by the state, the Region has an independent duty under section 301(b)(1)(C) of the CWA to include more stringent permit limitations." This independent obligation, CLF asserts, has been widely upheld. Moreover, CLF states that the Phase II regulations also require compliance with state WQS when setting NPDES permit conditions.

CLF comments that this Class B water must support habitat for fish, other aquatic life and wildlife, as well as primary and secondary contact recreation. CLF asserts that the impingement and entrainment impacts associated with the draft permit would result in a degraded habitat for resident and anadromous fish (including game fish) as well as other aquatic species. CLF further states that the draft permit violates the anti-degradation standards of the MA WQS and the Clean Water Act.

CLF goes on to state that EPA has consistently held that the assessment of the significance of adverse environmental impact must take the condition of the ecosystem into account. Accordingly, CLF argues, losses from a stressed ecosystem like the Lower Basin are considered more environmentally significant than greater losses from a healthy ecosystem. CLF further states that another important factor is the biological value of the source water – including the presence of spawning grounds, migratory pathways, and nursery and feeding areas – and that the Lower Basin has significant biological value. CLF expresses the view that EPA must also consider cumulative impacts, that is, other stresses in addition to the CWIS in making BTA determinations, but in the Determinations Document, EPA acknowledged that the "overall cumulative effects of multiple CWIS withdrawals, increased thermal discharges at MKS and existing impairment in the lower Basin are not assessed in any detail or quantitatively in the current section 316(b) analysis for the MKS permit".

Finally, CLF comments that EPA has estimated that implementation of closed-cycle cooling, the most expensive of the several superior technologies considered, would cost $14 million. In light of the significant environmental improvement that would result, the public uses protected, and the public and private investments that have been directed toward the protection of the Charles River over the last decade, $14 million would be a relatively small price to pay, in CLF's view. It is well established, according to CLF, that cost should not be a primary factor in a section 316(b) determination. CLF states that only where the costs of the technology are wholly disproportionate to environmental benefit can cost even be considered. In this instance, CLF believes that there is no question that the costs of even the most expensive technology (closed-cycle cooling) are insignificant compared to its environmental benefits. CLF argues that the Charles (River) is clearly a highly valued public resource, as evidenced by the significant amount of public investment in its protection, and that the environmental benefits associated with virtually eliminating entrainment and impingement, and thereby helping to establish a healthy fishery, would dwarf the costs of such measures.

Response to H40 and related comment: Mirant does not dispute the proposition EPA spelled out in the DD that EPA is obligated under CWA section 301(b)(1)(C) to ensure that a cooling water intake associated with a permitted discharge must meet state WQS. Nor does Mirant dispute the proposition that if the state properly applies its WQS to impose a requirement on a cooling water intake, it may do so as a condition on the activity as a whole associated with a

discharge requiring a state certification under section 401. *See also* 33 U.S.C. 1341(a)(1), 1341(d), and 1370(a). It is clear that both sections 301(b)(1)(C) and 401 authorize the Region to ensure that cooling water withdrawals are consistent with Massachusetts' water quality standards, because the permit must assure that the overall "activity" associated with a discharge will not violate applicable WQS. PUD No. 1 of Jefferson County v. Washington Dep't of Ecology, 511 U.S. 700, 711-12 (1994). EPA has recently reaffirmed this approach to applying WQS to cooling water intakes. See In re: Dominion Energy Brayton Point L.L.C., NPDES Permit No. MA 0003654, EPA EAB NPDES Appeal No. 03-12 at 175 n. 205 and 185 (Feb. 1, 2006). *See also* 40 C.F.R. §§ 125.80(d), 125.84(e), 125.90(d) and 125.94(e); *Riverkeeper v. EPA*, 358 F.3d 174, 200-02 (2nd Cir. 2004). Therefore, the Region will not elaborate upon the framework of federal law under the Clean Water Act that gives EPA and the state authority to impose conditions on Mirant's cooling water intake based on the state's WQS, because Mirant has not preserved those issues for challenge.

Instead, Mirant disputes whether Massachusetts has any applicable laws that give MassDEP authority to govern cooling water intakes, whether there is any standard in Massachusetts law that applies to an intake, and finally, whether Massachusetts has made a finding that the technology requirements in EPA's 316(b) determination are insufficient to assure attainment of that standard.

