MODIFICATION OF AUTHORIZATION TO DISCHARGE UNDER THE NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM

In compliance with the provisions of the Federal Clean Water Act, as amended, (33 U.S.C. §§1251 et seq.; the "CWA"), and the Massachusetts Clean Water Act, as amended (M.G.L. Chap. 21, §§ 26-53),

Mirant Kendall, LLC

is authorized to discharge from the facility located at

Mirant Kendall Station
265 First Street
Cambridge, MA 02142

to receiving water named

Charles River in the Boston Harbor Watershed

in accordance with effluent limitations, monitoring requirements and other conditions set forth in the permit issued on September 26, 2006, except as set forth herein and modified as follows, with all changes in bold italics and/or strikethrough:

Parts I.A.1.f, I.A.2.d, I.A.2.e, I.A.11, I.A.12 (first paragraph), I.A.12.b, I.A.13 (second paragraph), I.A.14.a.3.c, e & f, I.A.14.d (first paragraph), I.A.14.d.1(a), I.A.14.d.2 (first paragraph), I.A.14.d.4, I.A.14.d.7, I.A.14.d.9, I.A.14.d.11, and I.A.16

This permit modification shall become effective on the first day of the calendar month following sixty (60) days after the date of signature**.**

This permit modification revises the permit that was issued on September 26, 2006 and that was appealed on October 30, 2006.

This permit consists of **42** pages in Part I including effluent limitations, monitoring requirements, and state permit conditions, **Table 1**, **Attachments A through I**, and 35 pages in Part II including General Conditions and Definitions.

Signed this 18th day of December, 2008

/s/ SIGNATURE ON FILE

Stephen S. Perkins, Director	Glenn Haas, Director
Office of Ecosystem Protection	Division of Watershed Management
Environmental Protection Agency	Department of Environmental Protection
Boston, MA	Commonwealth of Massachusetts
	Boston, MA

PART I.A. EFFLUENT LIMITATIONS AND MONITORING REQUIREMENTS

1. During the period beginning on the Effective Date of the permit and lasting through expiration, the permittee is authorized to discharge through any combination of **outfall serial numbers 001, 002, 003 and 004: once-through cooling water, ultrafilter and reverse osmosis (UF & RO) treatment system reject waters and boiler blowdown**[1]. Such discharges shall be limited and monitored by the permittee as specified below:

Effluent Characteristic	Discharge Limitations		Monitoring Requirements	
	Average Monthly	Maximum Daily	Measurement Frequency	Sample Type
Flow Rate (million gallons per day)	70[2,3]	80	Continuous	Recorder: Pump capacity curve and operational hours [4]
Total Residual Chlorine [5] (mg/l) as an instantaneous maximum	Report	0.1	1/Chlorination event	Grab during chlorination event
Temperature (°F), Discharge	Report	105 [6]	Continuous	Recorder
Temperature (°F), Instream	Report	Various [7,8]	Continuous	Recorder
Facility Temperature Rise [9]; Discharge °F minus Inlet °F	Report	20	Continuous	Recorder
pH, standard units, instream	See footnote 8	See footnote 8	Various	Recorder
Conductivity, instream	Report	Report	Various	Recorder
Dissolved oxygen, mg/l, instream[8]	Report	Report	Weekly	Recorder
Heat Load, in millions of BTUs [10]	Report	Report	Hourly and Daily	Calculated
Electricity generation, in megawatts	Report	Report	Hourly and Daily	Recorder
Whole Effluent Toxicity Testing, [11] LC50, C-NOEC, % [12,13,14]	Report	Report	1/Quarter	24 hour composite

Footnotes:

1. There have been separate permit conditions established for the discharge of reject waters and boiler blowdown from internal Outfall 009. See Part I.A.3.

2. For flow, report maximum and minimum daily rates and total flow for each operating date. The limit of 70 million gallons per day (MGD) is an **annual average** limit, which shall be reported for every consecutive twelve (12) month period, as a rolling average. The first rolling average value will be calculated using the monthly average flow for the first full calendar month ending after the effective date of the permit and the eleven previous monthly average flows (e.g. if the permit is effective on 12/1/06, the first annual average value will be reported on the December 2006 discharge monitoring report (DMR) and be calculated from the December 2006 average flow and the average flows from the previous eleven months). Each subsequent month's DMR will report the annual average flow for the preceding 12 months.

3. For the months of April, May and June only, a **monthly average** limit of 70 MGD applies for each month.

4. The flow rate may be estimated from pump capacity curves. This flow rate is the total cooling water flow, blowdown from the new heat recovery steam generator (HRSG) unit and reject waters from the new UF & RO water treatment units.

5. The quantity of total residual chlorine (TRC) discharged in once-through cooling water from any of these outfalls shall not exceed 0.1 mg/l as an "instantaneous maximum concentration" at the point of discharge into the Charles River. TRC may not be discharged from any generating unit for more than two hours in any one day. For this permit, the minimum level (ML) for TRC is defined as 20 ug/l. This value is the minimum level for chlorine using EPA-approved methods found in the most currently approved version of Standard Methods for the Examination of Water and Wastewater, Method 4500 CL-E and G, or USEPA Manual of Methods of Analysis of Water and Wastes, Method 330.5. One of these methods must be used to determine TRC. Sample results of 20 ug/l or less shall be reported as zero on the discharge monitoring report. The ML is not the minimum level of detection, but rather the level at which the entire analytical system shall give recognizable signal and acceptable calibration points. Chlorine may be used as a biocide. Sampling shall be conducted only during periods of chlorination at the Facility, when chlorine is being discharged. No other biocide shall be used without explicit approval from the Regional Administrator and the Commissioner. The term "Regional Administrator" means the Regional Administrator of Region I of the U. S. Environmental Protection Agency (EPA) and the term "Commissioner" means the Commissioner of the Massachusetts Department of Environmental Protection (MassDEP) or their designees. The TRC limit of 0.1 mg/l does not apply to Outfall 009 in Part I.A.3.

6. The instantaneous discharge temperature shall not exceed 105 ^{o}F at any time.

7. The permittee may not cause, or contribute to conditions that cause, in-stream water column temperatures to exceed the temperatures set forth in **Attachment A**. See Part I.A.14.b and **Attachments A and B** of this permit for instream temperature limits and locations. The permittee will make these instream temperature data available for viewing on a web site as described in Part I.A.14.a.4 of this permit.

8. See **Attachment B** of this permit for instream monitoring locations and Part I.A.14.c.2. of this permit for detailed water quality monitoring requirements. At a minimum, weekly monitoring of DO is required at locations and depths specified in Part I.A.14.b.11 and when collecting nutrient samples from June 1 through October 31. The pH shall not be less than 6.5 standard units and not more than 9.0 standard units.

9. Facility Temperature Rise is the difference between the discharge temperature and intake temperature. The intake and discharge temperatures may be recorded by instruments or computers. The Facility Temperature Rise, Daily Maximum Temperature and flow shall be calculated as hourly averages based upon readings every fifteen (15) minutes. These hourly average values will be tabulated for each month and attached to the monthly Discharge Monitoring Reports (DMR), as well as made available on a real-time continuous basis on a website as described in Part 14.a.4 of this permit. The hourly average discharge temperature shall be measured by temperature probes representing all once-through cooling water and shall not exceed a 20 ^{o}F rise over the hourly average temperature of the intakes on the Broad Canal at any time.

10. The Heat Load shall be calculated on an hourly basis using the following equation: $Q = Cpm(\Delta T)$

Where Q = Heat Load, British Thermal Units (BTU)/hour
Cp = Heat Capacity (Specific Heat) of water = 1.0 BTU/pound°F
m = mass of water = cooling water flow rate (MGD) x density of river water = cooling water flow rate (MGD) x 8.34 pounds/gallon
ΔT = discharge temperature - intake temperature, °F, hourly average (See footnote 9 above)

The monthly heat load shall be calculated by adding together each day's heat load for that month. Each day's heat load shall be calculated by adding together each hour's heat load for that day.

11. The permittee shall conduct chronic (and modified acute) toxicity tests four times per year. The chronic test may be used to calculate the acute LC50 at the 48-hour exposure interval. Prior to taking the first sample for this test, the permittee shall measure the salinity in its intake water. If such salinity is measured at less than 1 part per thousand (ppt), the permittee shall follow the testing protocol specified in Attachment C1 for freshwater species. If the measured salinity is 1 ppt or greater, the permittee shall follow the testing protocol specified in Attachment C2 for marine species. Toxicity test samples shall be collected during the calendar quarters ending March 31, June 30, September 30 and December 31. The test results shall be submitted by the last day of the month following the completed quarter, April 30, July 31, October 31 and January 31, respectively. The tests must be performed in accordance with test procedures and protocols specified in **Attachments C1 And C2** of this permit, follow the conditions set forth in the table below and be conducted during normal operating conditions.

Day 1	**Day 3**	**Day 5**
(Acute and sample #1 for chronic)	**(sample #2 for chronic)**	**(sample #3 for chronic)**
Discharge of Sodium Bisulfite **HRSG Blowdown** **UF and RO Water Treatment Reject Water**	**HRSG Blowdown** **UF and RO Water Treatment Reject Water**	**HRSG Blowdown** **UF and RO Water Treatment Reject Water**

After submitting one year and a minimum of four consecutive sets of WET test results (one per quarter), the permittee may request a reduction or elimination of the WET testing requirements, based upon the test results. The permittee is required to continue testing at the frequency specified in the permit until notice is received by certified mail from the EPA that the WET testing requirement has been changed. Days 3 and 5 may or may not include the discharge of sodium bisulfite.

12. The LC50 is the concentration of effluent which causes mortality to 50% of the test organisms.

13. C-NOEC (chronic-no observed effect concentration) is defined as the highest concentration of toxicant or effluent to which organisms are exposed in a life cycle or partial life cycle test which causes no adverse effect on growth, survival, or reproduction at a specific time of observation as determined from hypothesis testing where the test results exhibit a linear

dose-response relationship. However, where the test results do not exhibit a linear dose-response relationship, the permittee must report the lowest concentration where there is no observable effect.

14. If toxicity test(s) using receiving water as diluent show the receiving water to be toxic or unreliable, the permittee shall follow procedures outlined in **Attachment C, Section IV,** of this permit in order to obtain permission to use an alternate dilution water. In lieu of individual approvals for alternate dilution water required **in Attachment C**, the permittee may use the EPA New England guidance document entitled Self-Implementing Alternative Dilution Water Guidance ("Guidance Document") to obtain automatic approval of an alternate dilution water, including the appropriate species for use with that water. If the Guidance Document is revoked, the permittee shall revert to obtaining approval as outlined in **Attachment C.** The Guidance Document has been sent to all permittees with their annual set of DMRs and Revised Updated Instructions for Completing EPA's Pre-Printed NPDES Discharge Monitoring Report (DMR) Form 3320-1 and is not intended as a direct attachment to this permit. Any modification or revocation to the Guidance Document will be transmitted to the permittees as part of the annual DMR instruction package. However, at any time, the permittee may choose to contact EPA New England directly using the approach outlined in **Attachment C.**

Part I.A.1. (continued)

a. Effluent samples shall be taken prior to mixing with other waste streams through Outfalls 001, 002, 003 and/or 004.

b. The results of sampling for any parameter beyond its required frequency must be reported.

c. There shall be no discharge of floating solids, oil sheen or visible foam in other than trace amounts.

d. During operation of the Mirant Kendall Station (Facility), the permittee shall conduct biological/environmental studies and water quality monitoring as determined by the Regional Administrator and/or the Commissioner and as described in Part I.A.14. The purpose of these studies shall be to evaluate the effects of the Facility's discharge on the balanced, indigenous population (BIP) of shellfish, fish and wildlife in and on the Charles River, to evaluate the effectiveness of cooling water intake structure (CWIS) technologies to minimize adverse environmental impacts and to ensure the attainment of water quality standards (WQS).

e. This NPDES permit may be modified pursuant to 40 CFR 122.62 to contain additional or different thermal limitations or other requirements if these biological/environmental studies, water quality monitoring efforts and/or other available information indicate that such modifications are necessary for the attainment of WQS and/or the protection and propagation of a BIP of shellfish, fish and wildlife in and on the receiving waters.

f. The permittee shall report the date(s) that ***any exclusion technology or coarse mesh barrier net*** ~~the intake barrier net system (BNS)~~ is installed ***or removed*** with the DMR ***cover letter*** for that month.

2. During the period beginning on the Effective Date and lasting through expiration, the permittee is authorized to discharge intake screen backwash water from **outfall serial numbers 005, 006 and 007 at a total daily maximum flow rate not to exceed 0.1 MGD for each outfall.**

Effluent Characteristic	Discharge Limitations		Monitoring Requirements	
	Average Monthly	Maximum Daily	Measurement Frequency	Sample Type
Flow Rate (million gallons/day)	0.1	--------	When being used	Estimate
pH, standard units	See part c.	See part c.	Daily, when in use	Meter

a. There shall be no discharge of floating solids, oil sheen or visible foam in other than trace amounts.

b. The temperature of the discharge shall at no time exceed the temperature of the intake water used for this discharge.

c. The pH shall not be less than 6.5 standard units and not more than 9.0 standard units

d. ***See Parts I.A.11.c and I.A.14.d.9(a) regarding the operation of the traveling screens at the intake structures and impingement related conditions.*** ~~The traveling screens at Units 1, 2, and 3 for any intake structures shall be rotated at least once per eight hour shift and for a time sufficient to dislodge any impinged organisms and backwashed as the screens are rotated, as soon as practicable intake water is bypassing any barrier net or when any BNS components are not in place. This screen rotation shall continue until the barrier nets are restored in front of such intake structure.~~

~~e. All live adult and juvenile fish collected or trapped on the intake screens 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 Part I.A.14.d.9. All other material shall be removed from the intake screens and BNS and disposed of in accordance with all existing Federal, State, and/or Local laws and regulations that apply to waste disposal. Such material shall not be returned to the receiving waters.~~

3. During the period beginning on the Effective Date and lasting through expiration, the permittee is authorized to discharge low- volume waste from **outfall serial number 009: UF & RO water treatment system reject waters, other low-volume waste streams and boiler blowdown from the new HRSG. This is an internal outfall**.

Effluent Characteristic	Discharge Limitations		Monitoring Requirements	
	Average Monthly	Maximum Daily	Measurement Frequency	Sample Type
Flow Rate (million gallons per day)	Report	3.73	Daily	Estimate
Total Suspended Solids (mg/l)	30	100	Daily	24 hour composite
Oil and Grease, mg/l	15	20	Daily	Grab
Total Residual Chlorine (mg/l)	Report	Report	Daily, when in use	Grab during chlorination event (1)
126 Priority pollutants (2)	Report	Report	1/Year (3)	Grab

a. There shall be no discharge of floating solids, oil sheen or visible foam in other than trace amounts.

b. The results of sampling for any parameter above its required frequency must be reported.

c. The combination of these streams will be monitored prior to joining the condenser cooling water stream.

d. The monitoring of this outfall must coincide with the approximate time period of the maximum use of the chemicals listed in Table 1 at the end of this permit.

Footnotes:

1. See Footnote 5 beginning on Page 3.
2. The list of these may be found at 40 CFR 423, Appendix A.
3. These shall be sampled for during the first month of discharge from the UF & RO system under the permit and annually thereafter during the period of July through September.

Part I.A. (continued)

4. The chemicals listed in Table 1 are approved for water discharge. The permittee may propose to conduct feasibility studies involving new chemicals not currently approved for water discharge. The permittee shall gain approval from the Regional Administrator (RA) and the Commissioner before any such studies take place. A report summarizing the results of any such studies shall be submitted to the RA and the Commissioner regarding discharge frequency, concentration, and the impact, if any, on the indigenous populations of the receiving water. The RA or the Commissioner may require WET testing as part of feasibility studies.

5. The discharges shall not cause a violation of any applicable WQS or degrade the aquatic habitat quality.

6. Any change in the location, design or capacity of the present cooling water intake structures shall be approved by the RA and the Commissioner.

7. This permit may be modified, revoked or reissued to comply with any applicable effluent standard or limitation issued or approved under Sections 30l(b)(2)(C) and (D), 304(b) (2), and 207(a) (2) of the Act, if the effluent standard or limitation so issued or approved:

    a. contains different conditions or is otherwise more stringent than any effluent limitation in this permit; or

    b. controls any pollutant not limited by this permit.

    If the permit is modified or reissued, it shall be revised to reflect all currently applicable requirements of the Act.

8. Any thermal plume in the receiving water resulting from the discharges from the Facility shall not block or severely restrict fish passage, in accordance with the Zone of Passage and Habitat (ZPH) requirements of **Attachment A;** a depiction of the ZPH is included in **Attachment D.**

9. There shall be no discharge of polychlorinated biphenyl (PCB) compounds. The permittee shall dispose of all known PCB equipment, articles, and wastes in accordance with 40 CFR § 761. The permittee shall certify that this disposal has been accomplished.

10. All existing manufacturing, commercial, mining, and silvicultural dischargers must notify the RA as soon as they know or have reason to believe (40 CFR §122.42):

    a. That any activity has occurred or will occur which would result in the discharge, on a routine or frequent basis, of any toxic pollutant (as defined at 40 CFR

§122.2) which is not limited in the permit, if that discharge will exceed the highest of the following "notification levels":

(1) One hundred micrograms per liter (100 ug/L);
(2) Two hundred micrograms per liter (200 ug/L) for acrolein and acrylonitrile; five hundred micrograms per liter (500 ug/L) for 2,4-dinitrophenol and for 2-methyl- 4,6-dinitrophenol; and one milligram per liter (1 mg/L) for antimony;
(3) Five (5) times the maximum concentration value reported for that pollutant in the permit application in accordance with 40 CFR §122.21(g)(7); or
(4) Any other notification level established by the RA of EPA in accordance with 40 CFR §122.44(f).

b. That any activity has occurred or will occur which would result in the discharge, on a non-routine or infrequent basis, of any toxic pollutant which is not limited in the permit, if that discharge will exceed the highest of the following "notification levels":
(1) Five hundred micrograms per liter (500 ug/L);
(2) One milligram per liter (1 mg/L) for antimony;
(3) Ten (10) times the maximum concentration value reported for that pollutant in the permit application in accordance with 40 CFR §122.21(g)(7); or
(4) Any other notification level established by the Director of EPA in accordance with 40 CFR §122.44(f).

c. That they have begun or expect to begin to use or manufacture as an intermediate or final product or byproduct any toxic pollutant which was not reported in the permit application.

11. ***Cooling Water Intake Structure (CWIS) Requirements to Minimize Adverse Environmental Impacts from Impingement and Entrainment***

a. The design, location, construction, and capacity of the permittee's CWIS shall reflect the best technology available (BTA) for minimizing the adverse environmental impacts from the entrainment and impingement of fish eggs and larvae, as well as impingement of adult and juvenile fish, due to the CWIS. In order to satisfy this BTA standard, the permittee shall install and operate an aquatic organism exclusion technology ("exclusion technology"), other than fine mesh traveling screens, located within the Broad Canal with specifications as described in 11.a.(1) to 11.a.(6) below. The location of the exclusion technology shall not preclude unobstructed entrance or egress of recreational boats to the Broad Canal or navigation within the Broad Canal, except during temporary construction periods.

(1) ***The permittee shall implement an exclusion technology with an opening size of no greater than 0.5 mm.***

(2) ***The permittee shall restrict the effective through-media velocity to no more than 0.5 feet per second (fps) at any point in the media to the extent practicable when the exclusion technology is in place. "Media" refers to the particular material composition of the exclusion technology that is installed.***

(3) ***Operation of the exclusion technology shall preclude bypasses to the extent practicable, except as otherwise provided by Part II.B.4 of this permit.***

(4) ***The permittee shall ensure that the exclusion technology includes an airburst, backflow, or comparable mechanism to minimize debris loading. The permittee shall operate this mechanism in a manner and at a frequency provided by the manufacturer's guidelines, except where the permittee demonstrates that an alternative operating method would better maximize the survival of eggs and larvae. If the manufacturer has not provided guidelines regarding the frequency of operation of this mechanism, the permittee shall operate the mechanism as often as needed to maintain a through-media velocity no greater than 0.5 fps.***

(5) ***The permittee shall ensure a minimum induced sweeping velocity past the exclusion technology that is greater than the approach velocity. The approach velocity in the direction of the intake flow shall be measured between 6 and 8 inches from the surface of the media and prior to passing through the media. The induced sweeping velocity shall direct eggs and larvae to the Lower Basin downstream of the head wall of the Broad Canal.***

(6) ***The permittee shall maintain deployment of the exclusion technology starting no later than March 1 (unless icing conditions in the river preclude such deployment, in which case the technology shall be deployed as soon after March 1 as icing conditions allow) and ending no earlier than August 31 of every year.***

b. ***The design, location, construction, and capacity of the permittee's CWIS shall reflect the best technology available (BTA) for minimizing the adverse environmental impacts from the impingement of juvenile and adult fish. When the exclusion technology described in Part I.A.11.a. is not deployed or not functioning properly, the permittee shall install and operate a coarse-mesh barrier net. The coarse-mesh barrier net shall have a maximum pore size of ¼-***

inch and an effective through-screen velocity of no more than 0.5 fps at any point in the coarse-mesh barrier net to the extent practicable. The net shall be deployed in front of each of the three CWISs except when icing conditions in the river preclude their deployment. Operation of the coarse-mesh barrier net system shall preclude bypasses to the extent practicable, except as otherwise provided by Part II.B.4 of this permit.

c. ***The requirements of Part I.A.11.c.2 apply when neither the exclusion technology nor the coarse-mesh barrier net are deployed or functioning properly, except as provided in Part I.A.11.c.1.***

(1) ***The requirements of Part I.A.11.c.(2), I.A.11.e.(3), and I.A.14.d.9(a) do not apply if the permittee has (i) installed a year-round exclusion technology and (ii) rerouted the intake piping in a manner that physically excludes any traveling screens from intercepting the cooling water flow.***

(2) ***When neither the exclusion technology nor the coarse-mesh barrier net are deployed or functioning properly, the permittee shall operate the traveling screens at Units 1, 2, and 3. The permittee shall begin rotating the screens at least once per eight hour shift and for a time sufficient to dislodge any impinged organisms. As soon as practicable following each rotation, material collected must be inspected for live fish, either by plant personnel or another method, in a manner that maximizes the survival of impinged fish. All live adult and juvenile fish collected or trapped on the traveling screens shall be returned to the Lower Basin downstream of the head wall of the Broad Canal. All other material shall be removed from the traveling screens and disposed of in accordance with all existing Federal, State, and/or local laws and regulations that apply to waste disposal. Such material shall not be returned to the receiving waters. This screen rotation shall continue for the minimum amount of time required to reinstate either the operation of the exclusion technology or the coarse-mesh barrier net. Also see Part I.A.14.d.9(a) for additional requirements regarding impinged fish.***

d. ***To the extent practicable, the permittee shall ensure that scheduled maintenance outages occur between May 15 and June 30. In each Annual Monitoring Report described in Part I.A.14.a.2, the permittee shall report the dates of scheduled maintenance outages for the year and, for scheduled maintenance outages not occurring between May 15 and June 30, describe why it was not practicable for the outage to occur during this time period.***

e. ***The permittee shall conduct routine inspections during deployment of all cooling water intake technologies to maintain optimal performance as follows:***

(1) ***The permittee shall visually inspect the exclusion technology from the surface on a weekly basis, and from top to bottom, including all anchoring points, if applicable, on a monthly basis. The permittee shall repair damage that compromises performance as soon as practicable and in a manner to reduce the potential for entrainment and impingement mortality during repair. After the first year of deployment, the permittee may request a reduction in the frequency of inspection, upon demonstrating no malfunctions in the technology during the previous year of deployment.***

(2) ***The permittee shall visually inspect the coarse-mesh barrier net from the surface on a weekly basis, and from top to bottom, including all anchoring points, on a monthly basis during months when it is in use. The permittee shall repair damage that compromises performance of the net as soon as practicable. After the first year of deployment, the permittee may request a reduction in the frequency of inspection upon demonstrating no malfunctions in the technology during the previous year of deployment.***

(3) ***The permittee shall inspect the traveling screens at least monthly. The permittee shall repair damage that compromises performance as soon as practicable.***

(4) ***During each year of deployment, the permittee shall conduct field measurements to document the approach velocity, as defined in Part I.A.11.a.5, at several representative locations along the exclusion technology. Field measurements must be taken at least twice each year, at a minimum. Measurements shall be taken soon after deployment of the exclusion technology each year and just prior to the end of such deployment. If the exclusion technology is a permanent installation, then the permittee shall document the approach velocity at such technology in March and August of each year, at a minimum.***

(5) ***During each year of deployment, the permittee shall document the through-screen velocity at several representative locations along the coarse-mesh barrier net. Field measurements and/or calculations must be performed at least twice each year, at a minimum. Measurements shall be taken soon after deployment of the coarse-mesh barrier net and just prior to the end of such deployment. If the coarse-mesh barrier net is a permanent installation, then the permittee shall document the through-screen velocity at such technology in February and September of each year, at a minimum.***

~~11. Barrier Net Requirements~~

~~a. There is a detailed discussion of CWA Section 316(b) issues in EPA's document entitled "Clean Water Act NPDES Permitting Determinations for Thermal Discharge and Cooling Water Intake from Mirant Kendall Power Station in Cambridge, MA" and in Section H of EPA's Response to Comments (RTC) document. Based on available information, EPA has made the determination that the permittee shall implement the following technology-based impingement mortality reduction requirements as components of the Best Technology Available (BTA) for this facility to satisfy CWA Section 316(b):~~

~~(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.~~

~~To the extent practicable, the BNS shall be designed to allow for impinged eggs and larvae to be freed in a manner that would increase the probability of their survival. The BNS may be located outside of the Broad Canal, where impinged eggs and larvae could be returned directly into the River rather than in the Canal where their potential for re-impingement may be increased and their survival and maturation may be less likely. If the permittee wants to change any aspect of the approved BNS design, as described in the Part I.A.11.b.(1) and (2) below, it must obtain the prior, written approval of the RA and the Commissioner. Any permit modifications will follow the process and satisfy the criteria of 40 C.F.R. §§ 122.62 and 122.63, whichever is applicable~~.

~~The permittee shall implement this BNS no later than **one hundred and twenty (120) days after the effective date of the permit (EDOTP)**, or consistent with the time frame included in the MassDEP approved plan, as described in the Part I.A.11.b.(1) and (2) below, whichever is later, unless icing conditions preclude such deployment. In such case, the BNS shall be implemented as soon as icing conditions allow. On any date past 120 days after the EDOTP, if there has been no plan approval as described in Parts I.A.11.b.(1) and (2), EPA may give the permittee notice and a time frame of no less than an additional 120 days to implement a BNS that meets the requirements of Part I.A.11.a. The permittee shall report the BNS implementation date with the cover letter of that month's DMR.~~

~~The installed BNS shall be inspected daily from April 1 through September 30 and repaired as required and shall be inspected weekly for the remainder of the year that they are installed and replaced or repaired as required. The cleanliness of this BNS will be monitored by plant personnel and/or by contracted divers on a monthly basis. The BNS will be checked for any condition(s) that may affect its performance. In addition, the permittee shall conduct an operational study of the BNS as described in Part I.A.14.d.7 of this permit.~~

~~The BNS shall be designed so that if a component of it is found to be operating improperly, it can be repaired. The permittee shall have available appropriate materials for immediate replacement or repair of barrier net components that are neither operating as designed nor consistent with permit goals. For any occasion when a BNS component is replaced, except for routine maintenance, the permittee shall prepare a report explaining why such component was ineffective, how long such component was operating in this condition and what actions or changes in operation the permittee undertook as a result. This report shall be submitted to EPA and MassDEP no later than 30 days following such an occurrence and mailed together with the DMR, but under a separate cover letter.~~

~~The BNS shall be implemented in a manner that will preclude bypasses due to circumstances within the permittee's control, to the extent practicable. The permittee shall evaluate any circumstances beyond its control that result in bypass and propose and implement changes to the BNS or its operation and maintenance that would minimize any related future bypasses.~~

~~As soon as practicable after the permittee becomes aware that intake water is not passing through any barrier net, the rotation of the traveling screens for any such affected CWIS shall begin and such screen rotation shall be conducted at least once per eight hour shift and for a time sufficient to dislodge any impinged organisms. This procedure is described in Part I.A.2.d on Page 8. These periods include times when icing conditions preclude BNS deployment and the time period between the EDOTP and BNS operation. With each DMR for this time period, the permittee shall report the percentage of time that all intake water did not pass through the BNS during operation of the intake, a description of technical problem(s) requiring bypass of the BNS , the percent of BNS bypassed for each affected intake, the proposed solution to technical problem(s) and the projected time to cure such problem(s). After approval from EPA and MassDEP the approved solution shall be implemented by the permittee.~~

~~b. EPA has set an impingement mortality reduction goal for this permit along with requiring ongoing reporting. The BNS shall be designed to meet this goal. For impingement mortality, this permit sets a goal of a minimum of at least 80% impingement mortality reduction from a calculated baseline. For the purposes of calculating this impingement reduction, only juvenile and adult life stages of fish are to be considered. Organisms that become impinged on intake screens (not the barrier nets) are assumed to not survive. For entrainment, this permit requires that the permittee minimize impacts associated with entrainment. Consistent with the State Water Quality Certification (WQC), the permittee shall:~~

~~(1) Design and install a BNS or alternative entrainment prevention system ("EPS") consistent with the BNS impingement-related provisions in Part I.A.11.a. of the Final Permit and the WQC, provided that the BNS/EPS minimizes the entrainment and impingement mortality (i.e., maximizes the survival) of river herring and white perch larvae to the extent practicable. Within 30 days of the effective date of the permit, the permittee shall submit a plan for MassDEP's review and approval that sets out the proposed design and location to meet these performance standards.~~

~~(2) Operate a BNS or EPS consistent with the BNS impingement-related provisions of Part I.A.11.a. of the Final Permit and the WQC, provided that the system is operated in a manner to maximize the survival of and minimize the adverse impact to river herring and white perch larvae or eggs impinged on the barrier net, including, without limitation, evaluating the magnitude and condition of the impinged organisms at a reasonable frequency to determine whether they have the~~

~~potential to survive if returned to the river, and returning the potential survivors to the river with the minimum of stress. Within 45 days of the effective date of the permit, the permittee shall submit a plan for MassDEP's review and approval that sets out the proposed operating protocol to meet these performance standards.~~

c. ~~With each Annual Monitoring Report (AMR) described in Part I.A.14.a.3 and together with the barrier net study and impingement and entrainment (I/E) monitoring detailed in Part I.A.14.d. of this permit, the permittee will estimate the total I/E at the Facility as well as the percentage of I/E that the BNS has excluded. Any such exclusion percentage shall be discounted by the percent of time over the season that any net was inoperable and bypassed. The permittee shall calculate a baseline of adult and juvenile fish to use in calculating the impingement values in each AMR at a minimum. If these nets are not meeting the impingement goal set forth in this permit, the permittee shall propose net design changes or alternative screening devices in the AMR that would improve on the impingement reduction levels and meet the impingement reduction goal. The permittee will also assess its efforts to minimize entrainment effects associated with the intake structures to the extent practicable.~~

12. Fish Mortality Requirements

Each day through the year, the permittee shall visually inspect (1) the Broad Canal, (2) the Zone of Dilution (ZD), (3) ***any deployed exclusion technology, and (4) any deployed coarse mesh barrier nets,*** ~~the BNS daily~~ for dead fish. A fish, defined for this purpose as any juvenile or adult fish, shall be considered dead if it exhibits a loss of equilibrium. The ZD is shown in Attachment D and defined as the area bordered by Monitoring Station 2 at the upstream edge, and Monitoring Stations 3 to 6, at the downstream edge.

a. Initial Notification and Response

1. If the permittee observes 25 or more dead fish within any 24-hour period in any of the 3 areas specified above, it shall provide telephone notification to the Massachusetts Division of Marine Fisheries (DMF), EPA's Office of Ecosystem Protection, and the MassDEP, within four hours of such observation. See contact names and phone numbers for the EPA and MassDEP in the fact sheet. If dead fish are observed during weekend, holiday or evening periods, the permittee shall notify the DMF, EPA and MassDEP on the next business day.

2. On observation of fish mortalities sufficient to require notification, the permittee shall make a concerted effort to collect all dead fish and immediately initiate a separate hourly record showing: (1) the Facility discharge temperatures; (2) the dissolved oxygen levels and river temperatures at the monitoring stations; (3) the dissolved oxygen levels and river temperature at the approximate location of the

fish kill (4) the number of dead fish observed, by species and (5) the length of all dead fish collected, in millimeters. The total length of each fish shall also be recorded. If more than 100 dead fish are collected, a representative subset of the fish may be measured for total length. The record shall be maintained until advised by MassDEP or EPA to change or to discontinue the effort. Some of this required monitoring is already recorded on a continuous basis and would be sufficient to partly meet this requirement. This record shall be included in the written report documenting the event, as required in Part I.A.12.c, below.

3. On observation of fish mortalities sufficient to require notification, the permittee shall suspend all unit chlorination operations, and if the discharge temperature is greater than 95 °F, the permittee shall reduce the discharge temperature to no more than 95 °F within two hours of such observation.

4. If, at the end of the 24-hour period from the initial observation, fish mortalities are no longer occurring and EPA or the MassDEP do not advise otherwise, the permittee shall cease monitoring under this section of the permit and return to normal station operation (including unit chlorination).

b. In the event of fish mortalities in the ZD, the Broad Canal, ***or in the vicinity of the exclusion technology or the coarse mesh barrier nets*** ~~or the BNS~~, the permittee will begin removing all dead fish within four hours after the fish mortalities have been observed. The dead fish shall be enumerated in accordance with Part I.A.12.a.2, above.

c. The permittee shall make a written report of any documented fish mortalities to DMF, EPA, and MassDEP, within ten (10) business days of the event. Included in this report shall be (1) the status of operation at the Facility before and during the event, including records required in Part I.A.12.a.2 of this permit, (2) any meteorological or other environmental conditions that may have contributed to the event, (3) the opinion of the permittee as to the cause of the event, and (4) what actions the Facility shall take in the future to reduce the recurrence of fish kills (if applicable). The MassDEP and EPA addresses to be used are found in Section B of this permit.

13. Unusual Impingement Events

The permittee shall report all "unusual impingement events" at the Facility. An "unusual impingement event" (UIE) is the impingement of a school of fish or a large number of a single species that exceeds normal, historical impingement for the traveling screens as developed through the statistical review of previous impingement data. Until such a review is completed and approved by EPA, an UIE shall be any event resulting in 15 or more total fish of all species impinged per hour.

Such UIEs will be reported to EPA, MassDEP and MADMF designees by telephone no later than twelve (12) hours after the permittee is aware of or has reason to believe an UIE has occurred. If the UIE is observed during weekend, holiday or evening periods, the permittee shall notify the EPA, MassDEP and DMF on the next business day. The permittee shall prepare and submit a written report regarding such UIE within ten (10) business days to EPA, MassDEP and DMF. The MassDEP and EPA addresses to be used are found in Part I.B. of this permit. The report must ***fulfill*** ~~contain~~ the requirements listed in ***Part I.A.14.d.9.(a) of this permit***. ***The permittee shall refer to Part I.A.11.e of this permit regarding inspection requirements. The permittee shall report any UIE that takes place during these required inspections or during any other periods.***

14. <u>Temperature, Water Quality and Biological Monitoring Program</u>

   a. General and Reporting

      1. The permittee shall conduct the sampling, monitoring and reporting described in this Part, also referred to as the "Monitoring Program" (MP). Whenever appropriate, sampling time, frequency, location, and methods used shall be the same as the sampling effort documented in past sampling conducted by the permittee during the period of 1999 through 2005. Sampling efforts may be modified from historical programs if EPA and MassDEP agree in writing that the change would be an improvement to the MP.

      2. Unless otherwise specified, the results of all sampling and monitoring shall be reported in an **Annual Monitoring Report (AMR)**. The first Report shall be submitted no later than ninety (**90) days after the effective date of the permit** and cover any related monitoring performed between the permit application and the effective date of the permit, provided this information has not already been summarized, statistically analyzed and submitted by the permittee. Subsequent AMRs shall be submitted ninety (90) days after the anniversary of the effective date of the permit. All of these reports shall be sent to the same address as the DMR reports, under separate cover letter and as provided at the end of this permit. In the case where the permit expires before reissuance, the Monitoring Program will continue and the Annual Monitoring Report submittals will be made each year.

      3. Each AMR shall summarize the previous year's information and conclusions as well as the following:

         (a) The AMR will indicate the trends of the various parameters that have been sampled over the previous 12 months. In order to identify trends, tables and graphs created for the most recent year's submittal must incorporate data from all past years' monitoring efforts, when appropriate. In addition, the report shall identify any anomalies that appear in the annual historical data comparison. The report must offer possible reasons for the differences, along with supporting information, if available. The permittee will make recommendations for any remediation considered necessary or for any programs to better understand the anomaly.

(b) The AMR will provide the status of the present sampling and monitoring programs, the expected effort for the following twelve months, and an alert to EPA and MassDEP of any anomalies that may be evident in the previous twelve months of data collection.

(c) ***Impingement sampling must be conducted whenever the traveling screens are operated in accordance with Part I. A. 11. c. In its AMR, the permittee shall provide estimates of the Facility's adult and juvenile fish impingement mortality for all species documented through this impingement sampling. Impingement mortality estimates must include both raw numbers and, when applicable, adult equivalents.***

~~(c) In its AMR, the permittee shall provide estimates of the Facility's impingement mortality for all species documented through impingement sampling. Impingement mortality estimates must include both raw numbers and adult equivalents, as well as estimates of the impingement mortality reduction rates experienced at the Facility as a result of the installation of the BNS. Reduction rates will be calculated by using baseline impingement mortality, calculated by the permittee.~~

(d) The AMR will also estimate the population size of, at a minimum, alewife, blueback herring, and yellow perch, based on field data collected over the previous 12 months. The technique used to estimate population size must be consistent across years to allow meaningful comparison of population size from year to year. If sampling techniques to estimate population size are changed, a site-specific calibration factor must be determined so results from the two different methods can be meaningfully compared. See also Part I.A.14.d.11.

(e) The permittee shall report the approach velocities as documented in Part I.A.11.d.(4) and (5) and calculate the through media velocities at the exclusion technology and at the coarse mesh barrier nets.

(f) The permittee shall report the deployment dates and removal dates of all applicable exclusion technologies (including coarse mesh barrier nets). The permittee shall also report instances when deployed exclusion technologies were not functioning properly, the reasons for these occurrences, and actions the permittee took or will take to prevent or minimize periods when any deployed technologies are not functioning properly.

4. Treatment of real-time monitoring data

(a) Real-time, continuous water quality data will be summarized and, together with an electronic copy of the raw data, be included in the Annual Monitoring Report. Any electronic information must be compatible with a generally available spreadsheet program.

(b) In addition to the yearly submittal, real-time water quality information will be continuously transmitted to a web-based data reporting system, with a minimum of one reading taken each hour at each Monitoring Point for each parameter. For each four hour time period listed as follows (00:00 [midnight]-03:59, 04:00-07:59, 08:00-11:59, 12:00-15:59, 16:00-19:59, 20:00-23:59), data will be averaged for each Monitoring Point for each parameter and compared with temperature limits in effect at that time. This information shall also be transmitted to a web-based data reporting system. At least EPA and MassDEP shall have continuous access to this web site and be able to inspect water quality data at any time. In addition, applicable temperature limits, some historical data, certain basic calculations, and the clear identification of the Monitoring Stations and Monitoring Points where the data was collected will be incorporated into this website. Upon request by EPA or MassDEP, an electronic record of the continuous water quality data must be made available, within a reasonable time period. A series of charts depicting one way to configure the four hour data at each location on such web site is presented in **Attachment E**. Real-time hourly water quality data shall also be presented on this web site as part of a thirty (30) day trend analysis for each Monitoring Station and Monitoring Point. **Attachment F** depicts one way to present this data. While **Attachments E and F** present only one possible format for this data presentation, all data points and calculations specified in these attachments must be included on this website in a logical format. When continuous temperature data violate any temperature limit in effect at the time, this information must be included with that month's DMR submittal. **Attachment G** contains the forms that may be used as part of the DMR submission to report any violation of this type.

5. In analyzing, summarizing, and/or describing monitoring data in the AMR and other reports that interpret environmental data, the permittee shall apply and report accepted, appropriate, and reasonably available statistical tests related to sampling frequency, study design, and the representative nature of the observations.

6. Quality Assurance Project Plan **(**QAPP**)**

(a) The permittee shall develop and submit a Quality Assurance Project Plan (QAPP) within sixty (60) days after the effective date of the permit in conformance with the applicable requirements of the EPA QA/R-5 document, published in March of 2001. This document is available at EPA's web site at "www.epa.gov/quality1/qa_docs.html". The QAPP shall encompass all measurements made in compliance with this permit and must describe how data will be reported and reviewed for accuracy and usability prior to its submittal to EPA and MassDEP.

(b) The QA/QC data will be reported and summarized in the AMR, including a detailed Materials and Methods section, describing the results of the monitoring with specific attention focused on any impacts (positive or negative) attributable to diffuser operation, if approved and operable.

b. **Continuous Temperature Monitoring**

1. As indicated in Part I.A.1., instream water temperatures shall be monitored continuously and reported in real-time as described in **Attachment A** for the effective period of the permit for compliance with permit limits.

2. The permittee shall maintain continuous real-time temperature Monitoring Stations at the locations described below and shown in **Attachment B - Station 1 (Background).** One fixed monitoring station downstream of the B.U. Bridge to access ambient river conditions. This station shall be placed near mid-river at the downstream location closest to the bridge where there is a water depth of at least 15 feet. Efforts will be made to position the station where it will reduce the risk of interference with boat traffic, if possible.

Station 2 (Zone Boundary Station). One fixed monitoring station, spaced about 50% across the river from the Boston side and along the transect that coincides with the location of the upstream edge of the Zone of Dilution, as indicated in the permittee's predictive model.

Stations 3, 4, 5 and 6 (In Zone Transect). Four fixed monitoring stations, spaced at equidistant points along a bank-to-bank transect that coincides with the location where the thermal plume impacts the greatest cross-section with a delta T of 5 degrees Fahrenheit or greater, as indicated by the permittee's predictive model. Stations 3 through 6 will be equally spaced along the transect, with Station 3 being closest to the Boston side and Station 6 being on the Cambridge side (see **Attachment B**).

Station 7. A fixed monitoring station at the midpoint of the Boston Museum of Science Lock. To avoid impeding boat traffic, the Monitoring Points at this station will be attached to the concrete wall of the lock. A floating buoy will not be necessary.

Station 8. A fixed monitoring station just upstream of the New Charles River Dam, at a location near the lock used to transfer an attractant flow of Charles River water to Boston Harbor during anadromous fish in-migration.

Station 9. A fixed monitoring station downstream of the New Charles River Dam, in Boston Harbor. This Monitoring Station must be outside the direct influence of Charles River water and be positioned to gather water quality data representative of Boston Harbor.

3. For each **Monitoring Station**, with the exception of **Station 1,** temperature will be monitored continuously with **Monitoring Points** at discrete depths, including 2 feet, 6 feet, 12 feet, 24 feet (where depth allows), and near bottom (approximately 3 feet above the bottom, where depth allows). **Station 1** will have Monitoring Points at 2 feet, 6 feet and 12 feet only. Thus, there will be a total of 4 or 5 points at Stations 2, 3, 4, 5 and 6 depending on the depth at each location.

4. Monitoring **Stations 1, 2, 3, 4, 5 and 6** will record continuous, real-time temperature values year-round while the permit is in effect (a minimum of one reading per hour for each parameter), and must be in operation within sixty (60) days of the effective date of the permit. Monitoring **Stations 7, 8 and 9** will record continuous, real-time temperature (a minimum of one reading per hour for each parameter), from April 1 through October 31 and must be in operation (1) within 60 days of the effective date of the permit, if the effective date is between February 1 and August 31 or (2) no later than April 1 if the effective date is between September 1 and January 31.

5. Data will be collected in real-time and presented on a web site made available by the permittee (see Part I.A.14.a.4.(b) and **Attachments E** and **F** for examples), as well as stored electronically, to demonstrate compliance with the thermal limits for the Zone of Passage and Habitat, as specified in **Attachment A** of the permit. Basic calculations necessary for the raw data to be compared with compliance limits are also specified in **Attachment A.** In general, continuous temperature data will be taken at a minimum of once per hour. Temperature data will be averaged within six established, four hour periods during every calendar day, before being compared with maximum temperature limits in effect at the time (00:00 [midnight]-03:59, 04:00-07:59, 08:00-11:59, 12:00-15:59, 16:00-19:59, 20:00-23:59). If more than one reading is taken within an hour, each hour within the prescribed four hour block must have the same number of readings, evenly spaced within the hour (e.g. every 15 minutes) and taken with the same frequency. A 24 hour block average temperature will be used (00:00 [midnight]-23:59]) to calculate one number at Station 1, which will be compared with appropriate Station Monitors over the same 24 hour period to document compliance with Delta T requirements. Delta T compliance is specified in **Attachment A**.

6. Instrument calibration and maintenance will be done in accordance with the manufacturers' recommendations and accepted water quality data collection practices and with the QAPP described in Part I.A.14.a.6. Instrument calibration and maintenance logs will be maintained for a minimum of five years and be made

available for agency review upon request. Calibration or maintenance problems that have the potential to impact the accuracy of the data will be reported in the monthly DMR and also noted in the Annual Monitoring Report.

7. Monitoring Station exceptions:

   (a) During conditions of icing over of the receiving water surface, the fixed stations may be removed and replaced with vertical profile water quality monitoring for the same parameters, when practicable. A minimum of one daily sampling is required during such periods, if possible.

   (b) During special recreational events in the receiving water body, the fixed stations may be removed and be replaced with vertical profile water quality monitoring for the same parameters, upon approval by EPA. A minimum of twice daily sampling is required during such periods, with one sample taken between 6 to 8 A.M. and one other sample taken between 2 to 4 P.M.

8. In the event that any one or a series of water quality monitoring stations is damaged, lost, or moved away from its designated location and the Facility becomes aware of the situation during the period of 9 AM to 5 PM, the permittee shall notify EPA (G. Papadopoulos, ph: 617-918-1579) and MassDEP (G. Szal, ph: 508-767-2789) immediately by telephone. If a monitor is damaged, lost or moved away from its designated location and the Facility becomes aware of the situation at any other time, the permittee must notify EPA and MassDEP as early as practicable on the following business day. The permittee will have five (5) days from the discovery of the damage, loss or movement of such monitoring station to re-establish the collection of continuous data at the affected locations. Periodic vertical profile water quality monitoring consistent with Parts I.A.14.b.7.(a) and (b) shall be conducted in these locations where practicable, until the continuous monitoring has been re-established.

9. The following parameters of Facility operation data, collected in accordance with Part I.A.1 of this permit, shall be collected continuously, with at least one reading per hour, for the same time intervals and reported as described in **Attachment F**: intake temperature, discharge temperature, Facility temperature rise (intake versus discharge), discharge flow rate and Facility megawatt generation (related to heat load to the river).

10. Meteorological Data affecting water quality. To assess the effects of air temperature, precipitation and wind on water temperature and other water quality parameters, the permittee shall collect basic meteorological data approximately every hour at a location in or adjacent to the lower Charles River Basin. This "real time" meteorological data shall be reported with the continuous water quality monitoring data specified in **Attachment F**, if practicable. The data collected shall

include air temperature, precipitation, wind speed and wind direction. Upon request by EPA or MassDEP, a record of the continuous meteorological data must be made available, within a reasonable time period. A summary of this data, along with an electronic copy of the information, compatible with a generally available spreadsheet program, will be submitted as part of the AMR.

11. At a minimum, the permittee shall conduct DO monitoring at the surface, at a depth of 2 feet, 6 feet, and every three feet from a depth of 6 feet to the bottom at least once a week at each of the real-time continuous temperature Monitoring Stations, Stations 1 through 8 (See Attachment B). All DO monitoring must be conducted on the same day and as close in time as practicable. The most recent DO data collected at these Monitoring Stations will be used to determine whether there is sufficient DO (greater than or equal to 5.0 mg/l) for a Monitoring Point to be considered part of the ZPH. When monitoring at a real-time continuous temperature Monitoring Station is not required (for example, Monitoring Station 8 from November 1 through March 31), then DO monitoring at that station is not required during that time period.

c. **Non-Continuous Water Quality Monitoring**

1. <u>Periodic Water Quality Monitoring for Contour Mapping</u>

Boat-mounted, towed water quality surveys will be conducted, sufficient to produce complete, periodic water quality contour maps of the lower Basin from the B.U. Bridge to the New Charles River Dam. Temperature, dissolved oxygen, pH and conductivity parameters will be collected by the boat-mounted, towed water quality survey. These surveys will be conducted on a monthly basis, beginning within sixty (60) days of the effective date of the permit to obtain background data. Corresponding Facility operating conditions at the time of sampling will be included with the towed water quality profiling data. After two full years of monthly mapping, the permittee shall conduct these surveys at least once per calendar quarter. During periods of icing conditions when boats cannot safely or adequately conduct this mapping, such mapping will not be required.

2. <u>Nutrients and Other Sampling</u>

Nutrient sampling will be collected at three locations, Stations A, B and C as shown in **Attachment B**. At each station, grab or in-situ samples will be collected at three (3) feet below the surface, three (3) feet above the thermocline, and three (3) feet above the bottom of the water column, in the hypolimnion. If no thermal stratification is observed, samples will be collected at three (3) feet below the surface, mid-depth and three (3) feet above the bottom of the water column. Samples will be analyzed for pH, turbidity, conductivity (salinity), dissolved oxygen, transmissivity, BOD5, COD, nitrogen-ammonia, nitrogen-nitrate, nitrogen-nitrite, total nitrogen, Total Kjeldahl Nitrogen, total and dissolved phosphorus, orthophosphate, sulfate, sulfide, sulfite, and oxidation reduction potential. At the time of sample collection, temperature, dissolved oxygen, pH, and conductivity (salinity) measurements will be taken at 3.0 ft. intervals from surface to bottom, as well as at the corresponding sample depths in the water column. Monitoring will begin within **sixty (60) days of the effective date of the permit**. Sampling at all stations must be completed on the same day. The permittee must conduct once a week sampling of the above parameters from June 1 through October 31, coinciding with phytoplankton field sampling (see Part 14.d.10). Sampling will continue as long as the permit is effective.