Mirant is mistaken if it is asserting that Massachusetts' WQS must specifically address cooling water withdrawals in order to assert Ssection 401 certification authority over those withdrawals. The Supreme Court has held that Section 401 may be invoked to protect designated uses. PUD No. 1, 511 U.S. at 723 (upholding state certification conditions to protect designated use of fish habitat). See also id. at 714-718 (rejecting arguments that a state may only require compliance with specific criteria). Thus protecting the designated uses in the Basin is an appropriate basis for intake limits under Ssection 401, even if cooling water withdrawals are not explicitly mentioned in the Massachusetts WQS. Again, EPA's Environmental Appeals Board recently confirmed that cooling water intakes may be regulated to protect designated uses. Dominion at 186-188.

In the litigation leading up to the EAB's opinion in Dominion, the MassDEP carefully explained how state water quality law applies to cooling water intake structures. See Amicus Brief of the MassDEP in Support of EPA NPDES Permit No. MA003654 at 5-11 (Dec. 22, 2003) and Supplemental Amicus Brief of the Massachusetts Department of Environmental Protection in Response to Briefs Filed by USGen and UWAG in Support of USGEN's Appeal of EPA NPDES Permit No. MA003654 at 5-8 (June 24, 2004). First, the Massachusetts Clean Water Act provides that "no person shall engage in any other activity which may reasonably result, directly or indirectly, in the discharge of pollutants to waters of the [state] without a currently valid permit from the Department. " M.G.L. c. 21, s. 43(2) and 314 CMR 3.04. MassDEP's position is that the cooling water withdrawal associated with a once-through cooling water operation is an integral component of the "activity" that directly results in a thermal discharge. Therefore, the cooling

water withdrawal is an activity subject to regulation under the permit that MassDEP must issue to authorize the discharge of thermal pollution under the Commonwealth's Clean Water Act. Second, the state's CWA provides that MassDEP water permits may specify "technical controls and other components of treatment works to be constructed or installed . . . which [DEP] deems necessary to safeguard the quality of the receiving waters." M.G.L. c. 21, s. 43(7). "Treatment works" is broadly defined to include "any and all devices, processes and properties, real or personal, used in the collection, pumping, transmission . . . recycling . . . or reuse of waterborne pollutants." M.G.L. c. 21, s. 26A and 314 CMR 3.02. MassDEP concluded that a cooling water intake structure constitutes an integral component of a facility's once through cooling water "treatment works," and therefore, MassDEP has further authority to regulate such structures.

In its water quality certification letter issued under CWA § 401(a)(1), MassDEP has reiterated the above reasoning in support of its conclusion that its water quality standards may be applied to govern CWIS limits in the permit (see Massachusetts WQC). EPA sees no reasonable basis for disregarding MassDEP's considered interpretation of the scope of its authority under Massachusetts law to regulate or condition the operation of a cooling water intake structure.

In its water quality certification, MassDEP also explained how it derives the appropriate regulatory standard from its water quality standards to use in developing requirements for cooling water intakes. MassDEP has designated the Basin as a Class B water. Under the state's water quality standard regulations

> [e]ach class is identified by the most sensitive, and therefore governing, water uses to be achieved and protected. Surface waters may be suitable for other beneficial uses, but shall be regulated by the Department to protect and enhance the designated uses.

314 CMR 4.05(1). Thus the state's water quality standards include designated uses which must be protected in a NPDES permit, or correspondingly, in any state certification the Department makes under section 401 of the federal CWA. For Class B waters, the applicable standard includes the following designated uses: "These waters are designated as a habitat for fish [and] other aquatic life . . .." 314 CMR 4.05(2)(b). Though the standard for Class B waters does not include any specific numerical criteria that apply directly to cooling water intakes, it is nevertheless clear that MassDEP must impose the conditions it concludes are necessary to protect the designated uses for the Basin and ensure that it remains a "habitat for fish [and] other aquatic life."

The fact that the Class B standard also includes "compatible industrial cooling and process uses" does not override the requirement to protect the Basin's use as a "habitat for fish." First, by its terms, the Class B standard requires that any industrial cooling use be "compatible." This qualification is most naturally read as a requirement that industrial cooling uses must be

compatible with the other uses included in the standard, including the use as a fish habitat. Therefore, it is consistent with the Class B standard to operate a cooling water intake in the Basin, but that intake must not impair the ability of the Basin to provide a "habitat for fish." Second, section 4.05(1) of the Massachusetts standards provides that each water classification "is identified by the most sensitive, and therefore governing, water uses to be achieved and protected." This provision is most naturally read to require that where a standard lists several uses, the most sensitive of those uses will effectively govern the permit requirements necessary to protect that use and achieve the water quality standard. Again, the state's water quality certification letter spells out this line of reasoning.

MassDEP has included in its Section 401 state certification requirements that the permit contain certain conditions requiring Kendall Station to reduce mortality to aquatic organisms from both impingement and entrainment. The impingement-related provisions essentially mirror the technology-based requirements already included in the permit by EPA. The requirements of the water quality certification related to entrainment reduction, however, go beyond the federal technology-based requirements already included in the permit by EPA. MassDEP has concluded that the permit must address entrainment by the CWIS because the permit conditions EPA has imposed pursuant to 316(b) to address impingement would be insufficient to ensure that the waters in the Basin would continue to provide an adequate habitat for fish and other aquatic life consistent with the state's water quality standards. MassDEP bases this conclusion on the nature of the entrainment effects of the Kendall Station CWIS, as discussed in the state's water quality certification letter. EPA is including these entrainment-related requirements in the Final Permit as water quality-based requirements.

As outlined above, CLF is correct that the permit must protect the applicable WQS. EPA agrees that the permit must address any conditions the state includes in its 401 certification to protect water quality and that EPA must make an independent determination that the permit's limits are adequate to protect WQS, even if the state does not include any conditions in its certification. In this case, the MassDEP's water quality certification specifies permit conditions for controlling impingement and entrainment that the state deems necessary to satisfy its water quality standards applicable to the Lower Basin of the Charles River. Consistent with the discussion above, EPA has included these water quality-based provisions in the permit consistent with CWA § 401.

With respect to the technology identified as BTA at Kendall Station – namely, a barrier net system – in connection with the Phase II Rule, EPA has studied the efficacy of various technologies designed to minimize the impact of cooling water intakes. The Technical Development Document for the Section 316(b) Phase II Final Rule (TDD) includes a discussion of aquatic microfiltration barriers similar to the system this permit requires. The TDD can be found at http://www.epa.gov/waterscience/316b/devdoc/final/ch4.pdf , see sec. 2.5 at 4-15 and 16, and pp. A-30 to A-32 of Attachment A to Chapter 4. There is evidence these systems can

reduce intake velocities to very low levels and, as a result, greatly reduce (perhaps nearly eliminate) impingement of juvenile and adult fish. It also appears that, depending on the relative sizes of the net's mesh and the eggs and larvae of concern, barrier nets may be able to reduce the entrainment of eggs and larvae. In the case of Kendall Station, given the mesh-size proposed by the facility, it is expected that when it is deployed, the barrier net would prevent the entrainment of some species' larvae but not others and would not prevent the entrainment of fish eggs. It also appears that the proposed setting for Mirant's barrier net system should avoid the difficulties of using the technology in a marine setting that were noted in the TDD. Therefore, EPA and MassDEP have concluded that this system shows promise for helping to protect the Basin's use as a habitat for fish. The system's performance and the health of the ecosystem will have to be further assessed over time to determine if different or additional conditions are needed in future permits to satisfy CWA § 316(b) and state WQS.

EPA disagrees that this determination is inconsistent with the Clean Water Act and state water quality standard antidegradation requirements. The core requirement here is that "[i]n all cases existing uses and the level of water quality necessary to protect the existing uses shall be maintained and protected." 314 CMR 4.04. Installing the BNS will only improve the Basin as a habitat for fish, by reducing entrainment and impingement mortality. Massachusetts has provided a 401 certification specifying the conditions on the cooling water intake, including the specified entrainment reduction requirements, that are required to satisfy the Commonwealth's WQS, including the antidegredation provisions. EPA has included these conditions in the Final Permit. With respect to cooling towers, as EPA explained in Response H1 above, EPA has determined that converting the facility's cooling system to closed-cycle cooling would not be practicable at this site, at least at this time.

Finally, CLF expresses concern about the lack of a quantitative analysis of cumulative impacts on the ecosystem. While it is true that EPA did not conduct a quantitative analysis of the cumulative impacts on the fish habitat in the Basin from this permit and other stresses on the ecosystem, EPA did consider those impacts. This permit carefully limits the temperature impacts of the discharge. Furthermore, if the comments of Mirant prove to be accurate, those temperature limits will have the effect of limiting the amount of heated water the facility can discharge precisely during those times when the Basin is most stressed by heat. That heat limitation will have the corresponding effect of limiting the amount of cooling water the facility can withdraw. EPA has concluded that the cumulative effect of the permit conditions, the combination of the BNS and the heat discharge limitations, should substantially improve the Basin as a habitat for fish as compared with the current permit requirements and should protect that use consistent with the Massachusetts WQS.