3. Instream Total Residual Chlorine (TRC) Monitoring

The permittee shall monitor for instream TRC once per month. Sampling shall be conducted at the surface at Stations 2, 4 and 7 and consistent with other conditions in footnote 5 of Part I.A.1. of this permit. This sampling shall be conducted concurrently with the effluent TRC monitoring, during or immediately after periods of chlorination at the Facility. The EPA reserves the right to waive this requirement after at least one year of sampling.

d. **Biological Monitoring**

An annual biological sampling program will begin no later than **sixty (60) days after the effective date of the permit** and occur annually for the effective period of the permit. The goals and objectives of the biological sampling program include (1) to expand the baseline biological studies conducted during the period of 1999 through 2005 by the permittee, including the fish sonic tagging studies, (2) to identify any changes in fish populations and migration patterns resulting from Facility operation; (3) to define the extent of habitat and tolerance temperatures for yellow perch; (4) to determine the ***effectiveness*** ~~efficiency~~ of ***any deployed exclusion technology*** ~~the BNS~~; (5) to refine the understanding of the timing of and temperatures associated with the Charles River anadromous fish runs; and (6) to refine the understanding of the occurrence and nature of nuisance phytoplankton blooms. This monitoring shall be consistent with any State or Federal efforts to limit the collection of certain fish species, such as the current three year moratorium on the harvest, possession, and sale of alewives and bluebacks (river herring) from portions of the Charles River. This moratorium was put in place in November 14, 2005 by MADMF. In cases where sampling as described herein is not allowed, the permittee shall implement alternative methods, if available, to obtain comparable information.

1. Beach Seine and Push-net Sampling

(a) Beach seine collections will be made at four locations, designated Hyatt (S4), Storrow (S3), Lagoon (S2), and ***Near Fiedler (S1A)*** ~~Fiedler (S1)~~ as shown on Attachment H. ***Collections will not be made at Fiedler (S1). Station S1A will be***

established as close to Fiedler Station (S1) as practical, in a shoreline area that is suitable for beach seining. Finfish will be sampled in the lower Charles River using a 100 foot by 6 foot, ¼-inch mesh nylon beach seine. Since previous sampling showed that the bottom at the Hyatt Station was generally free of obstructions during previous sampling events, two hauls will be made there while a single haul will be made at the remaining sites. To improve collection efficiency at the rocky collection sites, ~~particularly Feidler Station,~~ an electroshocker ***may*** ~~will~~ be used inside the beach seine. Each haul will be standardized to the extent possible by walking one-third of the net perpendicular to shore, turning parallel to shore while deploying the middle third, then returning to shore while deploying the final one-third. Sampling will begin during July of each year and will continue weekly through the end of November or until river herring are not collected for two consecutive weeks. For the first year, if the effective date of the permit is after August 31, the permittee will initiate this sampling the following July. The sampling shall continue while the permit is effective."

All fish collected by beach seine will be identified, counted, and measured to the nearest millimeter in total length. When large collections of a single species are obtained, a subsample of 30 to 50 fish will be measured. The aggregate weight of this subsample shall also be recorded. In such cases, an attempt will be made to select the largest and smallest fish of the entire sample and record their lengths before obtaining a representative subsample.

Temperature, dissolved oxygen, pH and conductivity data will be collected at approximately two foot intervals from the surface to the bottom at each beach seine sampling event as part of the fish collection program.

(b) The permittee shall continue its annual push-net monitoring effort following procedures and protocols that ensure, to the degree practicable, that the data collected is comparable to data collected in previous annual push-net monitoring efforts. The results of this sampling shall be included in the AMR.

The push-net sampling program shall be conducted each year for the duration of the permit. A net, of the same dimensions used in the 2005 sampling program, mounted on the front of a motorized boat, shall be used to collect fish at the surface of the lower Basin of the Charles at nine different stations. Sampling shall be initiated on the third week of June and continue through the last week in October. Paired, 5-minute samples shall be collected at each of the nine stations listed below on each of the sampling dates. Sampling frequency at each of the following stations shall be five times per month, approximately once weekly, with one additional "floating" sampling event at each station within the month. Push-net sampling shall take place at nighttime only.

Stations:

1. historical Hyatt station,
2. across river from the historical MIT station, on Cambridge side
3. historical Lagoon station,
4. across river from the historical "Fiedler" Station, on Cambridge side
5. historical Boston station
6. historical Mid Channel station
7. historical Deep Diffuser station
8. historical Museum of Science (MOS) Locks station
9. downstream of the MOS

Each station shall be sampled twice per sampling date, as in the past. In addition, two water temperature measurements shall be taken at the start of each 5-minute sampling event: a) a surface water temperature measurement; and b) a water temperature measurement at the water depth corresponding to the deepest point of the push-net. A flow measurement shall also be taken during each 5-minute survey and be used to estimate the volume of water flow through the net during the 5-minute sampling event.
For each push-net sampling event, the permittee shall report the following information to EPA and MassDEP:

- Station
- Date of sampling event
- Beginning and end time of the sampling event
- Water temperature at the surface at the beginning of the sampling event
- Water temperature at the deepest point of the push-net used in the survey at beginning of sampling event
- Flow information, from flow meter, from each sampling event
- Number and species of fish caught
- Estimated life stage of each individual caught (e.g., young-of-year, adult)

2. <u>Gill and/or Fyke Net Sampling</u>

Station G1. Net samples will be collected to obtain information on fishes entering or residing in the Broad Canal. ***When neither the exclusion technology nor the coarse mesh barrier nets are deployed, net samples shall be collected*** for comparison with those impinged on the Facility intake screens ~~or barrier nets~~. (**Attachment H**)

Station B1. Additional subsurface net collections will be taken in the Charles River lower basin, boat traffic permitting, to determine if fish are utilizing relatively deep areas (**Attachment H**).

Gill nets, each 100-ft long, 8-ft deep and consisting of four 25-ft monofilament panels constructed with ½, 3/4, 1, and 1.5-inch bar mesh, will be used unless successfully supplanted by fyke nets. Nets will be set for approximately 24 to 30-hour periods on each occasion.

In addition to gill net samples, fyke nets will be anchored on the bottom of the Charles River to provide additional information on deep-water habitation by Charles River fish. These nets will measure 3.5 feet in diameter at the mouth with two throats and 25 foot wings. They will be constructed of 0.5-inch bar mesh. Like the gill nets, they will be set for single overnight periods ranging in length from 24 to 30 hours. Fyke nets will be substituted for gill nets if program results indicate that equivalent data can be obtained.

Sampling will begin during the first full week of March of each year and will be conducted every week through November for the first year and then every two weeks for each following year. For the first year, if the effective date of the permit is after August 31, the permittee will initiate this sampling the following March. Sampling will continue while the permit is effective.

All fish obtained in the gill nets will be identified, counted, measured to the nearest millimeter total length, and weighed to the nearest gram. Approximate depth of capture will be determined by noting the position of each fish entangled in the net.

Temperature, dissolved oxygen, pH and conductivity (salinity) data will be collected at approximately meter intervals from surface to bottom at each net location during initial deployment and retrieval of the nets.

3. Yellow Perch: Treatment of Captured Fish.

Any sampling of at least 30 large juvenile and adult perch collected in the beach seine and gill nets (if in good condition) will be tagged using individually numbered t-bar anchor tags.

From each individual, total length (mm), weight (g), sex and reproductive condition (when possible), and tag information will be recorded. Scale samples will be obtained for age determination. These data will provide information on growth in length and weight as well as mortality rates in the lower Charles River basin. As a component of the AMR, this information will be compared with data from other locations in New England and elsewhere to assess if Charles River perch appear to grow slowly, suffer high mortality, or otherwise appear stressed.

To provide information on the depth at which yellow perch occur at different times of year and at different locations, the permittee will explore the feasibility of using boat-mounted, side scanning hydroacoustics to characterize location and make-up of fish in the areas of the lower Charles River basin. Limited deployment of gill nets or Fyke nets would be needed to validate the sonar targets. EPA will consider, as a sampling substitute, the use of such a hydroacoustic method to characterize the location and make-up of yellow perch (as well as other populations of fish) as described above in order to reduce the frequency of net sampling. Any proposal to substitute hydroacoustic sampling must be submitted in writing.

4. Ichthyoplankton Sampling

Ichthyoplankton sampling will be conducted at the five following stations in the Lower Charles River basin (**As shown in Attachment H**):

Station I7 (Soldiers Field), Station I5 (MIT), Station I4 (Charles River), Station I3 (Old Channel) and Station I2 (Museum of Science)

Each station will be made up of two to three transects, oriented parallel to the shore (spaced equally near the Cambridge bank, at mid-river and near the Boston bank), with two discrete depths sampled per transect (20% depth from the surface and 80% depth from the surface).

At each depth of each transect for a station, duplicate samples will be collected with 33-cm diameter paired "bongo" nets constructed of 0.333-mm nylon mesh. Tow speeds will be maintained at 1 to 1.3 m/sec (2 to 2.5 knots), each tow covering a straight-lined transect. ***If, on a particular sampling run, it is not feasible to run an uninterrupted straight-lined tow, then the permittee may substitute a comparable collection transect (for example, multiple straight-lined tows or a circular tow) and record (1) why an uninterrupted straight-lined tow was not feasible, and (2) the reasons supporting the permittee's selected collection transect.*** Each tow will be approximately 6 to 9 minutes in length depending on the abundance of phytoplankton, inorganic debris, and detritus. Filtration volumes will be determined for each tow using calibrated General Oceanics 2030R flow meters or equivalent, mounted in each net mouth and shall average 100 m3 of water.

Following each tow, the nets will be washed and the contents of the cod end transferred to a one-liter jar containing sufficient Formalin to provide a 5-10% Formalin-to-sample solution. Information regarding time of day, flow meter readings, station, and date will be recorded on waterproof tags placed in each jar and in the field logbook. In addition, water temperature, pH, conductivity, and dissolved oxygen will be measured and recorded at each transect of each station at the surface and at one-meter intervals to the bottom.

Weekly sampling will begin on the effective date of the permit if the effective date falls within the March - August time frame, or otherwise begin in the first week of March of the following year. Weekly ichthyoplankton sampling for the period of March 1 through August 31 will continue for the effective period of the permit.

Temperature, dissolved oxygen, pH and conductivity (salinity) data will be collected at approximately meter intervals from surface to bottom in the immediate vicinity of the ichthyoplankton transect. All fish eggs and larvae will be identified and counted to the lowest possible taxonomic level. Counts will be expressed as numbers of individuals per 100 m3 of water. Larval river herring will be examined for condition to provide qualitative information on the general probability of survival. .

5. River Herring Spawning Migration Monitoring

Lock Number 3 of the New Charles River Dam is the large lock that is used to pass anadromous fish. This station will be used to monitor the passage of anadromous fish into the Charles River.

A **Watertown Dam Station** will also be monitored to estimate the numbers and duration of anadromous fish runs past that station.

At **Lock Number 3**, fish will be collected with continually attended small mesh gill nets or trammel nets set for reasonable periods of time. The passage of fish at the New Charles River Lock and Dam and the Watertown Dam Stations may also be monitored using hydroacoustics or other techniques agreed to by EPA and MassDEP, in writing. A program including suggested refinements and quality assurance of the hydroacoustic sampling methods described by the permittee in Exhibit A (River Herring Run Size Estimation) of the July 23, 2003 letter submitted to EPA would be acceptable.

When net sampling is conducted, the stations will be sampled three times per week, beginning in April and continuing through June, or until river herring are not collected for an entire week. This phase of the monitoring studies is scheduled to be conducted annually for the effective period of the permit because of the expected variability in the size and occurrence of each year's migration.

Data will be collected (1) to establish when different anadromous species enter the river, (2) to allow subsamples to be examined for the ratio between alewives and blueback herring, (3) to determine when the alewife in-migration is complete, and (4) to gather information on the timing and volume of anadromous fish that reach the Watertown Dam.

6. Treatment of Captured Fish (River Herring)

The river herring sonic tracking program conducted in 2001 and 2003 by the permittee will be repeated annually as part of the monitoring program. The tracking program will begin within **sixty (60) days of the effective date of the permit** and be conducted during April through June each year for the effective period of the permit.

Approximately 75-85 immigrating adult river herring will be collected in the Charles River New Dam and Lock System between April and June and tagged with 20 and 60-day sonic tags inserted orally into the stomach. Tagged herring movements will be monitored with both fixed and mobile hydrophones. Mobile gear will allow individual fish to be tracked as they move through the lower basin. Fixed receivers will record the presence of fish that are not being individually tracked at any given time, as well as their general position during times when the mobile system is not in use. The boat-mounted mobile receiver will be connected to two hydrophones, an omni-directional hydrophone used to locate the general position of specific fish and a directional hydrophone to more accurately pinpoint position. With the boat-mounted station, fish will be tracked to determine movement patterns in the area between fixed stations. A digital global positioning system (DGPS) will be used with the mobile unit to record boat location as various fishes are monitored. A fish's location may be triangulated with the aid of a sighting compass and directional hydrophone. Information available in the literature and confirmed in 2001 indicates that anadromous herring continue to swim at night but that little directional movement occurs. To confirm this in the Charles River, several of the tracking periods will include nighttime hours.

Fixed receiver locations established in past years programs will also be used during the post-operation survey. The lower Charles River will be divided into four sections. These areas are from the New Charlestown Dam to the Museum of Science, the Museum of Science to Longfellow Bridge, Longfellow Bridge to Harvard Bridge, and upstream of the Harvard Bridge. As river herring move upstream, they will pass the fixed stations, which detect and record the signal emitted by each tag. The fish's identification number will be determined from the tag frequency and pulse interval. Direction of travel will be determined by reviewing the time each fish passed each respective hydrophone. Throughout the lower Basin of the Charles River (New Dam to Harvard Bridge), four fixed hydrophone systems, receivers, and data loggers will be secured to bridges and piles in weather-tight boxes. Stations will include above the Museum of Science, Boston shore, above the Museum of Science, Cambridge shore, at the Longfellow Bridge, and at the Harvard Bridge. Both the Longfellow Bridge and Harvard Bridge stations will each have two hydrophones attached to dual input scanning receivers. Hydrophones between the Museum of Science and the Longfellow Bridge will face across the River to determine if river herring travel across the River toward the Facility or typically follow the old channel near the Boston side of the River to upstream locations. Fish which have moved upstream of the Harvard Bridge will be documented.

Periodically during each mobile tracking day, hydrographic data will be collected at several locations in the lower Basin to record water temperature, conductivity, and dissolved oxygen. Locations will include deep areas where saline waters accumulate and dissolved oxygen is likely to be reduced. Readings will be taken at the surface and at three-foot depth intervals to bottom. Additional readings will be taken on non-tracking days in conjunction with the ichthyoplankton sampling program.

When all data from the fixed stations and the mobile station are collected, the location of each fish shall be displayed at fixed points in time and their path through the lower Basin shall be presented using mapping software such as ArcView. This will show the movement of tracked fish in the lower Charles River Basin. The objective of this monitoring will be to (1) estimate the rate of alewife and blueback herring travel through the lower Basin, (2) estimate the amount of time each fish spends in the northeast basin near the Facility, (3) determine the depth of travel for those individuals fitted with depth sensing tags, and (4) obtain the corresponding water temperature at the depths and locations where fish were documented. Mean transit time through the river segments will be established. Deviation from the mean will be presented in tabular and graphical form for each fish. Cumulative frequency distributions can be prepared to display portions of total time in the lower basin in which fish are in the Broad Canal or the area around Kendall Station. These data will be compared with data collected in all previous years as part of the AMR.

7. ***Entrainment Reduction Technology Evaluation***

(a) The permittee shall conduct sampling annually to determine the effectiveness of the exclusion technology during periods of peak egg and larvae concentrations when the exclusion technology is in operation.

(b) In the vicinity of the exclusion technology, the permittee shall filter a sufficient volume of water which has not yet come into contact with the exclusion technology (outside the exclusion technology). A sufficient volume of water shall also be filtered using the same method as soon as possible, but no longer than two hours later, comprising water that has passed through the exclusion technology. The filtering mechanism used must retain the smallest eggs and larvae expected to be free floating or drifting in the water column of the Charles River.

(c) All fish eggs and larvae collected from these filtered samples shall be counted and identified to the lowest distinguishable taxonomic category. An appropriate number of those counted shall be measured to the nearest 0.1 mm to estimate the average and median size of the eggs and larvae filtered.

(d) A sufficient number of these filtered samples shall be collected at representative locations outside of the exclusion technology and at locations where water has passed through the exclusion technology during periods of peak ichthyoplankton concentrations each year. The number of samples must be sufficient to allow for a meaningful statistical analysis to evaluate any significant differences between the numbers of eggs and larvae collected in water outside of the

exclusion technology and those in water that has passed through the exclusion technology.

(e) The permittee shall make a statistically supported comparison for each paired group of samples to determine the degree to which eggs and larvae are being prevented from moving past the exclusion technology and shall report the statistical power for these comparisons.

(f) The permittee shall present all raw data, calculations and results of this entrainment reduction evaluation in the AMR.

~~7. Barrier Net Study~~

~~For the first year of operation of the barrier net system (BNS) only, the permittee shall evaluate the effectiveness of the BNS in a barrier net study. For this requirement, the permittee shall repeat the fine-mesh barrier test study that it conducted in May through July of 2000 (February 2001 NPDES application, Volume II of II). This study shall begin within the first full May through July period following the installation date of the BNS and the results of this study shall be presented in the AMR for that period.~~

~~As part of the barrier net study, the permittee shall calculate or measure the representative through screen velocity at the barrier nets when the BNS is in place and at the traveling screens when the BNS is not in place , to within an accuracy of one hundredth of a foot per second. This sampling is necessary to verify that the 0.5 fps through screen velocity performance standard is being attained (see Part I.A.11 of the permit).~~

8. Outfall Pipe Monitoring

Once per week during the months of April, May and June, the permittee shall conduct surveillance of Outfall 001 and the Charles River in the vicinity of this outfall. Each surveillance event shall document the presence, abundance and behavior of fish. Each surveillance event shall include visual inspection, photography or other means to effectively estimate fish numbers, characteristics and behavior (i.e. spawning and congregating). These surveillance results shall be reported annually in the AMR.

9. Impingement Reduction Technology Evaluation

(a) Impingement Reduction Evaluation

(i) Each year, the permittee shall conduct monitoring to determine the species, size and number of adult and juvenile fish impinged on the traveling screens of the CWIS.

(ii) The permittee shall conduct impingement monitoring at Units 1, 2, and 3, at least once per eight hour shift, whenever the traveling screens are operated to comply with Part I. A. 11. c. of this permit.

(iii) All live fish collected in accordance with Part I. A. 11. c. shall be identified to species, measured to determine total length (to the nearest mm), and counted before being returned to the receiving water. Sex and reproductive condition of the impinged fish shall be determined, if possible.

(iv) To the extent practicable, all dead fish obtained from the traveling screens shall also be identified to species, measured to determine total length (to the nearest mm), and counted before being discarded.

(v) All impingement information collected in (i) – (iv) shall be recorded on log sheets, on which shall also be recorded the time the information was collected, the name of the person collecting the information, and the rate of water being withdrawn during the eight hour impingement monitoring period. The permittee shall maintain data separately for the three intake structures.

(vi) Impingement information shall be presented in the AMR and compared with historical impingement information to determine the overall level of impingement reduction on a monthly basis.

(b) Ichthyoplankton Survivability

(i) Each year, the permittee shall conduct sampling to determine to the extent practicable the number of eggs and larvae that become impinged on the exclusion technology. ~~the number and condition of such impinged eggs and larvae that are released by the action of the exclusion technology, and the number and condition of eggs and larvae that remain impinged on the exclusion technology~~.

(ii) The permittee shall examine a representative section of a known area of the exclusion technology to determine the number and condition of eggs and larvae impinged on the surface of the media.

~~(iii) The permittee shall then initiate a mechanism to gently release eggs and larvae. The eggs and larvae that are gently dislodged from the representative section of the exclusion technology shall be collected. Eggs and larvae collected shall be examined to determine their condition as soon as practicable and again in 24 hours.~~

(iii) The representative section of the exclusion technology shall once again be examined by the permittee after the mechanism to gently dislodge the organisms has completed its activity to determine the number and condition of eggs and larvae that still reside on the media.

(iv) This sampling shall be repeated a sufficient number of times over the course of the peak egg and larval period each year to allow for a meaningful statistical treatment of the data.

(v) The raw data, calculations and results of this ichthyoplankton survivability evaluation shall be presented in the AMR. The report shall include the density and condition of eggs and larvae ~~first~~ impinged. ~~those estimated to be dislodged by the exclusion technology mechanism, and those remaining on the media, both as raw numbers and relative percentages~~.

9. ~~Impingement Sampling~~

~~An impingement sampling program will be established by the permittee within **ninety (90) days of the effective date of the permit**. While the barrier nets are in place, impingement monitoring shall take place at the barrier nets and for the rest of the year at the traveling screens. Monitoring shall be conducted once per week. For the time periods when the barrier nets are not in place, a screenwash monitoring and alert program, consistent with monitoring begun in 1999 by the permittee, will resume and continue through the effective period of the permit. The purpose of the program is to provide an estimate of the number and species of finfish impinged on the barrier nets and on each of the three circulating water traveling screens at the Facility. All debris washed off the screens will be collected in a wire mesh basket and the finfish will be placed in plastic bags with a label containing information relative to date, time of day, unit number, operator, and any general comments. Samples will be frozen and processed by a trained fisheries biologist on a weekly basis. All fish will be identified to species, counted, and measured to the nearest millimeter. Adult river herring will be examined internally to determine gonad condition, i.e., whether fish are in pre- or post-spawning condition. Data will be maintained separately for the three intake structures. An attempt will be made to determine the reproductive condition and sex of all fish collected, if possible. Impingement rate per hour for each unit and the monthly rate will be calculated. This program shall be in place for the effective period of the permit.~~

10. Phytoplankton Monitoring

Phytoplankton samples will be collected from the Charles River during the effective period of the permit, to investigate occurrence and nature of nuisance blooms. Once a week between June 1 and October 31, one liter phytoplankton samples will be collected at three locations, Stations A, B and C as shown on **Attachment B**. At each location, samples will be collected in duplicate at depths where the light level, relative to surface solar illumination, is 100%, 50%, 25%, 10%, 1%, and 0%. In conjunction with each collection series at each location, recordings shall also be taken for water temperature, conductivity, and dissolved oxygen.

Phytoplankton samples will be preserved in Lugol's Solution and returned to a laboratory for analysis. Phytoplankton will be identified to the lowest possible taxonomic category and counted. Counts will be expressed as numbers of cells per milliliter.

Water collection for nutrient water chemistry shall be performed once a week between June 1 and October 31. Samples will be analyzed for all of the parameters listed in Part I.A.14.c.2. and all the sampling procedures of that section will be followed.

11. Additional Entrainment Analysis

Each year, using site specific data collected each year pursuant to the permit requirements, the permittee shall also conduct the following analyses:

(a) an adult equivalent analysis for alewife, blueback, and white perch eggs and larvae lost to impingement on the exclusion technology and/ or entrainment through the facility each year. The permittee shall also perform this analysis for any species that comprises ten percent or more of the impingement on the exclusion technology and/or that is entrained through the facility.

(b) the percentage loss of the egg and larval production for alewives, bluebacks and white perch within the lower Charles River Basin that is due to the facility's intakes each year. Each of these impact evaluations shall take into account the total number of eggs and larvae impinged on the exclusion technology and the total number of eggs and larvae entrained through the facility.

(c) a reliable estimate of the river herring population that enters the lower Basin each year and the relative abundance of alewife in accordance with the provisions of Parts I.A.14.d. 5 and 6, provided that the monitoring at the Watertown dam shall also provide data on the number of river herring that pass over the dam.

The information calculated each year in (a) through (c) above shall be presented in the AMR.

~~11. Biological Monitoring Program for Entrainment and Water Quality Certification~~

~~Consistent with the requirement of the WQC, the permittee shall, within 60 days of the EDOTP, submit an entrainment-related sampling, monitoring and reporting program plan for MassDEP's review and approval. The plan shall be designed and implemented to provide information to evaluate the entrainment impact of the CWIS on the habitat and designated use of the lower Charles River and the effectiveness of the BNS/EPS in meeting the WQC performance standards. The plan, upon implementation, shall include the following components:~~

~~(a) a reliable estimate of the river herring population that enters the lower Basin and the relative abundance of alewife in accordance with the provisions of Parts 14.d. 5 and 6 of the Final Permit, provided that the monitoring at the Watertown dam shall also provide data on the number of river herring that pass over the dam;~~

~~(b) a sampling, monitoring and assessment methodology to evaluate the performance of the BNS/EPS. The plan shall include a methodology to determine the reduction in the entrainment of river herring and white perch eggs and larvae as a result of the operation of the BNS or EPS, a description of the locations where sampling/monitoring will take place, the dates and frequency of sampling/monitoring, the means and timing by which samples will be taken, a methodology to estimate the conditions of the eggs and larvae before the samples are preserved and the sample preservation methods. All fish eggs and larvae shall be identified to the lowest distinguishable taxonomic category and counted and an appropriate number shall be measured to the nearest 0.1 mm to estimate the average and median size of larvae being impinged and entrained;~~

~~(c) a sampling, monitoring and assessment methodology to evaluate the survival potential of river herring and white perch larvae that are impinged on the BNS/EPS and returned to the Canal or the River; and~~

~~(d) methodologies to evaluate the impact of the permittee's CWIS on the populations of alewives and bluebacks that enter the lower Charles. The methods shall include: (1) an adult equivalent analysis for alewives and bluebacks; and (2) the percent loss of the egg and larval production for alewives, bluebacks and white perch within the Charles that is due to the facility's intake. Each of these impact evaluations shall take into account the total number of eggs and larvae drawn into the canal, the total number of eggs, larvae and juveniles impinged on the BNS/EPS and the total number of eggs and larvae entrained through the facility.~~

e. **Regular Monitoring Program Evaluation**

1. The permittee shall evaluate the Monitoring Program (MP), its collected data and protocols annually in the Annual Monitoring Report, at a minimum. The permittee

may make recommendations for improvements to the Monitoring Program, including further monitoring or studies and/or reductions in monitoring or studies. Additional sampling locations and any other justified analytical or program improvements or changes may be authorized in writing by EPA.

2. The permittee's evaluation of the MP shall include the following at a minimum:
   (a) An annual review of the sampling and analysis plan and data;
   (b) An identification of change in the aquatic or biological system;
   (c) An assessment of statistically significant change;
   (d) An assessment of biological importance;
   (e) An evaluation of the likelihood that the Facility contributed to the change; and
   (f) An identification of improved sampling and/or analysis technologies, including, but not limited to: statistical methods, sampling equipment, and modeling technologies.

This evaluation and recommendations, if any, shall be submitted with the Annual Monitoring Report for review, approval, disapproval or modification by EPA.

3. Monitoring Program Improvements

   This permit authorizes improvements, as approved by EPA, to the MP when indicated by results and analysis of monitoring data. Acceptable data from other sources may also be considered. Analysis of data from parameters such as temperature, delta T, and rates of impingement or entrainment and other biological monitoring identified in the MP may indicate the need for monitoring program enhancements or improvements.

   Within **thirty (30) days of authorization of MP improvements**, the permittee shall update and resubmit the MP to include any such improvements.

   Examples of MP improvements include, but are not limited to:

   (a) Additional or reduced sampling stations;
   (b) Increased or decreased sampling frequency;
   (c) Changes demonstrated to reduce data variability or increased analysis sensitivity;
   (d) Changes demonstrated to increase the power to detect statistical significance;
   (e) Collection of additional data demonstrated to more definitively determine Facility impacts;
   (f) Additional predictive models such as species-specific population, community, and/or trophic level risk, or
   (g) Elimination or reduction of monitoring requirements that EPA and MassDEP determine are no longer necessary.

4. **Monitoring Program Summary**. A summary of monitoring requirements is included in **Attachment I.**

15. Contingency for Reopener

If any of the monitoring conducted pursuant to this permit and/or any related studies indicate that there are water quality violations, or that the BIP is not being adequately protected due to the discharges from the Facility, or a TMDL is approved for the Charles River basin, then this permit may be modified to include numerical limitations and/or requirements to address these violations. Permit modification will be conducted according to 40 CFR §122.62, 122.63, 122.64 and 124.5.

~~16. Reports Required Pursuant to 316(b) Phase II Regulations for Reducing Adverse Environmental Impacts From Impingement and Entrainment~~

~~a. The permittee shall submit a **Comprehensive Demonstration Study (CDS)** pursuant to 40 C.F.R. § 125.95 as expeditiously as practicable, but **not later than January 7, 2008**. The purpose of the CDS is to characterize impingement mortality and entrainment by Mirant Kendall's cooling water intake structures, to describe the operation of the facility's cooling water intake structures, and to confirm that the technologies, operational measures, and/or restoration measures already installed, or that the permittee proposes to install, at the facility meet the applicable compliance requirements of 40 C.F.R. § 125.94. As part of the CDS, the permittee shall submit a **Proposal for Information Collection (PIC)** required by 40 C.F.R. §125.95(b)(1).~~

~~b. Consistent with 40 C.F.R. § 125.95(a)(2), the permittee shall also submit to the Regional Administrator by January 7, 2008, **the information required by 40 C.F.R. §§ 122.21(r)(2), (3) and (5)**, which includes:~~

~~1. Source Water Physical Data~~
~~2. Cooling Water Intake Structure Data~~
~~3. Cooling Water System Data~~

PART B. MONITORING AND REPORTING

Monitoring results obtained during the previous month shall be summarized for each month and reported on separate discharge monitoring report (DMR) forms and other forms as described in **Attachment G** and postmarked no later than the 15th day of the month following the effective date of the permit. An **Annual Monitoring Report** is also due no later than 90 days after the effective date of the permit and annually thereafter, as described in Section 14.a. In addition, a record of real-time, continuous monitoring data in an electronic format must be provided to EPA and/or DEP upon request, within a reasonable time period. The electronic format must be readable and presented in a generally available spreadsheet software program.

Mirant Kendall, LLC., may assert a business confidentiality claim with respect to part or all of the information submitted to EPA in the manner described at 40 CFR Part 2.203(b). Information covered by such a claim will be disclosed by EPA only to the extent, and by means, of the procedures set forth in 40 CFR Part 2, Subpart B. If no such claim accompanies the information when it is submitted to EPA, it may be made available to the public by EPA without further notice to Mirant Kendall. Effluent information shall not be regarded as confidential.

Signed and dated originals of the DMRs, and all Annual Monitoring Reports (AMR) required herein, shall be submitted to the Director and the State at the following addresses:

U.S. Environmental Protection Agency
Water Technical Unit (SEW)
P.O. Box 8127
Boston, Massachusetts 02114

The State Agency is:

Massachusetts Department of Environmental Protection
Bureau of Resource Protection
Northeast Regional Office
1 Winter Street
Boston, MA 02108

In addition, copies of all DMRs only and all other notifications shall be submitted to the following address:

Massachusetts Department of Environmental Protection
Division Of Watershed Management
Surface Water Discharge Permit Program
627 Main Street, 2nd Floor
Worcester, Massachusetts 01608

Copies of all notifications, submittals, continuous monitoring data requests and QAPPS, with the exception of DMRs and AMRs shall be sent to the following address:

U.S. Environmental Protection Agency
Massachusetts Office of Ecosystem Protection (CPE)
One Congress Street
Suite 1100
Boston, Massachusetts 02114
Attention: George Papadopoulos

The AMRs only will also be submitted to the following addresses:

Massachusetts Coastal Zone Management
251 Causeway Street, Suite 800
Boston, MA 02114
Attention: Todd Callaghan

and

Massachusetts Division of Marine Fisheries
Annisquam River Marine Fisheries Station
30 Emerson Avenue
Gloucester, MA 01930
Attention: Jack Schwartz, Ph.D.

PART C. STATE PERMIT CONDITIONS

This discharge permit is issued jointly by the U. S. Environmental Protection Agency (EPA) and the Massachusetts Department of Environmental Protection (MassDEP) under federal and state law, respectively. All the terms and conditions of this permit are hereby incorporated into and constitute a discharge permit issued by the Commissioner of the MassDEP pursuant to M.G.L. Chap. 21, §43.

Each agency shall have the independent right to enforce the terms and conditions of this permit. Any modification, suspension or revocation of this permit shall be effective only with respect to the agency taking such action, and shall not affect the validity or status of this permit as issued by the other agency, unless and until each agency has concurred in writing with such modification, suspension or revocation. In the event any portion of this permit is declared invalid, illegal or otherwise issued in violation of state law such permit shall remain in full force and effect under federal law as a NPDES Permit issued by the U.S. Environmental Protection Agency. In the event this permit is declared invalid, illegal or otherwise issued in violation of federal law, this permit shall remain in full force and effect under state law as a permit issued by the Commonwealth of Massachusetts.

NPDES PART II STANDARD CONDITIONS
(January, 2007)

TABLE OF CONTENTS

PART II. A. GENERAL REQUIREMENTS

1. Duty to Comply

   The permittee must comply with all conditions of this permit. Any permit noncompliance constitutes a violation of the Clean Water Act (CWA) and is grounds for enforcement action; for permit termination, revocation and reissuance, or modification; or for denial of a permit renewal application.

   a. The permittee shall comply with effluent standards or prohibitions established under Section 307(a) of the sludge use or disposal established under Section 405(d) of the CWA within the time provided in the regulations that establish these standards or prohibitions, even if the permit has not yet been modified to incorporate the requirements.

   b. The CWA provides that any person who violates Section 301, 302, 306, 307, 308, 318, or 405 of the CWA or any permit condition or limitation implementing any of such sections in a permit issued under Section 402, or any requirement imposed in a pretreatment program approved under Section 402 (a)(3) or 402 (b)(8) of the CWA is subject to a civil penalty not to exceed $25,000 per day for each violation. Any person who negligently violates such requirements is subject to a fine of not less than $2,500 nor more than $25,000 per day of violation, or by imprisonment for not more than 1 year, or both. Any person who knowingly violates such requirements is subject to a fine of not less than $5,000 nor more than $50,000 per day of violation, or by imprisonment for not more than 3 years, or both.

   c. Any person may be assessed an administrative penalty by the Administrator for violating Section 301, 302, 306, 307, 308, 318, or 405 of the CWA, or any permit condition or limitation implementing any of such sections in a permit issued under Section 402 of the CWA. Administrative penalties for Class I violations are not to exceed $10,000 per violation, with the maximum amount of any Class I penalty assessed not to exceed $25,000. Penalties for Class II violations are not to exceed $10,000 per day for each day during which the violation continues, with the maximum amount of any Class II penalty not to exceed $125,000.

   Note: See 40 CFR §122.41(a)(2) for complete "Duty to Comply" regulations.

2. Permit Actions

   This permit may be modified, revoked and reissued, or terminated for cause. The filing of a request by the permittee for a permit modification, revocation and reissuance, or termination, or notifications of planned changes or anticipated noncompliance does not stay any permit condition.

3. Duty to Provide Information

   The permittee shall furnish to the Regional Administrator, within a reasonable time, any information which the Regional Administrator may request to determine whether cause exists for modifying, revoking and reissuing, or terminating this permit, or to determine compliance with this permit. The permittee shall also furnish to the Regional Administrator, upon request, copies of records required to be kept by this permit.

4. Reopener Clause

The Regional Administrator reserves the right to make appropriate revisions to this permit in order to establish any appropriate effluent limitations, schedules of compliance, or other provisions which may be authorized under the CWA in order to bring all discharges into compliance with the CWA.

For any permit issued to a treatment works treating domestic sewage (including "sludge-only facilities"), the Regional Administrator or Director shall include a reopener clause to incorporate any applicable standard for sewage sludge use or disposal promulgated under Section 405 (d) of the CWA. The Regional Administrator or Director may promptly modify or revoke and reissue any permit containing the reopener clause required by this paragraph if the standard for sewage sludge use or disposal is more stringent than any requirements for sludge use or disposal in the permit, or contains a pollutant or practice not limited in the permit.

Federal regulations pertaining to permit modification, revocation and reissuance, and termination are found at 40 CFR §122.62, 122.63, 122.64, and 124.5.

5. Oil and Hazardous Substance Liability

Nothing in this permit shall be construed to preclude the institution of any legal action or relieve the permittee from responsibilities, liabilities or penalties to which the permittee is or may be subject under Section 311 of the CWA, or Section 106 of the Comprehensive Environmental Response, Compensation and Liability Act of 1980 (CERCLA).

6. Property Rights

The issuance of this permit does not convey any property rights of any sort, nor any exclusive privileges.

7. Confidentiality of Information

a. In accordance with 40 CFR Part 2, any information submitted to EPA pursuant to these regulations may be claimed as confidential by the submitter. Any such claim must be asserted at the time of submission in the manner prescribed on the application form or instructions or, in the case of other submissions, by stamping the words "confidential business information" on each page containing such information. If no claim is made at the time of submission, EPA may make the information available to the public without further notice. If a claim is asserted, the information will be treated in accordance with the procedures in 40 CFR Part 2 (Public Information).

b. Claims of confidentiality for the following information will be denied:

(1) The name and address of any permit applicant or permittee;
(2) Permit applications, permits, and effluent data as defined in 40 CFR §2.302(a)(2).

c. Information required by NPDES application forms provided by the Regional Administrator under 40 CFR §122.21 may not be claimed confidential. This includes information submitted on the forms themselves and any attachments used to supply information required by the forms.

8. Duty to Reapply

If the permittee wishes to continue an activity regulated by this permit after its expiration date, the permittee must apply for and obtain a new permit. The permittee shall submit a new application at least 180 days before the expiration date of the existing permit, unless permission for a later date has been granted by the Regional Administrator. (The Regional Administrator shall not grant permission for applications to be submitted later than the expiration date of the existing permit.)

9. State Authorities

Nothing in Part 122, 123, or 124 precludes more stringent State regulation of any activity covered by these regulations, whether or not under an approved State program.

10. Other Laws

The issuance of a permit does not authorize any injury to persons or property or invasion of other private rights, nor does it relieve the permittee of its obligation to comply with any other applicable Federal, State, or local laws and regulations.

PART II. B. OPERATION AND MAINTENANCE OF POLLUTION CONTROLS

1. Proper Operation and Maintenance

The permittee shall at all times properly operate and maintain all facilities and systems of treatment and control (and related appurtenances) which are installed or used by the permittee to achieve compliance with the conditions of this permit and with the requirements of storm water pollution prevention plans. Proper operation and maintenance also includes adequate laboratory controls and appropriate quality assurance procedures. This provision requires the operation of back-up or auxiliary facilities or similar systems only when the operation is necessary to achieve compliance with the conditions of the permit.

2. Need to Halt or Reduce Not a Defense

It shall not be a defense for a permittee in an enforcement action that it would have been necessary to halt or reduce the permitted activity in order to maintain compliance with the conditions of this permit.

3. Duty to Mitigate

The permittee shall take all reasonable steps to minimize or prevent any discharge or sludge use or disposal in violation of this permit which has a reasonable likelihood of adversely affecting human health or the environment.

4. Bypass

a. Definitions

(1) *Bypass* means the intentional diversion of waste streams from any portion of a treatment facility.

(2) *Severe property damage* means substantial physical damage to property, damage to the treatment facilities which causes them to become inoperable, or substantial and permanent loss of natural resources which can be reasonably expected to occur in the absence of a bypass. Severe property damage does not mean economic loss caused by delays in production.

b. Bypass not exceeding limitations

The permittee may allow any bypass to occur which does not cause effluent limitations to be exceeded, but only if it also is for essential maintenance to assure efficient operation. These bypasses are not subject to the provision of Paragraphs B.4.c. and 4.d. of this section.

c. Notice

(1) Anticipated bypass. If the permittee knows in advance of the need for a bypass, it shall submit prior notice, if possible at least ten days before the date of the bypass.

(2) Unanticipated bypass. The permittee shall submit notice of an unanticipated bypass as required in paragraph D.1.e. of this part (Twenty-four hour reporting).

d. Prohibition of bypass

Bypass is prohibited, and the Regional Administrator may take enforcement action against a permittee for bypass, unless:

(1) Bypass was unavoidable to prevent loss of life, personal injury, or severe property damage;

(2) There were no feasible alternatives to the bypass, such as the use of auxiliary treatment facilities, retention of untreated wastes, or maintenance during normal periods of equipment downtime. This condition is not satisfied if adequate back-up equipment should have been installed in the exercise of reasonable engineering judgment to prevent a bypass which occurred during normal periods of equipment downtime or preventative maintenance; and

(3) i) The permittee submitted notices as required under Paragraph 4.c. of this section.
ii) The Regional Administrator may approve an anticipated bypass, after considering its adverse effects, if the Regional Administrator determines that it will meet the three conditions listed above in paragraph 4.d. of this section.

5. <u>Upset</u>

a. Definition. *Upset* means an exceptional incident in which there is an unintentional and temporary noncompliance with technology-based permit effluent limitations because of factors beyond the reasonable control of the permittee. An upset does not include noncompliance to the extent caused by operational error, improperly designed treatment facilities, inadequate treatment facilities, lack of preventive maintenance, or careless or improper operation.

b. Effect of an upset. An upset constitutes an affirmative defense to an action brought for noncompliance with such technology-based permit effluent limitations if the requirements of paragraph B.5.c. of this section are met. No determination made during administrative review of claims that noncompliance was caused by upset, and before an action for noncompliance, is final administrative action subject to judicial review.

c. Conditions necessary for a demonstration of upset. A permittee who wishes to establish the affirmative defense of upset shall demonstrate, through properly signed, contemporaneous operating logs, or other relevant evidence that:

(1) An upset occurred and that the permittee can identify the cause(s) of the upset;
(2) The permitted facility was at the time being properly operated;
(3) The permittee submitted notice of the upset as required in paragraphs D.1.a. and 1.e. (Twenty-four hour notice); and
(4) The permittee complied with any remedial measures required under B.3. above.

d. Burden of proof. In any enforcement proceeding the permittee seeking to establish the occurrence of an upset has the burden of proof.

PART II. C. MONITORING REQUIREMENTS

1. Monitoring and Records

a. Samples and measurements taken for the purpose of monitoring shall be representative of the monitored activity.

b. Except for records for monitoring information required by this permit related to the permittee’s sewage sludge use and disposal activities, which shall be retained for a period of at least five years (or longer as required by 40 CFR Part 503), the permittee shall retain records of all monitoring information, including all calibration and maintenance records and all original strip chart recordings for continuous monitoring instrumentation, copies of all reports required by this permit, and records of all data used to complete the application for this permit, for a period of at least 3 years from the date of the sample, measurement, report or application except for the information concerning storm water discharges which must be retained for a total of 6 years. This retention period may be extended by request of the Regional Administrator at any time.

c. Records of monitoring information shall include:

(1) The date, exact place, and time of sampling or measurements;
(2) The individual(s) who performed the sampling or measurements;
(3) The date(s) analyses were performed;
(4) The individual(s) who performed the analyses;
(5) The analytical techniques or methods used; and
(6) The results of such analyses.

d. Monitoring results must be conducted according to test procedures approved under 40 CFR Part 136 or, in the case of sludge use or disposal, approved under 40 CFR Part 136 unless otherwise specified in 40 CFR Part 503, unless other test procedures have been specified in the permit.

e. The CWA provides that any person who falsifies, tampers with, or knowingly renders inaccurate any monitoring device or method required to be maintained under this permit shall, upon conviction, be punished by a fine of not more than $10,000, or by imprisonment for not more than 2 years, or both. If a conviction of a person is for a violation committed after a first conviction of such person under this paragraph, punishment is a fine of not more than $20,000 per day of violation, or by imprisonment of not more than 4 years, or both.

2. Inspection and Entry

The permittee shall allow the Regional Administrator or an authorized representative (including an authorized contractor acting as a representative of the Administrator), upon presentation of credentials and other documents as may be required by law, to:

a. Enter upon the permittee's premises where a regulated facility or activity is located or conducted, or where records must be kept under the conditions of this permit;

b. Have access to and copy, at reasonable times, any records that must be kept under the conditions of this permit;

c. Inspect at reasonable times any facilities, equipment (including monitoring and control equipment), practices, or operations regulated or required under this permit; and

d. Sample or monitor at reasonable times, for the purposes of assuring permit compliance or as otherwise authorized by the CWA, any substances or parameters at any location.

PART II. D. REPORTING REQUIREMENTS

1. Reporting Requirements

a. Planned Changes. The permittee shall give notice to the Regional Administrator as soon as possible of any planned physical alterations or additions to the permitted facility. Notice is only required when:

(1) The alteration or addition to a permitted facility may meet one of the criteria for determining whether a facility is a new source in 40 CFR§122.29(b); or
(2) The alteration or addition could significantly change the nature or increase the quantities of the pollutants discharged. This notification applies to pollutants which are subject neither to the effluent limitations in the permit, nor to the notification requirements at 40 CFR§122.42(a)(1).
(3) The alteration or addition results in a significant change in the permittee's sludge use or disposal practices, and such alteration, addition or change may justify the application of permit conditions different from or absent in the existing permit, including notification of additional use or disposal sites not reported during the permit application process or not reported pursuant to an approved land application plan.

b. Anticipated noncompliance. The permittee shall give advance notice to the Regional Administrator of any planned changes in the permitted facility or activity which may result in noncompliance with permit requirements.

c. Transfers. This permit is not transferable to any person except after notice to the Regional Administrator. The Regional Administrator may require modification or revocation and reissuance of the permit to change the name of the permittee and incorporate such other requirements as may be necessary under the CWA. (See 40 CFR Part 122.61; in some cases, modification or revocation and reissuance is mandatory.)

d. Monitoring reports. Monitoring results shall be reported at the intervals specified elsewhere in this permit.

(1) Monitoring results must be reported on a Discharge Monitoring Report (DMR) or forms provided or specified by the Director for reporting results of monitoring of sludge use or disposal practices.

(2) If the permittee monitors any pollutant more frequently than required by the permit using test procedures approved under 40 CFR Part 136 or, in the case of sludge use or disposal, approved under 40 CFR Part 136 unless otherwise specified in 40 CFR Part 503, or as specified in the permit, the results of the monitoring shall be included in the calculation and reporting of the data submitted in the DMR or sludge reporting form specified by the Director.

(3) Calculations for all limitations which require averaging or measurements shall utilize an arithmetic mean unless otherwise specified by the Director in the permit.

e. Twenty-four hour reporting.

(1) The permittee shall report any noncompliance which may endanger health or the environment. Any information shall be provided orally within 24 hours from the time the permittee becomes aware of the circumstances.

A written submission shall also be provided within 5 days of the time the permittee becomes aware of the circumstances. The written submission shall contain a description of the noncompliance and its cause; the period of noncompliance, including exact dates and times, and if the noncompliance has not been corrected, the anticipated time it is expected to continue; and steps taken or planned to reduce, eliminate, and prevent reoccurrence of the noncompliance.

(2) The following shall be included as information which must be reported within 24 hours under this paragraph.

(a) Any unanticipated bypass which exceeds any effluent limitation in the permit. (See 40 CFR §122.41(g).)
(b) Any upset which exceeds any effluent limitation in the permit.
(c) Violation of a maximum daily discharge limitation for any of the pollutants listed by the Regional Administrator in the permit to be reported within 24 hours. (See 40 CFR §122.44(g).)

(3) The Regional Administrator may waive the written report on a case-by-case basis for reports under Paragraph D.1.e. if the oral report has been received within 24 hours.

f. Compliance Schedules. Reports of compliance or noncompliance with, any progress reports on, interim and final requirements contained in any compliance schedule of this permit shall be submitted no later than 14 days following each schedule date.

g. Other noncompliance. The permittee shall report all instances of noncompliance not reported under Paragraphs D.1.d., D.1.e., and D.1.f. of this section, at the time monitoring reports are submitted. The reports shall contain the information listed in Paragraph D.1.e. of this section.

h. Other information. Where the permittee becomes aware that it failed to submit any relevant facts in a permit application, or submitted incorrect information in a permit application or in any report to the Regional Administrator, it shall promptly submit such facts or information.

2. Signatory Requirement

a. All applications, reports, or information submitted to the Regional Administrator shall be signed and certified. (See 40 CFR §122.22)

b. The CWA provides that any person who knowingly makes any false statement, representation, or certification in any record or other document submitted or required to be maintained under this permit, including monitoring reports or reports of compliance or noncompliance shall, upon conviction, be punished by a fine of not more than $10,000 per violation, or by imprisonment for not more than 2 years per violation, or by both.

3. Availability of Reports.

Except for data determined to be confidential under Paragraph A.8. above, all reports prepared in accordance with the terms of this permit shall be available for public inspection at the offices of the State water pollution control agency and the Regional Administrator. As required by the CWA, effluent data shall not be considered confidential. Knowingly making any false statements on any such report may result in the imposition of criminal penalties as provided for in Section 309 of the CWA.

PART II. E. DEFINITIONS AND ABBREVIATIONS

1. Definitions for Individual NPDES Permits including Storm Water Requirements

Administrator means the Administrator of the United States Environmental Protection Agency, or an authorized representative.

Applicable standards and limitations means all, State, interstate, and Federal standards and limitations to which a “discharge”, a “sewage sludge use or disposal practice”, or a related activity is subject to, including “effluent limitations”, water quality standards, standards of performance, toxic effluent standards or prohibitions, “best management practices”, pretreatment standards, and “standards for sewage sludge use and disposal” under Sections 301, 302, 303, 304, 306, 307, 308, 403, and 405 of the CWA.

Application means the EPA standard national forms for applying for a permit, including any additions, revisions, or modifications to the forms; or forms approved by EPA for use in "approved States", including any approved modifications or revisions.

Average means the arithmetic mean of values taken at the frequency required for each parameter over the specified period. For total and/or fecal coliforms and Escherichia coli, the average shall be the geometric mean.

Average monthly discharge limitation means the highest allowable average of "daily discharges" over a calendar month calculated as the sum of all "daily discharges" measured during a calendar month divided by the number of "daily discharges" measured during that month.

Average weekly discharge limitation means the highest allowable average of "daily discharges" measured during the calendar week divided by the number of "daily discharges" measured during the week.

Best Management Practices (BMPs) means schedules of activities, prohibitions of practices, maintenance procedures, and other management practices to prevent or reduce the pollution of "waters of the United States." BMPs also include treatment requirements, operating procedures, and practices to control plant site runoff, spillage or leaks, sludge or waste disposal, or drainage from raw material storage.

Best Professional Judgment (BPJ) means a case-by-case determination of Best Practicable Treatment (BPT), Best Available Treatment (BAT), or other appropriate technology-based standard based on an evaluation of the available technology to achieve a particular pollutant reduction and other factors set forth in 40 CFR §125.3 (d).

Coal Pile Runoff means the rainfall runoff from or through any coal storage pile.

Composite Sample means a sample consisting of a minimum of eight grab samples of equal volume collected at equal intervals during a 24-hour period (or lesser period as specified in the section on Monitoring and Reporting) and combined proportional to flow, or a sample consisting of the same number of grab samples, or greater, collected proportionally to flow over that same time period.

Construction Activities - The following definitions apply to construction activities:

(a) Commencement of Construction is the initial disturbance of soils associated with clearing, grading, or excavating activities or other construction activities.

(b) Dedicated portable asphalt plant is a portable asphalt plant located on or contiguous to a construction site and that provides asphalt only to the construction site that the plant is located on or adjacent to. The term dedicated portable asphalt plant does not include facilities that are subject to the asphalt emulsion effluent limitation guideline at 40 CFR Part 443.

(c) Dedicated portable concrete plant is a portable concrete plant located on or contiguous to a construction site and that provides concrete only to the construction site that the plant is located on or adjacent to.

(d) Final Stabilization means that all soil disturbing activities at the site have been complete, and that a uniform perennial vegetative cover with a density of 70% of the cover for unpaved areas and areas not covered by permanent structures has been established or equivalent permanent stabilization measures (such as the use of riprap, gabions, or geotextiles) have been employed.

(e) Runoff coefficient means the fraction of total rainfall that will appear at the conveyance as runoff.

Contiguous zone means the entire zone established by the United States under Article 24 of the Convention on the Territorial Sea and the Contiguous Zone.

Continuous discharge means a "discharge" which occurs without interruption throughout the operating hours of the facility except for infrequent shutdowns for maintenance, process changes, or similar activities.

CWA means the Clean Water Act (formerly referred to as the Federal Water Pollution Control Act or Federal Water Pollution Control Act Amendments of 1972) Pub. L. 92-500, as amended by Pub. L. 95-217, Pub. L. 95-576, Pub. L. 96-483, and Pub. L. 97-117; 33 USC §§1251 et seq.

Daily Discharge means the discharge of a pollutant measured during the calendar day or any other 24-hour period that reasonably represents the calendar day for purposes of sampling. For pollutants with limitations expressed in units of mass, the "daily discharge" is calculated as the total mass of the pollutant discharged over the day. For pollutants with limitations expressed in other units of measurements, the "daily discharge" is calculated as the average measurement of the pollutant over the day.

Director normally means the person authorized to sign NPDES permits by EPA or the State or an authorized representative. Conversely, it also could mean the Regional Administrator or the State Director as the context requires.

Discharge Monitoring Report Form (DMR) means the EPA standard national form, including any subsequent additions, revisions, or modifications for the reporting of self-monitoring results by permittees. DMRs must be used by "approved States" as well as by EPA. EPA will supply DMRs to any approved State upon request. The EPA national forms may be modified to substitute the State Agency name, address, logo, and other similar information, as appropriate, in place of EPA's.

Discharge of a pollutant means:

(a) Any addition of any "pollutant" or combination of pollutants to "waters of the United States" from any "point source", or

(b) Any addition of any pollutant or combination of pollutants to the waters of the "contiguous zone" or the ocean from any point source other than a vessel or other floating craft which is being used as a means of transportation (See "Point Source" definition).

This definition includes additions of pollutants into waters of the United States from: surface runoff which is collected or channeled by man; discharges through pipes, sewers, or other conveyances owned by a State, municipality, or other person which do not lead to a treatment works; and discharges through pipes, sewers, or other conveyances leading into privately owned treatment works.

This term does not include an addition of pollutants by any "indirect discharger."

Effluent limitation means any restriction imposed by the Regional Administrator on quantities, discharge rates, and concentrations of "pollutants" which are "discharged" from "point sources" into "waters of the United States", the waters of the "contiguous zone", or the ocean.

Effluent limitation guidelines means a regulation published by the Administrator under Section 304(b) of CWA to adopt or revise "effluent limitations".

EPA means the United States "Environmental Protection Agency".

Flow-weighted composite sample means a composite sample consisting of a mixture of aliquots where the volume of each aliquot is proportional to the flow rate of the discharge.

Grab Sample – An individual sample collected in a period of less than 15 minutes.

Hazardous Substance means any substance designated under 40 CFR Part 116 pursuant to Section 311 of the CWA.

Indirect Discharger means a non-domestic discharger introducing pollutants to a publicly owned treatment works.

Interference means a discharge which, alone or in conjunction with a discharge or discharges from other sources, both:

(a) Inhibits or disrupts the POTW, its treatment processes or operations, or its sludge processes, use or disposal; and

(b) Therefore is a cause of a violation of any requirement of the POTW's NPDES permit (including an increase in the magnitude or duration of a violation) or of the prevention of sewage sludge use or disposal in compliance with the following statutory provisions and regulations or permits issued thereunder (or more stringent State or local regulations): Section 405 of the Clean Water Act (CWA), the Solid Waste Disposal Act (SWDA) (including Title II, more commonly referred to as the Resources Conservation and Recovery Act (RCRA), and including State regulations contained in any State sludge management plan prepared pursuant to Subtitle D of the SDWA), the Clean Air Act, the Toxic Substances Control Act, and the Marine Protection Research and Sanctuaries Act.

Landfill means an area of land or an excavation in which wastes are placed for permanent disposal, and which is not a land application unit, surface impoundment, injection well, or waste pile.

Land application unit means an area where wastes are applied onto or incorporated into the soil surface (excluding manure spreading operations) for treatment or disposal.

Large and Medium municipal separate storm sewer system means all municipal separate storm sewers that are either: (i) located in an incorporated place (city) with a population of 100,000 or more as determined by the latest Decennial Census by the Bureau of Census (these cities are listed in Appendices F and 40 CFR Part 122); or (ii) located in the counties with unincorporated urbanized populations of 100,000 or more, except municipal separate storm sewers that are located in the incorporated places, townships, or towns within such counties (these counties are listed in Appendices H and I of 40 CFR 122); or (iii) owned or operated by a municipality other than those described in Paragraph (i) or (ii) and that are designated by the Regional Administrator as part of the large or medium municipal separate storm sewer system.

Maximum daily discharge limitation means the highest allowable "daily discharge" concentration that occurs only during a normal day (24-hour duration).

Maximum daily discharge limitation (as defined for the Steam Electric Power Plants only) when applied to Total Residual Chlorine (TRC) or Total Residual Oxidant (TRO) is defined as "maximum concentration" or "Instantaneous Maximum Concentration" during the two hours of a chlorination cycle (or fraction thereof) prescribed in the Steam Electric Guidelines, 40 CFR Part 423. These three synonymous terms all mean "a value that shall not be exceeded" during the two-hour chlorination cycle. This interpretation differs from the specified NPDES Permit requirement, 40 CFR § 122.2, where the two terms of "Maximum Daily Discharge" and "Average Daily Discharge" concentrations are specifically limited to the daily (24-hour duration) values.

Municipality means a city, town, borough, county, parish, district, association, or other public body created by or under State law and having jurisdiction over disposal of sewage, industrial wastes, or other wastes, or an Indian tribe or an authorized Indian tribe organization, or a designated and approved management agency under Section 208 of the CWA.

National Pollutant Discharge Elimination System means the national program for issuing, modifying, revoking and reissuing, terminating, monitoring and enforcing permits, and imposing and enforcing pretreatment requirements, under Sections 307, 402, 318, and 405 of the CWA. The term includes an "approved program".

New Discharger means any building, structure, facility, or installation:

(a) From which there is or may be a "discharge of pollutants";

(b) That did not commence the "discharge of pollutants" at a particular "site" prior to August 13, 1979;

(c) Which is not a "new source"; and

(d) Which has never received a finally effective NPDES permit for discharges at that "site".

This definition includes an "indirect discharger" which commences discharging into "waters of the United States" after August 13, 1979. It also includes any existing mobile point source (other than an offshore or coastal oil and gas exploratory drilling rig or a coastal oil and gas exploratory drilling rig or a coastal oil and gas developmental drilling rig) such as a seafood processing rig, seafood processing vessel, or aggregate plant, that begins discharging at a "site" for which it does not have a permit; and any offshore rig or coastal mobile oil and gas exploratory drilling rig or coastal mobile oil and gas developmental drilling rig that commences the discharge of pollutants after August 13, 1979, at a "site" under EPA's permitting jurisdiction for which it is not covered by an individual or general permit and which is located in an area determined by the Regional Administrator in the issuance of a final permit to be in an area of biological concern. In determining whether an area is an area of biological concern, the Regional Administrator shall consider the factors specified in 40 CFR §§125.122 (a) (1) through (10).

An offshore or coastal mobile exploratory drilling rig or coastal mobile developmental drilling rig will be considered a "new discharger" only for the duration of its discharge in an area of biological concern.

New source means any building, structure, facility, or installation from which there is or may be a "discharge of pollutants", the construction of which commenced:

(a) After promulgation of standards of performance under Section 306 of CWA which are applicable to such source, or

(b) After proposal of standards of performance in accordance with Section 306 of CWA which are applicable to such source, but only if the standards are promulgated in accordance with Section 306 within 120 days of their proposal.

NPDES means "National Pollutant Discharge Elimination System".

Owner or operator means the owner or operator of any "facility or activity" subject to regulation under the NPDES programs.

Pass through means a Discharge which exits the POTW into waters of the United States in quantities or concentrations which, alone or in conjunction with a discharge or discharges from other sources, is a cause of a violation of any requirement of the POTW's NPDES permit (including an increase in the magnitude or duration of a violation).

Permit means an authorization, license, or equivalent control document issued by EPA or an "approved" State.

Person means an individual, association, partnership, corporation, municipality, State or Federal agency, or an agent or employee thereof.

Point Source means any discernible, confined, and discrete conveyance, including but not limited to any pipe ditch, channel, tunnel, conduit, well, discrete fissure, container, rolling stock, concentrated animal feeding operation, landfill leachate collection system, vessel, or other floating craft, from which pollutants are or may be discharged. This term does not include return flows from irrigated agriculture or agricultural storm water runoff (see 40 CFR §122.2).

Pollutant means dredged spoil, solid waste, incinerator residue, filter backwash, sewage, garbage, sewage sludge, munitions, chemical wastes, biological materials, radioactive materials (except those regulated under the Atomic Energy Act of 1954, as amended (42 U.S.C. §§2011 et seq.)), heat, wrecked or discarded equipment, rock, sand, cellar dirt and industrial, municipal, and agricultural waste discharged into water. It does not mean:

(a) Sewage from vessels; or

(b) Water, gas, or other material which is injected into a well to facilitate production of oil or gas, or water derived in association with oil and gas production and disposed of in a well, if the well is used either to facilitate production or for disposal purposes is approved by the authority of the State in which the well is located, and if the State determines that the injection or disposal will not result in the degradation of ground or surface water resources.

Primary industry category means any industry category listed in the NRDC settlement agreement (Natural Resources Defense Council et al. v. Train, 8 E.R.C. 2120 (D.D.C. 1976), modified 12 E.R.C. 1833 (D. D.C. 1979)); also listed in Appendix A of 40 CFR Part 122.

Privately owned treatment works means any device or system which is (a) used to treat wastes from any facility whose operation is not the operator of the treatment works or (b) not a "POTW".

Process wastewater means any water which, during manufacturing or processing, comes into direct contact with or results from the production or use of any raw material, intermediate product, finished product, byproduct, or waste product.

Publicly Owned Treatment Works (POTW) means any facility or system used in the treatment (including recycling and reclamation) of municipal sewage or industrial wastes of a liquid nature which is owned by a "State" or "municipality".

This definition includes sewers, pipes, or other conveyances only if they convey wastewater to a POTW providing treatment.

Regional Administrator means the Regional Administrator, EPA, Region I, Boston, Massachusetts.

Secondary Industry Category means any industry which is not a "primary industry category".

Section 313 water priority chemical means a chemical or chemical category which:

(1) is listed at 40 CFR §372.65 pursuant to Section 313 of the Emergency Planning and Community Right-To-Know Act (EPCRA) (also known as Title III of the Superfund Amendments and Reauthorization Act (SARA) of 1986);

(2) is present at or above threshold levels at a facility subject to EPCRA Section 313 reporting requirements; and

(3) satisfies at least one of the following criteria:

- (i) are listed in Appendix D of 40 CFR Part 122 on either Table II (organic priority pollutants), Table III (certain metals, cyanides, and phenols), or Table V (certain toxic pollutants and hazardous substances);
- (ii) are listed as a hazardous substance pursuant to Section 311(b)(2)(A) of the CWA at 40 CFR §116.4; or
- (iii) are pollutants for which EPA has published acute or chronic water quality criteria.

Septage means the liquid and solid material pumped from a septic tank, cesspool, or similar domestic sewage treatment system, or a holding tank when the system is cleaned or maintained.

Sewage Sludge means any solid, semisolid, or liquid residue removed during the treatment of municipal wastewater or domestic sewage. Sewage sludge includes, but is not limited to, solids removed during primary, secondary, or advanced wastewater treatment, scum, septage, portable toilet pumpings, Type III Marine Sanitation Device pumpings (33 CFR Part 159), and sewage sludge products. Sewage sludge does not include grit or screenings, or ash generated during the incineration of sewage sludge.

Sewage sludge use or disposal practice means the collection, storage, treatment, transportation, processing, monitoring, use, or disposal of sewage sludge.

Significant materials includes, but is not limited to: raw materials, fuels, materials such as solvents, detergents, and plastic pellets, raw materials used in food processing or production, hazardous substance designated under section 101(14) of CERCLA, any chemical the facility is required to report pursuant to EPCRA Section 313, fertilizers, pesticides, and waste products such as ashes, slag, and sludge that have the potential to be released with storm water discharges.

Significant spills includes, but is not limited to, releases of oil or hazardous substances in excess of reportable quantities under Section 311 of the CWA (see 40 CFR §110.10 and §117.21) or Section 102 of CERCLA (see 40 CFR § 302.4).

Sludge-only facility means any "treatment works treating domestic sewage" whose methods of sewage sludge use or disposal are subject to regulations promulgated pursuant to Section 405(d) of the CWA, and is required to obtain a permit under 40 CFR §122.1(b)(3).

State means any of the 50 States, the District of Columbia, Guam, the Commonwealth of Puerto Rico, the Virgin Islands, American Samoa, the Trust Territory of the Pacific Islands.

Storm Water means storm water runoff, snow melt runoff, and surface runoff and drainage.

Storm water discharge associated with industrial activity means the discharge from any conveyance which is used for collecting and conveying storm water and which is directly related to manufacturing, processing, or raw materials storage areas at an industrial plant. (See 40 CFR §122.26 (b)(14) for specifics of this definition.

Time-weighted composite means a composite sample consisting of a mixture of equal volume aliquots collected at a constant time interval.

Toxic pollutants means any pollutant listed as toxic under Section 307 (a)(1) or, in the case of "sludge use or disposal practices" any pollutant identified in regulations implementing Section 405(d) of the CWA.

Treatment works treating domestic sewage means a POTW or any other sewage sludge or wastewater treatment devices or systems, regardless of ownership (including federal facilities), used in the storage, treatment, recycling, and reclamation of municipal or domestic sewage, including land dedicated for the disposal of sewage sludge. This definition does not include septic tanks or similar devices.

For purposes of this definition, "domestic sewage" includes waste and wastewater from humans or household operations that are discharged to or otherwise enter a treatment works. In States where there is no approved State sludge management program under Section 405(f) of the CWA, the Regional Administrator may designate any person subject to the standards for sewage sludge use and disposal in 40 CFR Part 503 as a "treatment works treating domestic sewage", where he or she finds that there is a potential for adverse effects on public health and the environment from poor sludge quality or poor sludge handling, use or disposal practices, or where he or she finds that such designation is necessary to ensure that such person is in compliance with 40 CFR Part 503.

Waste Pile means any non-containerized accumulation of solid, non-flowing waste that is used for treatment or storage.

Waters of the United States means:

(a) All waters which are currently used, were used in the past, or may be susceptible to use in interstate or foreign commerce, including all waters which are subject to the ebb and flow of tide;

(b) All interstate waters, including interstate “wetlands”;

(c) All other waters such as intrastate lakes, rivers, streams (including intermittent streams), mudflats, sandflats, “wetlands”, sloughs, prairie potholes, wet meadows, playa lakes, or natural ponds the use, degradation, or destruction of which would affect or could affect interstate or foreign commerce including any such waters:

(1) Which are or could be used by interstate or foreign travelers for recreational or other purpose;

(2) From which fish or shellfish are or could be taken and sold in interstate or foreign commerce; or

(3) Which are used or could be used for industrial purposes by industries in interstate commerce;

(d) All impoundments of waters otherwise defined as waters of the United States under this definition;

(e) Tributaries of waters identified in Paragraphs (a) through (d) of this definition;

(f) The territorial sea; and

(g) “Wetlands” adjacent to waters (other than waters that are themselves wetlands) identified in Paragraphs (a) through (f) of this definition.

Waste treatment systems, including treatment ponds or lagoons designed to meet the requirements of the CWA (other than cooling ponds as defined in 40 CFR §423.11(m) which also meet the criteria of this definition) are not waters of the United States.

Wetlands means those areas that are inundated or saturated by surface or ground water at a frequency and duration to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions. Wetlands generally include swamps, marshes, bogs, and similar areas.

Whole Effluent Toxicity (WET) means the aggregate toxic effect of an effluent measured directly by a toxicity test. (See Abbreviations Section, following, for additional information.)

2. <u>Definitions for NPDES Permit Sludge Use and Disposal Requirements</u>.

Active sewage sludge unit is a sewage sludge unit that has not closed.

Aerobic Digestion is the biochemical decomposition of organic matter in sewage sludge into carbon dioxide and water by microorganisms in the presence of air.

Agricultural Land is land on which a food crop, a feed crop, or a fiber crop is grown. This includes range land and land used as pasture.

Agronomic rate is the whole sludge application rate (dry weight basis) designed:

(1) To provide the amount of nitrogen needed by the food crop, feed crop, fiber crop, cover crop, or vegetation grown on the land; and

(2) To minimize the amount of nitrogen in the sewage sludge that passes below the root zone of the crop or vegetation grown on the land to the ground water.

Air pollution control device is one or more processes used to treat the exit gas from a sewage sludge incinerator stack.

Anaerobic digestion is the biochemical decomposition of organic matter in sewage sludge into methane gas and carbon dioxide by microorganisms in the absence of air.

Annual pollutant loading rate is the maximum amount of a pollutant that can be applied to a unit area of land during a 365 day period.

Annual whole sludge application rate is the maximum amount of sewage sludge (dry weight basis) that can be applied to a unit area of land during a 365 day period.

Apply sewage sludge or sewage sludge applied to the land means land application of sewage sludge.

Aquifer is a geologic formation, group of geologic formations, or a portion of a geologic formation capable of yielding ground water to wells or springs.

Auxiliary fuel is fuel used to augment the fuel value of sewage sludge. This includes, but is not limited to, natural gas, fuel oil, coal, gas generated during anaerobic digestion of sewage sludge, and municipal solid waste (not to exceed 30 percent of the dry weight of the sewage sludge and auxiliary fuel together). Hazardous wastes are not auxiliary fuel.

Base flood is a flood that has a one percent chance of occurring in any given year (i.e. a flood with a magnitude equaled once in 100 years).

Bulk sewage sludge is sewage sludge that is not sold or given away in a bag or other container for application to the land.

Contaminate an aquifer means to introduce a substance that causes the maximum contaminant level for nitrate in 40 CFR §141.11 to be exceeded in ground water or that causes the existing concentration of nitrate in the ground water to increase when the existing concentration of nitrate in the ground water exceeds the maximum contaminant level for nitrate in 40 CFR §141.11.

Class I sludge management facility is any publicly owned treatment works (POTW), as defined in 40 CFR §501.2, required to have an approved pretreatment program under 40 CFR §403.8 (a) (including any POTW located in a state that has elected to assume local program responsibilities pursuant to 40 CFR §403.10 (e) and any treatment works treating domestic sewage, as defined in 40 CFR § 122.2, classified as a Class I sludge management facility by the EPA Regional Administrator, or, in the case of approved state programs, the Regional Administrator in conjunction with the State Director, because of the potential for sewage sludge use or disposal practice to affect public health and the environment adversely.

Control efficiency is the mass of a pollutant in the sewage sludge fed to an incinerator minus the mass of that pollutant in the exit gas from the incinerator stack divided by the mass of the pollutant in the sewage sludge fed to the incinerator.

Cover is soil or other material used to cover sewage sludge placed on an active sewage sludge unit.

Cover crop is a small grain crop, such as oats, wheat, or barley, not grown for harvest.

Cumulative pollutant loading rate is the maximum amount of inorganic pollutant that can be applied to an area of land.

Density of microorganisms is the number of microorganisms per unit mass of total solids (dry weight) in the sewage sludge.

Dispersion factor is the ratio of the increase in the ground level ambient air concentration for a pollutant at or beyond the property line of the site where the sewage sludge incinerator is located to the mass emission rate for the pollutant from the incinerator stack.

Displacement is the relative movement of any two sides of a fault measured in any direction.

Domestic septage is either liquid or solid material removed from a septic tank, cesspool, portable toilet, Type III marine sanitation device, or similar treatment works that receives only domestic sewage. Domestic septage does not include liquid or solid material removed from a septic tank, cesspool, or similar treatment works that receives either commercial wastewater or industrial wastewater and does not include grease removed from a grease trap at a restaurant.

Domestic sewage is waste and wastewater from humans or household operations that is discharged to or otherwise enters a treatment works.

Dry weight basis means calculated on the basis of having been dried at 105 degrees Celsius (°C) until reaching a constant mass (i.e. essentially 100 percent solids content).

Fault is a fracture or zone of fractures in any materials along which strata on one side are displaced with respect to the strata on the other side.

Feed crops are crops produced primarily for consumption by animals.

Fiber crops are crops such as flax and cotton.

Final cover is the last layer of soil or other material placed on a sewage sludge unit at closure.

Fluidized bed incinerator is an enclosed device in which organic matter and inorganic matter in sewage sludge are combusted in a bed of particles suspended in the combustion chamber gas.

Food crops are crops consumed by humans. These include, but are not limited to, fruits, vegetables, and tobacco.

Forest is a tract of land thick with trees and underbrush.

Ground water is water below the land surface in the saturated zone.

Holocene time is the most recent epoch of the Quaternary period, extending from the end of the Pleistocene epoch to the present.

Hourly average is the arithmetic mean of all the measurements taken during an hour. At least two measurements must be taken during the hour.

Incineration is the combustion of organic matter and inorganic matter in sewage sludge by high temperatures in an enclosed device.

Industrial wastewater is wastewater generated in a commercial or industrial process.

Land application is the spraying or spreading of sewage sludge onto the land surface; the injection of sewage sludge below the land surface; or the incorporation of sewage sludge into the soil so that the sewage sludge can either condition the soil or fertilize crops or vegetation grown in the soil.

Land with a high potential for public exposure is land that the public uses frequently. This includes, but is not limited to, a public contact site and reclamation site located in a populated area (e.g., a construction site located in a city).

Land with low potential for public exposure is land that the public uses infrequently. This includes, but is not limited to, agricultural land, forest and a reclamation site located in an unpopulated area (e.g., a strip mine located in a rural area).

Leachate collection system is a system or device installed immediately above a liner that is designed, constructed, maintained, and operated to collect and remove leachate from a sewage sludge unit.

Liner is soil or synthetic material that has a hydraulic conductivity of 1×10^{-7} centimeters per second or less.

Lower explosive limit for methane gas is the lowest percentage of methane gas in air, by volume, that propagates a flame at 25 degrees Celsius and atmospheric pressure.

Monthly average (Incineration) is the arithmetic mean of the hourly averages for the hours a sewage sludge incinerator operates during the month.

Monthly average (Land Application) is the arithmetic mean of all measurements taken during the month.

Municipality means a city, town, borough, county, parish, district, association, or other public body (including an intermunicipal agency of two or more of the foregoing entities) created by or under State law; an Indian tribe or an authorized Indian tribal organization having jurisdiction over sewage sludge management; or a designated and approved management agency under section 208 of the CWA, as amended. The definition includes a special district created under state law, such as a water district, sewer district, sanitary district, utility district, drainage district, or similar entity, or an integrated waste management facility as defined in section 201 (e) of the CWA, as amended, that has as one of its principal responsibilities the treatment, transport, use or disposal of sewage sludge.

Other container is either an open or closed receptacle. This includes, but is not limited to, a bucket, a box, a carton, and a vehicle or trailer with a load capacity of one metric ton or less.

Pasture is land on which animals feed directly on feed crops such as legumes, grasses, grain stubble, or stover.

Pathogenic organisms are disease-causing organisms. These include, but are not limited to, certain bacteria, protozoa, viruses, and viable helminth ova.

Permitting authority is either EPA or a State with an EPA-approved sludge management program.

Person is an individual, association, partnership, corporation, municipality, State or Federal Agency, or an agent or employee thereof.

Person who prepares sewage sludge is either the person who generates sewage sludge during the treatment of domestic sewage in a treatment works or the person who derives a material from sewage sludge.

pH means the logarithm of the reciprocal of the hydrogen ion concentration; a measure of the acidity or alkalinity of a liquid or solid material.

Place sewage sludge or sewage sludge placed means disposal of sewage sludge on a surface disposal site.

Pollutant (as defined in sludge disposal requirements) is an organic substance, an inorganic substance, a combination or organic and inorganic substances, or pathogenic organism that, after discharge and upon exposure, ingestion, inhalation, or assimilation into an organism either directly from the environment or indirectly by ingestion through the food chain, could on the basis on information available to the Administrator of EPA, cause death, disease, behavioral abnormalities, cancer, genetic mutations, physiological malfunctions (including malfunction in reproduction) or physical deformations in either organisms or offspring of the organisms.

Pollutant limit (for sludge disposal requirements) is a numerical value that describes the amount of a pollutant allowed per unit amount of sewage sludge (e.g., milligrams per kilogram of total solids); the amount of pollutant that can be applied to a unit of land (e.g., kilograms per hectare); or the volume of the material that can be applied to the land (e.g., gallons per acre).

Public contact site is a land with a high potential for contact by the public. This includes, but is not limited to, public parks, ball fields, cemeteries, plant nurseries, turf farms, and golf courses.

Qualified ground water scientist is an individual with a baccalaureate or post-graduate degree in the natural sciences or engineering who has sufficient training and experience in ground water hydrology and related fields, as may be demonstrated by State registration, professional certification, or completion of accredited university programs, to make sound professional judgments regarding ground water monitoring, pollutant fate and transport, and corrective action.

Range land is open land with indigenous vegetation.

Reclamation site is drastically disturbed land that is reclaimed using sewage sludge. This includes, but is not limited to, strip mines and construction sites.

Risk specific concentration is the allowable increase in the average daily ground level ambient air concentration for a pollutant from the incineration of sewage sludge at or beyond the property line of a site where the sewage sludge incinerator is located.

Runoff is rainwater, leachate, or other liquid that drains overland on any part of a land surface and runs off the land surface.

Seismic impact zone is an area that has 10 percent or greater probability that the horizontal ground level acceleration to the rock in the area exceeds 0.10 gravity once in 250 years.

Sewage sludge is a solid, semi-solid, or liquid residue generated during the treatment of domestic sewage in a treatment works. Sewage sludge includes, but is not limited to:, domestic septage; scum or solids removed in primary, secondary, or advanced wastewater treatment processes; and a material derived from sewage sludge. Sewage sludge does not include ash generated during the firing of sewage sludge in a sewage sludge incinerator or grit and screening generated during preliminary treatment of domestic sewage in treatment works.

Sewage sludge feed rate is either the average daily amount of sewage sludge fired in all sewage sludge incinerators within the property line of the site where the sewage sludge incinerators are located for the number of days in a 365 day period that each sewage sludge incinerator operates, or the average daily design capacity for all sewage sludge incinerators within the property line of the site where the sewage sludge incinerators are located.

Sewage sludge incinerator is an enclosed device in which only sewage sludge and auxiliary fuel are fired.

Sewage sludge unit is land on which only sewage sludge is placed for final disposal. This does not include land on which sewage sludge is either stored or treated. Land does not include waters of the United States, as defined in 40 CFR §122.2.

Sewage sludge unit boundary is the outermost perimeter of an active sewage sludge unit.

Specific oxygen uptake rate (SOUR) is the mass of oxygen consumed per unit time per unit mass of total solids (dry weight basis) in sewage sludge.

Stack height is the difference between the elevation of the top of a sewage sludge incinerator stack and the elevation of the ground at the base of the stack when the difference is equal to or less than 65 meters. When the difference is greater than 65 meters, stack height is the creditable stack height determined in accordance with 40 CFR §51.100 (ii).

State is one of the United States of America, the District of Columbia, the Commonwealth of Puerto Rico, the Virgin Islands, Guam, American Samoa, the Trust Territory of the Pacific Islands, the Commonwealth of the Northern Mariana Islands, and an Indian tribe eligible for treatment as a State pursuant to regulations promulgated under the authority of section 518(e) of the CWA.

Store or storage of sewage sludge is the placement of sewage sludge on land on which the sewage sludge remains for two years or less. This does not include the placement of sewage sludge on land for treatment.

Surface disposal site is an area of land that contains one or more active sewage sludge units.

Total hydrocarbons means the organic compounds in the exit gas from a sewage sludge incinerator stack measured using a flame ionization detection instrument referenced to propane.

Total solids are the materials in sewage sludge that remain as residue when the sewage sludge is dried at 103 to 105 degrees Celsius.

Treat or treatment of sewage sludge is the preparation of sewage sludge for final use or disposal. This includes, but is not limited to, thickening, stabilization, and dewatering of sewage sludge. This does not include storage of sewage sludge.

Treatment works is either a federally owned, publicly owned, or privately owned device or system used to treat (including recycle and reclaim) either domestic sewage or a combination of domestic sewage and industrial waste of a liquid nature.

Unstable area is land subject to natural or human-induced forces that may damage the structural components of an active sewage sludge unit. This includes, but is not limited to, land on which the soils are subject to mass movement.

Unstabilized solids are organic materials in sewage sludge that have not been treated in either an aerobic or anaerobic treatment process.

Vector attraction is the characteristic of sewage sludge that attracts rodents, flies, mosquitoes, or other organisms capable of transporting infectious agents.

Volatile solids is the amount of the total solids in sewage sludge lost when the sewage sludge is combusted at 550 degrees Celsius in the presence of excess air.

Wet electrostatic precipitator is an air pollution control device that uses both electrical forces and water to remove pollutants in the exit gas from a sewage sludge incinerator stack.

Wet scrubber is an air pollution control device that uses water to remove pollutants in the exit gas from a sewage sludge incinerator stack.

3. Commonly Used Abbreviations

BOD	Five-day biochemical oxygen demand unless otherwise specified
CBOD	Carbonaceous BOD
CFS	Cubic feet per second
COD	Chemical oxygen demand
Chlorine	
Cl_2	Total residual chlorine
TRC	Total residual chlorine which is a combination of free available chlorine (FAC, see below) and combined chlorine (chloramines, etc.)

TRO	Total residual chlorine in marine waters where halogen compounds are present
FAC	Free available chlorine (aqueous molecular chlorine, hypochlorous acid, and hypochlorite ion)
Coliform	
Coliform, Fecal	Total fecal coliform bacteria
Coliform, Total	Total coliform bacteria
Cont. (Continuous)	Continuous recording of the parameter being monitored, i.e. flow, temperature, pH, etc.
Cu. M/day or M^3/day	Cubic meters per day
DO	Dissolved oxygen
kg/day	Kilograms per day
lbs/day	Pounds per day
mg/l	Milligram(s) per liter
ml/l	Milliliters per liter
MGD	Million gallons per day
Nitrogen	
Total N	Total nitrogen
NH_3-N	Ammonia nitrogen as nitrogen
NO_3-N	Nitrate as nitrogen
NO_2-N	Nitrite as nitrogen
NO_3-NO_2	Combined nitrate and nitrite nitrogen as nitrogen
TKN	Total Kjeldahl nitrogen as nitrogen
Oil & Grease	Freon extractable material
PCB	Polychlorinated biphenyl
pH	A measure of the hydrogen ion concentration. A measure of the acidity or alkalinity of a liquid or material
Surfactant	Surface-active agent

Temp. °C	Temperature in degrees Centigrade
Temp. °F	Temperature in degrees Fahrenheit
TOC	Total organic carbon
Total P	Total phosphorus
TSS or NFR	Total suspended solids or total nonfilterable residue
Turb. or Turbidity	Turbidity measured by the Nephelometric Method (NTU)
ug/l	Microgram(s) per liter
WET	"Whole effluent toxicity" is the total effect of an effluent measured directly with a toxicity test.
C-NOEC	"Chronic (Long-term Exposure Test) – No Observed Effect Concentration". The highest tested concentration of an effluent or a toxicant at which no adverse effects are observed on the aquatic test organisms at a specified time of observation.
A-NOEC	"Acute (Short-term Exposure Test) – No Observed Effect Concentration" (see C-NOEC definition).
LC_{50}	LC_{50} is the concentration of a sample that causes mortality of 50% of the test population at a specific time of observation. The LC_{50} = 100% is defined as a sample of undiluted effluent.
ZID	Zone of Initial Dilution means the region of initial mixing surrounding or adjacent to the end of the outfall pipe or diffuser ports.

Response to Comments
Mirant Kendall Station
NPDES Permit No. MA0004898 – Modification

Contents

Response to Comments

Introduction

In accordance with the provisions of 40 C.F.R. §124.17, this document presents EPA's and the Massachusetts Department of Environmental Protection's (MassDEP) responses to comments received on the Draft NPDES Permit Modification (MA0004898) for the Mirant Corporation's Kendall Station Power Plant (also referred to in this document as Mirant Kendall, Mirant, Mirant Kendall Station, MKS, the applicant, and the permittee). The responses to comments explain and support the EPA and MassDEP determinations that form the basis of the Statement of Basis. The Mirant Kendall Station (MKS) Draft Permit Modification public comment period began March 10, 2008 and ended on May 1, 2008. This time period included one extension of the comment period. Comments from the permittee and several other parties regarding the Draft Permit Modification and Statement of Basis were received. Since the Statement of Basis is a final document, no changes were made to this document. Instead, Statement of Basis comments were noted, and responses to them are included in this document.

Extensive comments were received from Mirant during the public comment period. Additional comments were received from the following parties with each party's specific comment and location in the document as follows:

Massachusetts Coastal Zone Management (MA CZM): 5.3

East Cambridge Planning Team (ECPT): 4.12

Mark Jaquith: 4.12, 6.12

Rae Stiening: 4.12, 4.37.3, 6.1.1, 6.2, 6.3, 6.4

Conservation Law Foundation: 2.25, 4.4

After a review of the comments received, EPA and MassDEP have made a final decision to issue this permit modification authorizing this intake and discharge, subject to the resolution of appeal of the 2006 final permit. The Final Permit Modification is substantially identical to the Draft Permit Modification that was available for public comment. Although EPA's decision-making process has benefited from the various comments and additional information submitted, the information and arguments presented did not raise any substantial new questions concerning the Permit Modification. EPA did, however, improve certain analyses and make certain clarifications in response to the comments. These improvements and changes are detailed in this document and reflected in the Final Permit Modification. A summary of the changes made in the Final Permit Modification is listed below. The analyses underlying these changes are explained in the responses to individual comments that follow.

The Final Permit Modification and this response to public comments are available on EPA's web site at epa.gov/region01/npdes/mirantkendall/index.html. Copies of the Final Permit Modification also may be obtained by writing or calling EPA's Industrial Permits Branch (CIP), Office of Ecosystem Protection, 1 Congress Street, Suite 1100, Boston, MA 02114-2023; Telephone: (617) 918-1579.

In this response to comments document, EPA has structured the responses using the outline of issues included in the comments from Mirant Kendall, dated May 1, 2008. EPA reviewed the significant comments received from Mirant Kendall according to this outline. EPA then grouped together supporting and opposing comments concerning those issues where EPA received comments in addition to those from Mirant Kendall, where applicable. EPA used the convention of starting with MKS's comments on a topic and then identifying the other parties and digesting their comments on that topic.

In many cases, EPA has included original comments nearly verbatim for the reader's convenience. In others, EPA included a brief digest of each comment to remind the reader of the topics being discussed. The particular language used in the summary of each issue presented below may derive primarily from one set of comments, but this does not mean that EPA has not read each of the comments noted under that issue. Many of the details presented in the original comments were not repeated in the digested comments. EPA did not limit its analysis of the comments submitted to the digest presented below, and EPA has reviewed each comment in its entirety. This outline and its digest of the comments are simply designed to structure EPA's responses and make them more accessible to the interested public. No significance should be attached to the form in which EPA cited or summarized the original comment in this response document.

This permit is being jointly issued by EPA and MassDEP. EPA will generally present responses to comments as EPA's, unless there are particular issues in which MassDEP plays a unique role beyond being a co-issuer of this permit. For most responses where EPA is the agency presenting the response, MassDEP's certification and joint issuance of the permit will establish that the Department agrees with EPA's response. This document may refer to Mirant Kendall, LLC variously as Mirant Kendall, Mirant, Mirant Kendall Station, MKS, the applicant, or the permittee.

The following changes have been made from the Draft Permit Modification to the Final Permit Modification. Where applicable, relevant sections of the response document where the following changes have been discussed have been included in parentheses at the end of each change:

1. In Part I.A.11.a., the words "other than fine mesh traveling screens" were added to clarify that fine-mesh traveling screens do not reflect BTA at this facility. (4.11.6)

2. A sentence was added at the end of the first paragraph of Part I.A.11.a in order to preclude the opening to the Broad Canal from being blocked off due to the implementation of a BTA technology. (4.3, 4.12, 4.17.3)

3. In Part I.A. 11.a.(2), the words “to the extent practicable” were added regarding meeting the through-media velocity of 0.5 fps. (4.23.1)

4. In Part I.A.11.a. the words “at the entrance to the Broad Canal, or outside the Broad Canal “ have been removed since the location inside the Broad Canal was determined to represent BTA. (4.12)

5. In Part I.A.11.a.(3), the words “to the extent practicable” were added regarding the preclusion of bypasses of the exclusion technology. (4.23.2, 4.30)

6. Several sentences of Part I.A.11.a (4) have been modified based on EPA’s determination that a gentle release mechanism was not available at this time. (4.11.5, 4.24.1, 4.24.2)

7. In Part I.A.11.a.(5), EPA has clarified the language regarding the design standard for the sweeping current velocity (4.25.1)

8. In Part I.A.11.a.(6), EPA has modified the language regarding the timing of exclusion technology deployment as it relates to icing conditions (4.26)

9. In Part I.A.11.b. the words “at all times” were replaced with “to the extent practicable” regarding the through screen velocity requirement and the preclusion of bypasses, since bypasses could occur due to conditions that are out of the permittee’s control. (4.29.2)

10. In Part I.A.11.c.(1), language has been added to account for the eventuality that the permittee installs an exclusion technology that would require the removal of the existing traveling screens. In such case, the tertiary BTA regarding the rotation of the traveling screens and associated requirements would not apply. (4.38.3)

11. In Part I.A.11.c.(2), EPA has added specificity to the location where the permittee must return any live and juvenile fish that are trapped on the traveling screens. (4.38.2)

12. Part I.A.11.d. is a new section (original became Part 1.A.11.e) which requires the permittee to conduct its scheduled maintenance outages during the period of May 15 to June 30, to reflect this period of historically high entrainment, to the extent practicable. (4.5)

13. The first sentence of Part I.A.11.d (which is now I.A.11.e.) was changed to add more specific inspection language and to require a *visual* inspection of installed exclusion technologies. In addition, the wording “previous deployment period” at the end of I.A.11.d.(1) and (2) was changed to “the previous year of deployment”.

14. Part I.A.11.d.(2) {which is now 11.e.(2)}, now specifies that inspection of the coarse mesh barrier net shall be conducted “during months when it is in use”.

15. In Part I.A.11.d.(4), {(which is now 11.e.(4)}, the words “as defined in Part I.A.11.a.(5)” have been added to refer back to change made as discussed in # 7 above.

16. In Part I.A.11.d.(5), {which is now 11.e.(5)}, the word “approach” has been replaced with “through–screen” to reflect the determination that through-screen velocity is the more appropriate velocity to measure.

17. In the first paragraph of Part I.A.12, the words “any deployed” have been added before “coarse mesh barrier nets”.

18. Part I.A.14.a.3.(f) was added to require the permittee to annually report exclusion technology deployment and removal dates and issues regarding the improper functioning of these technologies. (6.2)

19. Part I.A.14.d.1.(a) has been revised to change a sampling station. (5.5)

20. Part I.A.14.d.4. has been revised with more detail regarding an ichthyoplankton sampling procedure (5.6)

21. EPA has revised Part I.A.14.d.9.(b) regarding the ichthyoplankton survivability assessment. (5.11)

Background

This permit modification derives from a lengthy process lasting nearly two decades. Most recently, in 2001, Mirant submitted an updated application for renewal of its 1988 NPDES permit. The principal, though not sole, subjects at issue were thermal discharge limits to be imposed under CWA § 316(a), and cooling water intake structure (CWIS) requirements to be imposed under CWA §§ 316(b), 301(b)(1)(C), and 401(a)(1) and (d). Section 316(b) requires that “the location, design, construction, and capacity of cooling water intake structures reflect the best technology available for minimizing adverse environmental impact.”

As part of its 2001 permit renewal application, Mirant proposed to install a seasonal barrier net in fulfillment of section 316(b). Mirant indicated that it believed that its proposed barrier net technology could potentially reduce both impingement mortality and entrainment.

In June 2004, EPA issued a Draft Permit requiring seasonal use of barrier nets in front of the plant’s existing cooling water intake structures. The Draft Permit required the nets to be designed to meet a goal of 80% impingement mortality reduction and 60% entrainment reduction, as compared to baseline conditions.

During the public comment period for the 2004 Draft Permit, Mirant, the Conservation Law Foundation (CLF), several state agencies, and other parties commented extensively. Mirant argued that EPA should have hewn more closely to the substantive requirements of the Phase II Rule, and not specifically required a barrier net. By contrast, other commenters argued that EPA should have required technologies potentially more effective at reducing impingement and/or entrainment. For example, both the Massachusetts Division of Marine Fisheries (MADMF) and CLF recommended that the draft barrier net requirement be replaced with a requirement to deploy an aquatic filter barrier known as the Gunderboom Marine Life Exclusion System, which has airburst technology to dislodge impinged organisms.

In September 2006, EPA issued the Final Permit. The Final Permit retained the requirement for a barrier net system. EPA declined to require installation of an aquatic filter barrier (e.g., Gunderboom) as CLF and MADMF had suggested. The Final Permit included both thermal discharge limits imposed under CWA § 316(a) and cooling water intake structure (CWIS) requirements imposed under CWA §§ 316(b), 301(b)(1)(C), and 401(a)(1) and (d). The Final Permit's requirements under CWA § 316(b) were based, in part, on a regulation that set categorical technology-based requirements for CWISs at large, existing power plants, such as Kendall Station. *See generally* 40 C.F.R. Part 125 Subpart J (the "Phase II Rule") (suspended as of July 9, 2007). Pursuant to a provision of the Phase II Rule, the Region developed the Final Permit's CWIS requirements using Best Professional Judgment (BPJ), *see* 40 C.F.R. § 125.95(a)(2)(ii), but the Region's exercise of BPJ was explicitly and substantively informed by certain aspects of the Phase II Rule. In particular, EPA determined that, guided in part by the substantive requirements of the Final Phase II Rule, it would exercise its Best Professional Judgment to require only impingement reduction, not entrainment reduction. MassDEP, however, issued a state Water Quality Certification requiring the barrier net system to also achieve entrainment reduction, and EPA incorporated the requirements of this certification into the Final Permit.

In the fall of 2006, both Mirant and CLF filed petitions for review of the Final Permit. CLF argued that the Region "unjustifiably applied the Phase II Rule" and specifically challenged EPA's decision not to require technologies under section 316(b) that would reduce entrainment. With respect to section 316(b), CLF argued that EPA should have required a Gunderboom aquatic filter barrier, which, in CLF's view, "would have greater entrainment and impingement benefits" than a barrier net system and which, unlike a barrier net, "has been proven to be effective at preventing entrainment." Meanwhile, Mirant argued essentially the opposite, i.e., that the Region should have hewn more closely to the substantive requirements of the Phase II Rule.

Subsequent legal developments concerning the Phase II Rule led to the Region's decision to withdraw a portion of the 2006 Final Permit pursuant to 40 C.F.R. § 124.19(d) and to prepare a draft permit modification. *See* Statement of Basis (SOB) at 4-5. The Environmental Appeals Board granted EPA's request to stay the proceedings while this permit modification process took place.

In March 2008, EPA submitted for public notice a Draft Permit Modification. The Draft Permit Modification proposed requirements designed to minimize both entrainment and impingement mortality. Specifically, the Draft Permit Modification required seasonal use of an aquatic organism exclusion technology meeting certain technical design and operational standards (e.g., a maximum screen opening or pore size) that should minimize both entrainment and impingement mortality (the "primary BTA technology"). The Draft Permit Modification further sought to minimize impingement mortality by requiring that whenever the primary BTA technology is not in place and functioning properly, the permittee must implement a coarse-mesh barrier net system meeting certain design criteria geared to minimize impingement mortality (the "secondary BTA technology"). Finally, the Draft Permit Modification required that whenever neither the primary BTA technology nor the secondary BTA technology are in place and functioning properly, the permittee must operate the existing traveling screens in a manner intended to minimize impingement mortality (the "tertiary BTA technology"). As noted above, EPA has responded to public comments received and, in some instances, revised provisions in the Final Permit Modification, but the Final Permit Modification is substantially identical to the Draft Permit Modification as described above.

1. COMMENTS ON PROCESS

General Response 1.01

As summarized earlier, EPA has made a number of changes to the Final Permit Modification. In particular, EPA has:

- Specified that the exclusion technology (and, where applicable, coarse mesh barrier net) must be located within the Broad Canal.
- Specified that the exclusion technology (and, where applicable, coarse mesh barrier net) may not preclude recreational or navigational access to the Broad Canal.
- Substantially revised the requirement to ensure a sweeping velocity past the face of the exclusion technology.
- Replaced the requirement that the exclusion technology include a mechanism to "gently release" impinged eggs and larvae with a requirement to include an airburst, backflow, or comparable mechanism to minimize debris loading.
- Revised the through-media velocity and bypass prohibition provisions so as to require compliance "to the extent practicable" rather than "at all times."

These changes are explained in detail in the responses to the specific comments. Many of the comments submitted refer to the Draft Permit Modification's proposed permit conditions in the aggregate, without specifically identifying which conditions are under discussion. To the extent that particular comments refer in the aggregate, or generally allude to but do not specify, requirements that have been removed or substantially revised, EPA considers those portions of those comments to have been addressed by the changes made. This general response is incorporated into every subsequent response, even if not specifically cited.

General Response 1.02

In several comments, Mirant argues that the length of the public comment period was inadequate.

EPA is only required to provide a 30-day comment period. 40 C.F.R. § 124.10(b)(1). The vast majority of EPA-issued permits have public comment periods of only 30 days, which EPA has found to be sufficient even where complex technical matters are at issue. Nevertheless, in this case EPA initially provided a 38-day comment period, from March 10, 2008 to April 17, 2008. Public Notice at 1, 3. Mirant then requested an extension of precisely two weeks, to May 1, 2008. EPA granted that extension verbally at the public hearing that was held pertaining to this modification on April 15, 2008.

Because Mirant received the full extension that it requested, for a total comment period of 52 days (almost twice as long as the required period), EPA is not persuaded by Mirant's argument that it was deprived of an adequate opportunity for comment.

Comments 1.1 & 1.2
In these comments, Mirant sets forth its comment numbering system, its expectation that EPA fully review and respond to these comments, and the abbreviations and terminology it uses in its comments.

Response to Comments 1.1 & 1.2
EPA appreciates the effort Mirant has put into organizing its voluminous comments, and has adopted Mirant's decimal outline numbering system to organize EPA's responses. EPA has in some instances expanded a Mirant comment that contained several distinct points by creating an additional numbering level, and in other cases integrated comments by other parties into the numbering system by associating them with the most closely pertinent Mirant comment. Finally, except where specifically noted otherwise, references to a comment or the response to that comment should be assumed to apply not just to that numbered comment but also to any distinctly numbered sub-comments.

EPA has also used abbreviations and terminology consistent with that of Mirant's where appropriate.

EPA is obligated to "[b]riefly describe and respond to all significant comments on the draft permit [modification] . . . raised during the public comment period, or during any hearing." 40 C.F.R. § 124.17(a)(2). "The regulation does not require the Region 'to respond to each comment in an individualized manner,' nor does it require that 'the Region's response be of the same length or level of detail as the comment.'" *In re Dominion Energy Brayton Point, LLC*, 12 E.A.D. 490, 578 (EAB 2006) (quoting *In re NE Hub Partners, L.P.*, 7 E.A.D. 561, 583 (EAB 1998), *rev. denied sub nom. Penn Fuel Gas, Inc. v. EPA*, 185 F.3d 862 (3d Cir. 1999))

Comment 1.3
Mirant notes that its comments and submissions predating the draft permit modification do not bind Mirant, and disavows any earlier statements indicating that Mirant agreed with EPA on any of the requirements of the draft permit modification. Mirant reserves the right to argue now for different requirements than it may have been prepared to accept at an earlier time, but only as part of a different overall set of permit provisions.

Response to Comment 1.3
EPA agrees that Mirant is not bound by comments, submissions, or statements it made before the issuance of the Draft Permit Modification. Indeed, EPA is not even obligated to consider materials submitted before the public comment period. *See* Response to Comment 1.9.

That said, there were many instances where suggestions and recommendations by Mirant (and/or its consultants) led EPA to evaluate or pursue options that Mirant had put forth. While Mirant is not bound to accept a proposal now simply because it advanced that proposal before, neither is EPA required to reject that proposal simply because Mirant has exercised its right to change its mind. Where Mirant's earlier proposals continue to have merit and be useful for this permit, EPA has evaluated such proposals on their objective merits.

In some instances, EPA has noted in these Responses to Comments where Mirant advocated one position in its comments on the 2004 Draft Permit, and now advocates for an opposite or near-opposite position. Of course, Mirant's comments on the 2004 Draft Permit were made in response to a different proposal and under a different legal regime, and Mirant is free to change its position even on issues that did not change between 2004 and 2008. Where EPA has noted a change in position, the point is solely to set Mirant's current comment, and EPA's response, in context.

Comment 1.4
Mirant observes that the final Permit Modification will be jointly issued by EPA New England and MassDEP, each pursuant to its respective permitting authorities, and therefore directs its comments both to EPA New England and MassDEP.

Response to Comment 1.4
EPA is responsible for issuing NPDES permits within the Commonwealth of Massachusetts, since Massachusetts has not received authorization from EPA to administer the NPDES permit program within its borders. Massachusetts maintains separate water pollution control permitting authority under Massachusetts law. Generally, as here, when the Region issues an NPDES permit in Massachusetts under the Clean Water Act, MassDEP will concurrently issue a water permit pursuant to the Massachusetts Clean Waters Act. Thus, under this joint permitting scheme, the Draft Permit Modification, Statement of Basis (SOB), Final Permit Modification, and Response to Comments are issued concurrently by EPA and MassDEP pursuant to the separate federal and state legal authorities. The SOB and Response to Comments reflect the conclusions of both EPA and MassDEP, unless otherwise noted. These responses generally refer to the permitting authority as "EPA" for the sake of convenience.

Comment 1.5
Mirant states that it understands that the SOB was issued solely by EPA New England and that MassDEP did not issue a fact sheet or statement of basis. Mirant suggests that the Draft Permit Modification did not comply with state regulations and that MassDEP must prepare its own fact sheet or statement of basis and open a new public comment period.

Response to Comment 1.5
This Final Permit Modification and indeed the Draft Permit were authored by EPA and MassDEP jointly. MassDEP's regulations that are referenced are satisfied by this joint issuance process. As noted in the Introduction, these responses generally refer to the permitting authority as "EPA" for the sake of convenience, but these responses are issued on behalf of MassDEP as well except where specifically noted.

Comment 1.6
Mirant observes that the Massachusetts Office of Coastal Zone Management (CZM) must certify that the Final Permit Modification is consistent with CZM's enforceable policies under the Coastal Zone Management Act.

Response to Comment 1.6
CZM has determined that the Final Permit Modification is consistent with its enforceable program policies. *See* Letter from Leslie-Ann McGee (CZM) to Shawn Konary (MKS), dated November 19, 2008, AR #775.

Comment 1.7
Mirant claims that the Administrative Record does not include all information, data and studies relied upon in the Statement of Basis for the Draft Permit Modification. Mirant requests an additional public comment period.

Response to Comment 1.7
EPA disagrees with the comment.

EPA acknowledges that the administrative record for the Draft Permit Modification, as of the date of the public notice, inadvertently omitted several documents that were cited in the SOB. Before the date of public notice, items numbered 676 through 698 were added to the existing administrative record. Soon after the public comment period was opened on March 10, 2008, and following discussions with the permittee, EPA was notified that there were several documents, including some that were referenced in the draft permit modification, which had not been added to the administrative record. During the public comment period, these and several other documents were identified as appropriate for the supporting file for the permit modification. Pursuant to 40 C.F.R. § 124.18(c), EPA added these documents to the record as soon as possible, and specifically notified the permittee that the documents had been added. All such documents were added to the administrative record and made available to the permittee (and the general public) on or about April 24, 2008—two weeks before the close of the comment period. In addition, Mintz Levin, on behalf of the permittee, submitted a Freedom of Information Act (FOIA) request to EPA on March 19, 2008 requesting certain documents pertaining to the Draft Permit Modification. All of the additional items that were added to the administrative record, with the exception of some that were made available to the permittee through e-mail transmission, were released to a copy vendor working on behalf of the permittee on April 24, 2008—again, two weeks before the close of the comment period.[1]

EPA has added Mirant's comments, including all exhibits and appendices, to the administrative record. The administrative record for the Final Permit Modification includes all items that were considered in the Draft Permit Modification and all other

[1] A small number of items were disclosed pursuant to the FOIA request after the close of the comment period; the FOIA was finally closed on May 27, 2008. EPA subsequently supplemented the administrative record with a small number of documents. Additionally, in the process of completing this final permit modification, EPA has added additional items to the administrative record pursuant to 40 C.F.R. §§ 124.18(b)(4) and (6).

items required by 40 C.F.R. § 124.18. The administrative record has been available for viewing by the permittee or any member of the public at any time during normal business hours.

The comment does not specify which specific documents that Mirant believes should be included in the Administrative Record,[2] and EPA is not required to divine which documents Mirant has in mind. *See, e.g., In re Spokane Reg'l Waste-to-Energy*, 2 E.A.D. 809, 816 (Adm'r 1989) ("Just as 'the opportunity to comment is meaningless unless the agency responds to significant points raised by the public,' so too is the agency's opportunity to respond to those comments meaningless unless the interested party clearly states its position.") (quoting *Northside Sanitary Landfill, Inc. v. Thomas*, 849 F.2d 1516, 1520 (D.C. Cir. 1988) (internal citations omitted); *see also Vt. Yankee Nuclear Power Corp.* v. *Natural Resources Defense Council*, 435 U.S. 519, 553-54 (1978) ("Administrative proceedings should not be a game or a forum to engage in unjustified obstructionism by making cryptic and obscure reference to matters that 'ought to be' considered and then, after failing to do more to bring the matter to the agency's attention, seeking to have that agency determination vacated on the ground that the agency failed to consider matters 'forcefully presented.'"). Therefore, EPA presumes that its addition of Mirant's comments, and the attached exhibits, to the Administrative Record addresses this comment. *See* 40 C.F.R. § 124.13. (Even as the date of the Final Permit Modification, Mirant has not asked EPA to add any specific documents to the administrative record, other than those included with its comments.)

An additional comment period is not necessary and would serve no real purpose. First, the public comment period was more than adequate. *See* General Response 1.02. During the public comment period, Mirant neither asked EPA to add to the Administrative Record any document that EPA already possessed, nor submitted the unspecified documents that it now claims were omitted. Mirant received the full extension that it requested, for a total comment period of 52 days (almost twice as long as the required period), and it is unpersuasive for Mirant to argue that it did not receive a sufficient opportunity for public comment. Second, reopening the comment period for this reason would not serve any real purpose. The purpose of the public comment period is to comment on the proposed permit action, not the administrative record. *See* 40 C.F.R. §§ 124.11, 124.13; *cf. Am. Mining Congress v. Marshall*, 671 F.2d 1251, 1262 (10th Cir. 1982) (under Administrative Procedures Act, right of comment applies to notice of proposed rulemaking, not the rulemaking record). Third, the omission was cured well within the comment period, and no party was prejudiced thereby. More than a week before the close of the comment period, the administrative record for the Draft Permit Modification was perfected and the permittee, through an approved off-site copy vendor, copied the added documents.[3] Consequently, EPA has declined to provide an additional comment period for the purpose of allowing Mirant to provide further comment on the

[2] The only document that Mirant cites in the comment is a March 19, 2008 request under the Freedom of Information Act. That document itself is not appropriately part of the administrative record under 40 C.F.R. § 124.18, nor does it provide any basis for finding that the documents it requests ought to be part of the administrative record.

[3] No party other than the permittee has requested to view the administrative record to date.

small number of documents that were inadvertently omitted from the record on the date the Draft Permit Modification was issued.

Comment 1.8
Mirant states that MassDEP has not completed its responses to the public records requests, and reserves the right to supplement these comments.

Response to Comment 1.8
While EPA has *discretion* to accept post-comment period submissions, Mirant does not retain a *right* to supplement its comments with post-comment period submissions. *See* 40 C.F.R. §§ 124.13, 124.17(a)(2); Response to General Comment 1.02. EPA further notes that, as of the date of this Final Permit Modification, MassDEP has completed its responses to the public records requests submitted by Mirant, and furthermore that EPA has not received any proposed supplemental comments from Mirant.

Comment 1.9
Mirant incorporates each of its prior communications and data submissions to EPA New England or MassDEP concerning the renewal or modification of Permit No. MA0004898 as comments on the Draft Permit Modification. This incorporation by reference includes all submissions by Mirant or its predecessors concerning the permit dating from the initial renewal application in 1993 to the date of these comments, including Mirant's comments on the draft permit, whether or not such submissions have been identified as part of the Administrative Record, and whether or not they were fully considered by EPA before issuance of the draft permit.

Response to Comment 1.9
Under applicable federal regulations, EPA is only required to respond to materials submitted *during* the public comment period. *See* 40 C.F.R. § 124.17(a)(2). "That is, within the interval of time between the beginning and end of the public comment period, not before, not after." *In re Avon Custom Mixing Servs.*, Inc., 10 E.A.D. 700, 706 (EAB 2002). Under appropriate circumstances, a party can "put the permit issuer on formal notice of any continuing objections" that pre-dated the comment period, by "register[ing] the objections with the permit issuer *during the public comment period*." *Id.* at 706 n.14 (emphasis in original). However, commenters are obligated to raise all issues "'with a reasonable degree of specificity and clarity during the comment period,'" so that EPA "'need not guess the meaning behind imprecise comments.'" *Dominion*, 12 E.A.D. at 510 (quoting *In re Westborough*, 10 E.A.D. 297, 304 (EAB 2002)); *see also Vt. Yankee*, 435 U.S. at 553-54 ("Administrative proceedings should not be a game or a forum to engage in unjustified obstructionism by making cryptic and obscure reference to matters that 'ought to be' considered and then, after failing to do more to bring the matter to the agency's attention, seeking to have that agency determination vacated on the ground that the agency failed to consider matters 'forcefully presented.'"). Therefore, a commenter attempting to incorporate to pre-comment period submissions into its comments must identify those submissions with a reasonable degree of specificity and clarity.

For this reason, EPA will only respond to significant comments in the permittee's submission dated (and received on) May 1, 2008, and declines the invitation to respond to a set of unspecified materials submitted to the agency over the last fifteen years. Mirant's attempt at blanket incorporation by reference of "all submissions by Mirant or its predecessors concerning the permit dating from the initial renewal application in 1993 to the date of these comments" is unreasonable and does not provide EPA with sufficient clarity about the company's particular concerns needed to craft meaningful responses. The comment does not make even a cursory attempt to catalogue such materials, nor has it explained their relevance to any particular Draft Permit Modification condition. As such, the permittee's proposed incorporation by reference would likely engender disputes over which materials are actually in the possession of EPA and confusion over how to apply the materials to the Draft Permit Modification conditions. This would frustrate the very purpose of the public comment period, which is to provide predictability and finality to the permitting process. *See, e.g., In re Spokane Reg'l Waste-to-Energy*, 2 E.A.D. 809, 816 (Adm'r 1989) ("Just as 'the opportunity to comment is meaningless unless the agency responds to significant points raised by the public,' so too is the agency's opportunity to respond to those comments meaningless unless the interested party clearly states its position.") (quoting *Northside Sanitary Landfill, Inc. v. Thomas*, 849 F.2d 1516, 1520 (D.C. Cir. 1988) (internal citations omitted).

Indeed, the permittee's attempt at generic incorporation by reference would force the Region into the position of construing materials that pre-dated issuance of the 2004 Draft Permit, let alone the 2008 Draft Permit Modification, as "comment" on the 2008 Draft Permit Modification. Furthermore, as Mirant emphasizes in Comment 1.3, Mirant is not bound by previous submissions, and is free to state a position in its comments on the Draft Permit Modification that contradicts earlier submissions on similar or identical issues. Thus, Mirant appears to suggest that EPA might be required to respond to pairs of opposing comments on the same issue from the same party and attempt to discern which actually reflects Mirant's position. To the contrary: permit issuers need not "guess the meaning behind imprecise comments," *In re Westborough*, 10 E.A.D. at 304, and are "under no obligation to speculate about possible concerns that were not articulated in the comments," *In re New Eng. Plating Co.*, 9 E.A.D. 726, 735 (EAB 2001).

Mirant's broad claim of issue preservation is also inconsistent with NPDES regulations. For the purposes of EAB review, an issue is not preserved simply because it is generally reflected somewhere in the administrative record. Instead, the issue must have been raised during the public comment period with a reasonable degree of specificity and clarity. *See In re Encogen Cogeneration Facility*, 8 E.A.D. 244, 250 n.10 (EAB 1999) (burden is on the petitioner to establish that issues were raised during the comment period, and "[i]t is not incumbent upon the Board to scour the record to determine whether an issue was properly raised below."). It is not sufficient for a commenter to have raised a more general or related argument during the public comment period. *See, e.g., Teck Cominco Alaska Inc.*, *Red Dog Mine*, 11 E.A.D. 457, 479-82 (EAB 2004) (comment on Alaska's water quality criteria fails to provide basis for appeal of suspended solids effluent limit that allegedly violates Alaska's antidegradation rule); *In re City of Marlborough, Mass. Easterly Wastewater Plant*, 12 E.A.D. 235, 243 (EAB 2005) (comment on length of time an interim phosphorus limit will be in effect is inadequate basis for preserving for appeal a challenge to the stringency of the limit).

Comment 1.10
The Agencies must squarely and fairly address Mirant's submissions and contentions in a fashion that the SOB did not accomplish. Mirant provides two specific examples:

1. Mirant objects to the SOB's remark that Mirant "suggested that impingement is not a concern at Kendall Station" in its 2006-2007 Charles River Monitoring Report, when that report's exact statement was "negligible levels of impingement combined with relatively high levels of abundance in the [Charles] River in 2007 indicate that impingement is not causing any adverse population effects."

2. Mirant objects to the SOB's use of cost information derived from Mirant's slides presented at a meeting between Mirant, EPA, and others on September 19, 2007. At that meeting, Mirant expressly stated that its presentations were based on preliminary and incomplete analyses, and declined to leave behind any of those preliminary analyses. EPA later issued a CWA § 308 request for copies of those slides. Mirant complied with the request but noted that the analyses were "preliminary, rushed and incomplete." The SOB used cost figures from those presentations, but did not cite Mirant Kendall's explicit qualifications regarding those submissions.

Mirant requests that EPA take care to avoid mischaracterizations of its submissions.

Response to Comment 1.10
The comment consists of a general point about "squarely and fairly address[ing] Mirant's submissions," and two specific examples. With regard to the general point, the commenter is obligated to identify the scope of its comment "'with a reasonable degree of specificity and clarity during the comment period,'" so that EPA "'need not guess the meaning behind imprecise comments.'" *Dominion*, 12 E.A.D. at 510 (quoting *In re Westborough*, 10 E.A.D. at 304). Where an issue is raised only generically during the public comment period, EPA is not required to provide more than a generic justification for its decision. *See id.* at 581. Beyond the specific examples cited, EPA cannot discern which technologies and which factors Mirant believes have not been "squarely and fairly" addressed. Therefore, to the extent, if any, that this comment may have been intended to embrace additional examples beyond those cited, it is not a comprehensible comment, let alone a significant one, and requires no response.

With respect to the two specific examples, EPA responds as follows:

SOB's reference to Mirant's 2006-2007 Charles River Monitoring Report: See Response to Comment 3.4.4; *see also generally* Response to Comments Section 3.

SOB's reference to Mirant's September 19, 2007 slides: See General Response 2.04.

Comment 1.11
[In Comment 1.11, Mirant states that EPA may not rely on the preliminary cost analyses at A.R. No. 688, and explains why it has not provided any further cost estimates. For simplicity, EPA has combined Comment 1.11 with other comments that cover essentially the same ground.]

Response to Comment 1.11
See General Response 2.04.

Comment 1.12
Mirant notes that its comments on the Draft Permit Modification rely on biological monitoring data that post-dates issuance of the 2004 Draft Permit and "could not have been provided in [Mirant's comments on that 2004 Draft Permit] or even with Mirant's petition to the EAB for review of the 2006 Final Permit." Mirant states that it reserves the right to rely fully on those updated information and analyses in all further proceedings at the EAB (and at MassDEP's Office of Dispute Resolution and Appeals and the Commonwealth's Division of Administrative Law Appeals) on any issue, including the portions of the 2006 Final Permit that were not withdrawn by EPA New England.

Response to Comment 1.12
In the Statement of Basis, EPA stated: "EPA is requesting, and plans only to respond to, comments regarding the portions of the Final Permit that have been replaced and/or modified by this permit modification." Statement of Basis, at 6; *see also* Public Notice, at 2; *see generally* 40 C.F.R. § 124.19(d) (noting that "Any portions of the permit which are not withdrawn and which are not stayed under §124.16(a) continue to apply," i.e., that exercise of § 124.19(d) withdrawal option does not reopen entire permit to renewed comment).

This comment pertains entirely to litigation before the Environmental Appeals Board. It does not request any changes to the Draft Permit Modification and is not a "significant comment" within the meaning of 40 C.F.R. § 124.17(a)(2). Therefore, no response is required. *Cf. ACLU v. FCC*, 823 F.2d 1554, 1581 (D.C. Cir. 1987) ("Thus only comments which, if true, raise points relevant to the agency's decision *and which, if adopted, would require a change in an agency's proposed rule* cast doubt on the reasonableness of a position taken by the agency [that a comment is not significant].") (quoting *Home Box Office, Inc. v. FCC*, 567 F.2d 9, 35 n.58 (1977)) (emphasis and alteration in *ACLU*).

That said, EPA provides the following response:

EPA already considered Mirant's 2005 biological data in the preparation of the 2006 Final Permit. *See* 2006 Response to Comments, Part C; AR 672. In the context of this permit modification, EPA has also considered all biological data, submitted by Mirant or any other party by May 1, 2008, that pertains to the adverse environmental impact of Kendall Station's cooling water intake structures. With respect to the portions of the permit that were not within the scope of the permit modification, the regulations state that "[t]he record shall be complete on the date the final permit is issued." 40 C.F.R. § 124.18(c); *Dominion*, 12 E.A.D. at 518 ("[D]ocuments submitted subsequent to permit issuance cannot be considered part of the administrative record.").

Comment 1.13
Mirant states that the SOB and the Draft Permit Modification are inadequate because they "do not propose any particular location or technology as BTA under CWA § 316(b) for the CWIS at Kendall Station." Mirant states that EPA must identify a "best" technology that is actually available for this site and base any design specifications or other requirements in the final Permit Modification on that technology or compatible technologies. Mirant states that if EPA agrees with Mirant's comments and proceeds to select a specific set of technologies during these permit proceedings, then EPA must reopen the public comment period. According to Mirant, although the initial proposal includes the possibility of the ultimate requirement, if the Agencies select a particular technology, Mirant and the public will not have been fairly apprised of the critical issues.

Response to Comment 1.13
EPA may alter conditions in a final permit from the corresponding conditions proposed in the draft permit without necessarily triggering the need for a new round of notice and comment. *See, e.g., In re D.C. Water & Sewer Auth.,* NPDES Appeal Nos. 05-02, 07-10, 07-11, 07-12, slip op. at 61 (EAB, Mar. 19, 2008) [hereinafter "*WASA*"] (citations omitted). Nevertheless, "a final permit that differs from a proposed permit and is not subject to public notice and comment must be a 'logical outgrowth' of the proposed permit." *Id.* (citations omitted). The "'essential inquiry'" for determining whether a final permit is a logical outgrowth of the draft permit "'focuses on whether interested parties reasonably could have anticipated the final rulemaking from the draft permit." *Id.* at 61 (citing *NRDC v. EPA*, 279 F.3d 1180, 1186 (9th Cir. 2002)); *Am. Med. Ass'n v. United States*, 887 F.2d 760, 768 (7th Cir. 1989) ("The crucial issue . . . is whether parties affected by a final rule were put on notice that their interests [were] at stake . . . in other words, whether or not potential commentators would have known that an issue in which they were interested was on the table and was to be addressed by a final rule.") (internal quotation marks and citations omitted). The mere fact that the final permit conditions differ from those in the draft permit does not mean that the final conditions could not reasonably have been anticipated. To answer this question, it is salient to determine "'whether a new round of notice and comment would provide the first opportunity for interested parties to offer comments that could persuade the agency to modify its rule.'" *WASA*, slip op. at 61-62 (citing *NRDC*, 279 F.3d at 1186).

In addition to the logical outgrowth test, EPA regulations at 40 C.F.R. § 124.14(b) specify that "if any data[,] information[,] or arguments submitted during the public comment period . . . appear to raise substantial new questions concerning a permit, the Regional Administrator may . . . reopen or extend the comment period." In the Brayton Point decision, the EAB summarized the legal framework surrounding 40 C.F.R. § 124.14(b) as follows:

> The critical elements of this regulatory provision are that new questions must be 'substantial' and that the Regional Administrator 'may' take action.' *In re NE Hub Partners, L.P.,* 7 E.A.D. 561, 585 (EAB 1998), *rev. denied sub nom. Penn Fuel Gas, Inc. v. EPA,* 185 F.3d 862 (3d Cir. 1999); *accord In re Ash Grove Cement Co.,* 7 E.A.D. 387, 431 (EAB 1997). Thus, based on the language of this regulation, the Board has long acknowledged that the decision to reopen the public comment period is largely discretionary." *NE Hub,* 7 E.A.D. at 585; *Amoco Oil.,* 4 E.A.D. at 980; *see also Old Dominion,* 3 E.A.D. at 797. Furthermore, where the Agency adds new information to the record in response to comments, "the appellate review process affords [petitioner] the opportunity to question the validity of the material in the administrative record upon which the Agency relies in issuing a permit." *Caribe,* 8 E.A.D. at 705 n.19 (EAB 2000); *accord NE Hub,* 7 E.A.D. at 587 n. 14; *Ash Grove,* 7 E.A.D. at 431.

Dominion, 12 E.A.D. at 695. A Region's decision not to reopen the comment period under 40 C.F.R. § 124.14(b) in the face of substantial new questions is subject to EAB review under an "abuse of discretion" standard and the Board has noted that a Region has "substantial discretion" in this regard. *In re Chelalis Generating Station*, PSD Appeal No. 01-06, slip op. at 32-33 (EAB, Aug. 20, 2001) (Order Denying Review). *See also In re Metcalf Energy Center,* PSD Appeal Nos. 01-07 & 01-08, slip op. at 27-30 (EAB, Aug. 10, 2001) (Order Denying Review). In addition, the EAB has stated that its review under § 124.14(b) will be "deferential." *NE Hub,* 7 E.A.D. at 585.

Thus, in responding to comments, a Region may generate new information and analysis, add new materials to the administrative record, and change permit conditions without necessarily triggering a need to reopen the public comment period under 40 C.F.R. § 124.14(b). *See also* 40 C.F.R. §§ 124.17(b) (in responding to comments, new materials may be added to administrative record for final permit) and 124.18(b)(4).[4] To warrant reopening the comment period, the questions raised by the new information must be both new (*i.e.*, not involve issues already evident in the permit proceeding) and substantial (*i.e.*, have a material effect on the permit result). Moreover, even if a question is new and substantial, the Region may still exercise reasonable discretion in deciding whether to reopen the comment period. Many considerations may inform the Region's exercise of this discretion, including whether permit conditions have been significantly changed as a result of the substantial new questions, whether the new information or new permit conditions were developed in response to comments received during the permit proceeding, whether the record adequately explains the agency's reasoning so that a dissatisfied party can fairly develop a permit appeal, and the significance of adding delay

[4] The law does not require additional rounds of public comment in every case in which new information is added to the record or a permit condition is changed in response to comments. *See, e.g., Cmty. Nutrition Inst. v. Block,* 749 F.2d 50, 58 (D.C. Cir. 1984) (in APA case, noting that "[r]ulemaking proceedings would never end if an agency's response to comments must always be made the subject of additional comments"). Requiring additional rounds of public comment under such circumstances would create a disincentive for agencies to respond to comments by improving analyses or appropriately changing permit conditions. *See, e.g. Old Dominion*, 3 E.A.D. at 797. Under such a regime, agencies would face a Hobson's choice between inferior quality decisions and a never ending public comment process. *See, e.g. Rybachek v. EPA***,** 904 F.2d 1276, 1287 (9th Cir. 1990); *BASF Wyandotte Corp., et al., v. Costle***,** 598 F.2d 637, 644 - 47 (1st Cir. 1979).

to the particular permit proceeding. *See, e.g., Chelalis,* slip op. at 33, 35-36; *Metcalf Energy*, slip op. at 29*; NE Hub*, 7 E.A.D. at 587, n. 14; *In re Old Dominion Elec. Co.*, 3 E.A.D. 779, 797-98 (Adm'r 1992); *In re Thermalkem, Inc.,* 3 E.A.D. 355, 357-58 (Adm'r 1990).

The logical outgrowth test and 40 C.F.R. § 124.14(b) impose separate but related standards. The former exclusively addresses changed permit conditions, whereas the latter addresses any situation in which substantial new questions are raised by new information, whether it involves changed permit conditions or the addition of new analysis to the record. In *WASA*, slip op. at 62, the Board explained that the "logical outgrowth" test is reflected in EPA regulations and prior Board decisions. Accordingly, the Board made clear that although it will often defer to the permit issuer's decision about whether or not to reopen the comment period, it will "consider changes to draft permits on a case-by-case basis and, depending on the significance of the change, may determine that reopening the comment period is warranted." *Id.* at 62 (citations omitted). The Board further stated that determining whether changed provisions in the final permit satisfy the "logical outgrowth" standard, or whether new information added to the record raises "substantial new questions" requiring reopening of the comment period, both involve "fact-based inquiries . . . [concerning] the evolution of the permit condition at issue, and the Region's corresponding explanatory statements." *Id.* at 63.

With regard to the Kendall Station permit modification, EPA's consideration of public comments since issuance of the Draft Permit Modification has led to a reconsideration of the Draft Permit Modification's CWIS-related limits under CWA § 316(b) and the revision of those requirements for the Final Permit Modification. *See* General Response 1.01. In response to comments on the Draft Permit Modification, EPA has also added certain new information to the record (*e.g.,* the SAIC Report concerning the availability of technology to generate a sweeping current). After considering the changed permit conditions and new information, EPA has determined that it is not necessary to reopen the public comment period in this case (1) because the changed Final Permit Modification conditions are a logical outgrowth of the Draft Permit Modification's conditions and supporting analysis, and (2) because the new information added to the record does not raise substantial new questions that warrant reopening the comment period.

The Final Permit Modification has not selected a different technology, nor imposed substantially different requirements, than the Draft Permit Modification. To the contrary, the principal changes between the Draft Permit Modification and the Final Permit Modification are a narrower specification of CWIS location pursuant to a request from Mirant, and the revision of several permit conditions to be less stringent. *See* General Response 1.01.

The Final Permit Modification contains only the following notable new or more stringent conditions:

1. The requirement that, to the extent practicable, the permittee shall ensure that scheduled maintenance outages occur between May 15 and June 30. Although this condition was not in the Draft Permit Modification, a provision of this nature has been under contemplation for over seven years. *See, e.g.*, 2004 Determinations Document at 189 n.12 ("[T]he permittee in this case has evaluated flow reductions as a result of operational shutdowns as a potential alternative means of satisfying CWA § 316(b)."); *id.* at 222; Mirant NPDES Permit Application, at 6-22. In its comments on the Draft Permit Modification, Mirant requested that EPA calculate intake flow reductions (and estimate impingement and entrainment reductions) that could be achieved by installation of variable speed pumps (VSPs). *See* Mirant Comment 4.5. In the process of considering that comment, EPA examined not only the intake volume achievable by further examined the possibility of intake volume reductions achievable by VSPs, but also of prescribed outages. The resulting permit condition recognizes limits on practicability (e.g., need to service steam customers) and only requires compliance "to the extent practicable." *See* Response to Comment 4.5.
2. The requirement that neither the exclusion technology nor the coarse-mesh barrier net may prevent recreational access to the Broad Canal. This was suggested by both Mirant itself and members of the public. *See* Response to Comment 4.3 and related comments.

EPA has determined that the comment period does not need to be reopened with regard to the CWIS requirements included in the Final Permit Modification under CWA § 316(b) because these conditions are a logical outgrowth of the Draft Permit Modification's provisions. Applying the test specified in *WASA,* slip op. at 61-62, a new round of public comment on the Final Permit Modification would not provide the first opportunity for interested parties to offer comments that could persuade the agency to modify its rule. As a result, the Final Permit Modification's conditions could reasonably have been anticipated from the provisions of the Draft Permit Modification and the analysis supporting them.

Therefore, although the Final Permit Modification's conditions are different from those included in the Draft Permit Modification, the new BPJ-based permit conditions are a logical outgrowth of the BPJ-based provisions of the Draft Permit Modification.

In addition, the SOB identified uncertainties about the performance capabilities of the various screening technologies. All interested persons had the opportunity to comment on these and any other technological options, but the uncertainties remain and no other technology was identified that was both as effective as the technologies cited, and available for use at Kendall Station. The Final Permit Modification's permit conditions reasonably address the current technological information and are also a logical outgrowth of the Draft Permit Modification.

While public comments have led to changed permit conditions, and have prompted some additional factual analysis by EPA (*e.g.*, regarding the availability of technology to induce a sweeping current), the questions raised for the Final Permit Modification are *not* "new," as contemplated by EPA's regulations. The new information related to the availability of an induced sweeping current in the Broad Canal that is included in the record for the Final Permit does not raise new questions. EPA has also written the Final Permit Modification conditions to be flexible enough to allow the permittee to comply with the Permit using any technology that can meet the Final Permit Modification's technical specifications. Moreover, in selecting the BTA, EPA has largely relied on record information that not only pre-dated issuance of the Draft Permit Modification, but was provided to EPA by Mirant itself.

Finally, even if substantial new questions were raised by the Final Permit Modification, EPA concludes that the questions at issue do not warrant the discretionary reopening of the public comment period. This Response to Comments document explains EPA's thinking on the relevant issues in detail and will fully enable Mirant or any other party to prepare an appeal of the Final Permit if they wish. Furthermore, reissuance of a Final Permit Modification to Kendall Station is long overdue. The existing permit expired in 1993. The Final Permit was issued in 2006, but was stayed immediately due to pending appeals, and therefore the facility continues to operate under the 1988 permit. As currently operated, the plant can take in up to 79.2 million gallons per day of water from the Charles River, entraining dozens of millions of eggs and larvae, and impinging up to thousands of organisms present in that water. Furthermore, these entrainment and impingement losses are occurring against a backdrop of an impaired river, which makes the losses, and their timely redress, an even greater concern.

Comment 1.14
Mirant notes the existence of public comments that generally support the proposed requirements in the Draft Permit Modification, but do not contain specific evidence to support a determination that the proposed requirements are necessary to minimize environmental impacts that are more than de minimis, or are the best technology or are available within the meaning of CWA § 316(b). Mirant states that EPA may not rely on such comments in making its final determination as to what constitutes BTA under CWA § 316(b) here.

Response to Comment 1.14
In developing this Final Permit Modification, EPA has carefully considered all comments received, including comments stating the commenter's general support for (or opposition to) the proposed requirements. EPA appreciates statements of general support. This is particularly important when the commenter may have a formal regulatory role with respect to the final permit modification. Furthermore, the purpose of a public comment period is to enable the public to *comment*, and EPA may properly consider the views of members of the public who submit such comments. That said, EPA's Final Permit Modification has been based on the evidence in the record, and does not rely solely on general statements of support (or opposition).

Comment 1.15
Mirant recognizes that the Agencies sought some input from the company and others during their development of the Draft Permit Modification, but they did not provide any

meaningful opportunity for discussion, the time provided was insufficient for Mirant to develop and present thorough proposals, and the public comment period on the Draft Permit Modification, even as extended, also was insufficient.

Specifically, by a letter dated August 24, 2007, A.R. 684, EPA New England invited Mirant to provide its views on a wide, open-ended set of issues under CWA § 316(b) as applied to Kendall Station, and to do so at a meeting scheduled just three weeks later on September 19, 2007. Mirant attended and provided some preliminary responses, and later provided the materials at A.R. 687, 688, 689, 691 and 692. The Agencies, however, declined to discuss their own approach with Mirant ahead of making their proposals public.

As indicated elsewhere in these comments, the Agencies have not selected any technology as BTA under CWA § 316(b) for the CWIS at Kendall Station. Instead, the SOB discusses and endorses a variety of innovative technologies, each of which it acknowledges are theoretical and present challenges to implement in this setting. These comments seek to address all of those measures as effectively as feasible in the few weeks allowed, but the sheer number and novelty of the technologies endorsed in the SOB have foreclosed any intensive review or comments.

Mirant accordingly reserves the right to supplement these comments with additional information that it has not had an adequate opportunity to develop during the comment period, and with any new information or data that arise concerning those technologies or the Charles River in the coming time. The Agencies should provide full attention to any such later comments and information as if they had been submitted along with these comments.

Response to Comment 1.15
EPA has no obligation to provide a private copy of a draft permit or draft permit modification to a permittee before submitting a draft for public comment. Nor, for that matter, was EPA under any obligation to meet with Mirant before submitting that draft. Nevertheless, at a very early stage in the development of the Draft Permit Modification, EPA invited Mirant to present its views regarding technology options. EPA appreciates Mirant's presentation at the September 19, 2007 meeting, and, as the record indicates, EPA personnel took careful notes during presentations by Mirant and its consultants. See generally AR 701 (notes taken by Danielle Gaito, EPA).

At that September 19, 2007 meeting, David Webster, the Manager of EPA New England's Industrial Permits Branch, expressly invited all parties present, including Mirant, to submit any and all information that they would like EPA to consider in preparing the Draft Permit Modification. See AR 682. Notwithstanding this request, in the almost six months between September 19, 2007 (the date of the meeting) and March 10, 2008 (the date of public notice of the Draft Permit Modification), Mirant did not, in fact, voluntarily submit any further information for EPA's consideration, except for a submission concerning impingement and entrainment data at a Mirant facility in New York. *See* Response to Comment 1.10. Moreover, Mirant requested and received an extension to the public comment period. Since it received the precise extension it requested, it is not persuasive for Mirant to now complain that it lacked adequate time. *See* General Response 1.02; *see also* Response to Comment 1.8 (regarding Mirant's claim of a "right" to supplement comments after the close of the comment period).

2. COMMENTS ON LAW

Introductory Comment
Mirant begins its section 2 comments with a general overview that summarizes its detailed comments.

Response to Introductory Comment
The responses are provided in the detailed comments below.

General Comment 2.00
In several comments, Mirant raises questions regarding EPA's position concerning *Riverkeeper, Inc., et al. v. EPA*, 475 F.3d 83 (2d Cir. 2007) ("*Riverkeeper II*"), *cert. granted sub nom. Entergy Corp. v. EPA*, 128 S. Ct. 1867 (2008), in light of both the pending Supreme Court appeal and of *Seacoast Anti-Pollution League v. Costle*, 597 F.2d 306 (1st Cir. 1979).

General Response 2.00
In early 2007, the U. S. Court of Appeals for the Second Circuit remanded to the Agency EPA's Phase II section 316(b) rule establishing standards for cooling water intake structures for existing power plants. *Riverkeeper, Inc., et al. v. United States EPA*, 475 F.3d 83 (2d Cir. 2007). In its decision, the Second Circuit found that, in determining the best technology available for minimizing adverse environmental impacts (BTA) for cooling water intake structures, EPA may not compare the costs and benefits of different technologies but may consider costs in two ways. EPA must first determine the most effective technology whose costs may be reasonably borne by the industry. Second, in selecting BTA, EPA may consider other factors, including the cost-effectiveness of technology, and choose a less expensive but more cost-effective technology so long as that technology achieves essentially the same results as the "best" technology whose costs may be reasonably borne. The court remanded the rule to the Agency because, in the court's view, it was unclear whether EPA had improperly weighed costs and benefits in its determination.

A number of parties appealed the Second Circuit decision and the U.S. Supreme Court granted certiorari in the case. *Entergy Corp. v. EPA,* 128 S. Ct. 1867 (2008). The Supreme Court limited its grant of certiorari to one question. The question is whether section 316(b) of the Clean Water Act authorizes EPA to consider costs and benefits in determining the best technology available for minimizing adverse environmental impacts. While the United States did not support the grant of certiorari, the Solicitor General has filed briefs in support of reversal of the Second Circuit. Oral argument was held in the case on December 2, 2008.

EPA disagrees with the Second Circuit's holding that cost-benefits comparison are not a factor EPA may lawfully consider in its decisions. EPA has long construed section 316(b) to permit consideration of the relationship between costs and benefits in determining individual facility's BTA on a case-by-case basis. As early as 1977, EPA issued a permitting decision and a General Counsel opinion that explained that, while section 316(b) does not require a formal cost-benefit analysis, it would not be "reasonable to interpret Section 316(b) as requiring use of technology whose cost is wholly disproportionate to the environmental benefit to be gained." *In re Pub. Serv. Co. of N.H. (Seabrook Station, Units 1 and 2)*, No. 76-7, 1977 WL 22370 (June 10, 1977), *remanded on other grounds*, 572 F.2d 872 (1st Cir. 1978); *accord In re Central Hudson Gas & Elec. Corp., Op. EPA Gen. Counsel*, NPDES No. 63, 1977 WL 28250, at *8 (July 29, 1977).

EPA has noted the tension between the holding in *Seacoast* and the Second Circuit decision in *Riverkeeper II*, arguing that the Second Circuit rejected the comparison of costs to benefits while the First Circuit in *Seacoast* sustained an EPA decision that compared costs and benefits. EPA has not compared the costs and benefits of various technology options in its determination of BTA for this and other post-*Riverkeeper II* case-by-case permits. If the Supreme Court decides that section 316(b) would authorize EPA to compare the costs and benefits of technologies in determining BTA-based limits, the Agency will review the permit in light of the decision and consider any further steps that may be suggested by the decision. Similarly, should the section 316(b) permit provisions be challenged before the EPA's Environmental Appeals Board, EPA will consider how the Supreme Court's decision would affect the challenge to EPA's permitting determination.

Separate MassDEP Response to General Comment 2.00
[This response is provided solely by MassDEP and should not be construed as reflecting the views of EPA.]

The Commonwealth of Massachusetts is a party to the pending U.S. Supreme Court appeal of *Riverkeeper II* and has filed legal briefs in support of the Second Circuit's decision (*i.e.* opposing EPA's interpretation of CWA § 316(b)). As noted in Response to Comment 1.4, the SOB and Response to Comments generally reflect the conclusions of both EPA and MassDEP. However, while MassDEP concurs that the final permit modification satisfies the CWA, the SOB and Response to Comments reflect EPA's conclusions, and not necessarily those of MassDEP, with respect to the consideration of costs and benefits in developing CWA § 316(b) requirements.

General Comment 2.01
In several comments, Mirant addresses EPA's reference to the "BAT" factors from section 304 of the Act, and criticizes EPA's application of those considerations to this section 316(b) permitting decision.

General Response 2.01
At the outset, it is important to repeat that EPA is not *required* to consider the § 304 factors in determining BTA under CWA § 316(b). Rather, EPA may look to them *by analogy* for guidance. *See* SOB at 17 & n.8, 19. Indeed, as the Second Circuit observed in *Riverkeeper I*, the fact that Congress set forth lists of factors that EPA must consider in implementing the various "best" standards of Sections 301 and 306, but conspicuously did not do so in Section 316(b), confirms the breadth of the discretion left to EPA. *See Riverkeeper, Inc. v. United States EPA,* 358 F.3d 174, 187 (2d Cir. 2004) ("*Riverkeeper I*"). In developing the Permit Modification for Kendall Station, EPA did consider the CWA § 304 factors except for comparing costs to benefits, because EPA is not currently authorized to make its BTA determination under § 316(b) on the basis of a cost/benefit comparison due to the court decision in *Riverkeeper, Inc., et al. v. EPA*, 475 F.3d 83 (2d Cir. 2007) ("*Riverkeeper II*"), *cert. granted sub nom. Entergy Corp. v. EPA*, 128 S. Ct. 1867 (2008).

General Comment 2.02

In several comments, Mirant asserts that EPA has failed to evaluate the adverse environmental impact of impingement and entrainment at Kendall Station.

General Response 2.02

In these comments, Mirant appears to assume that loss of fish due to impingement and entrainment is not itself "adverse environmental impact" under CWA § 316(b). Instead, Mirant further appears to assume that adverse environmental impact under § 316(b) is something that may be *caused by*, but not *constituted by*, the death of adult fish, juvenile fish, fish larvae, and fish eggs. In other words, Mirant seems to require that some unspecified level of harm to the populations of certain fish species, or to the overall community structure in the source water, be demonstrated to its satisfaction before it will recognize an "adverse environmental impact" under § 316(b). Yet EPA has long held a view contrary to Mirant's on this point and nothing in the law mandates that the Agency adopt Mirant's position.

The term "adverse environmental impact" (AEI) as used in CWA § 316(b) is not defined in either the statute or applicable regulations. As such, neither the statute nor the regulations expressly limit the extent of adverse environmental impacts that may be considered. The legislative history behind CWA § 316(b) is sparse, but in the House Consideration of the Report of the Conference Committee for the final 1972 CWA Amendments, Representative Clausen stated that "Section 316(b) requires the location, design, construction and capacity of cooling water intake structures of steam-electric generating plants to reflect the best technology available for minimizing *any* adverse environmental impact" (emphasis added). Congressional Research Service, *A Legislative History of the Water Pollution Control Act Amendments of 1972*, Vol. 1, 93d Cong., 1st Session, p. 264. This language does not suggest that the statutory term "adverse environmental impact" should be read narrowly. To the contrary, if anything, this language suggests that all adverse environmental impacts should be considered and minimized and tends to support a broad conception of the adverse environmental impacts that must be minimized.

In particular, EPA has determined that impingement and entrainment losses constitute adverse environmental impact which must be minimized under § 316(b), without the need for the Agency to find population- or community-level effects. EPA expressly took this approach for both the now-suspended Phase II Rule and the earlier Phase I Rule, and in both cases the Agency's stance was upheld in federal court. *See Riverkeeper II,* 475 F.3d at 123-25 (litigation regarding the Phase II Rule); *Riverkeeper I*, 358 F.3d at 196 (litigation regarding the Phase I Rule). *See also* 69 Fed. Reg. 41,586-87, 41,612; 66 Fed. Reg. at 65,284-85, 65,292. Whether or not EPA is legally bound for this BPJ-based permit by its prior determinations on this point for the Phase I and II Rules, EPA affirmatively embraces those determinations and the reasons for them in this permit action.

In addition, the interpretation of "adverse environmental impact" under CWA § 316(b) that is reflected in the contemporary rulemakings also reflects a long-held Agency view, as evidenced by a number of Agency determinations. *See Decision of the General Counsel No. 63 (In re Central Hudson Gas & Elec. Corp., et al.)*, at 371, 381-82 (July 29, 1977); 1977 Draft 316(b) Guidance, at 15 (listing various factors for consideration); *In the Matter of Public Service Company of New Hampshire, et al. (Seabrook Station, Units 1 and 2)*, 10 Env't Rep. Cas. (BNA) 1257, 1262 (EPA June 17, 1977); *Decision of the General Counsel No. 41 (In re Brunswick Steam Elec. Plant),* at 197, 203 (June 1, 1976); 41 Fed. Reg. 17387, 17389 (Apr. 26, 1976) (final CWA § 316(b) regulations later withdrawn by EPA after remand by federal court on procedural grounds) (noting that "[s]ome commenters recommended that the Development Document should provide that the proper test for minimizing adverse environmental impact is related to damage to the aquatic ecosystem and not to the number of fish and other aquatic organisms killed or damaged," but responding that damage to ecosystem is just one of many pertinent factors).

Finally, it is worth noting that although Mirant argues that population level effects must be shown in the Lower Charles River Basin in order to constitute adverse environmental impacts under CWA § 316(b), its argument is not logically limited to this result. At its most basic, Mirant's contention can be expressed as follows: "Impact *X* does not *itself* constitute adverse environmental impact. Rather, impact *X* must be evaluated in some larger context to determine if it causes impact *Y*." Put another way, Mirant argues that impact *X* is not inherently AEI; whether it constitutes AEI is contingent upon whether it affects impact *Y*, a higher level of generality. But this argument could just as easily be applied to impact *Y*: one might argue that impact *Y* is not inherently AEI, and whether it constitutes AEI is contingent upon whether it causes impact *Z*. That is, Mirant argues that a "body count" of impinged and entrained organisms does not itself constitute AEI, but rather that AEI must be determined in terms of species population-level effects (e.g., for river herring in the Lower Charles Basin). But one might equally well challenge whether population-level effects in the Lower Basin matter if they do not directly cause some higher-level effect (*e.g.*, diminishing river herring in the entire Charles River, or in its entire watershed, or in Massachusetts, or in New England, or the entire Atlantic Ocean, etc.). There is no logical limit to this process and this further diminishes the force of Mirant's argument.

To be sure, in these comments Mirant has generally restricted itself to arguing that AEI must be determined in terms of "the affected populations and the overall ecosystem." See, e.g., Mirant Comment 2.7. The point is that, in defining adverse environmental impact, an analytical level of generality must be selected. But no matter which level of generality is selected, the argument could always be raised that impact *X* does not matter on its own unless it can be shown to cause some higher-level impact *Y*. A level of generality at which to assess adverse environmental impacts—a type of impact that need not be justified in terms of a higher level of generality—must ultimately be chosen. EPA, as the agency charged with interpreting and implementing section 316(b), is the entity best suited to make that decision, and EPA, as explained above, has in this case (and elsewhere) selected impingement and entrainment mortality as the relevant measure.

General Comment 2.03

In several comments, Mirant states that EPA has failed to evaluate whether the impacts of impingement and/or entrainment at Kendall Station's CWISs are "de minimis." Mirant also states in several comments that the impacts of impingement and/or entrainment at its CWISs are in fact "de minimis."

General Response 2.03

The concept of a "de minimis" exception is drawn from the common law proposition that *de minimis non curat lex* – the law does not concern itself with trifles. In administrative law, an agency may be authorized to recognize de minimis exemptions if allowed by the particular statutory provision. An agency has no inherent power to create exceptions from statutes; rather, it can, when the statutory text permits, interpret certain statutory provisions as allowing the agency to recognize a de minimis exception. *See Ala. Power Co. v. Costle*, 636 F.2d 323, 360 (D.C. Cir. 1979) ("The ability . . . to exempt de minimis situations from a statutory command is not an ability to depart from the statute, but rather a tool to be used in implementing the legislative design."). "Courts have refused to allow de minimis exemptions where the statutory language does not allow it." *Ober v. Whitman*, 243 F.3d 1190, 1194 (9th Cir. 2001); *see also United States v. Alcan Aluminum Corp.,* 990 F.2d 711, 720 (2d Cir. 1993) (because Comprehensive Environmental Response, Compensation and Liability Act of 1980 draws no distinctions based on quantity, even parties contributing minimal amounts of hazardous substances are liable); *Pub. Citizen v. Young*, 831 F.2d 1108, 1113 (D.C. Cir. 1987) ("rigid" language of Color Additive Amendment does not allow application of de minimis exemption). In contrast, where a statutory language is ambiguous, courts have upheld as reasonable agency decisions to recognize a de minimis exception. *See, e.g., Ober*, 243 F.3d at 1193-95 (upholding, as reasonable interpretation, EPA's exemption of "de minimis" air pollution sources, where provision in question required "reasonably" available measures, or demonstration that attainment was "impracticable," which, court concluded, "allow[s] for the exercise of agency judgment").

In the present context, EPA acknowledges in principle that there could potentially be some de minimis threshold level of impacts below which EPA will not consider "adverse environmental impact" to have occurred under CWA § 316(b). (This would be the only relevant threshold; once adverse impacts are beyond some de minimis level, there is no particular threshold of significance which must be crossed before the adverse impacts must be minimized by the application of BTA.) Arguably, the term "adverse environmental impact" as used in § 316(b) could be read to reasonably permit an interpretation that excludes de minimis impacts. It is important, however, to distinguish a de minimis environmental impact from two related, but quite distinct, scenarios.

In some cases, an adverse environmental impact may be above de minimis levels, but the technology in place may nevertheless "minimize" adverse environmental impact because the technology is the "best," i.e., more effective technology for further reducing such impacts does not exist. In other words, in such cases, the impact may not be de minimis (i.e., it is not so trivial that the law takes no notice of it), but it may in fact be "minimized" (because it is not feasible to reduce further)—in short, the impact is "already minimized." In other cases, an adverse environmental impact may be above de minimis levels, and the technology in place is not the best-performing technology for reducing such impacts, but there are no better-performing technologies available at the site in question because of issues such as space limitations or unacceptable non-water quality environmental impacts or energy impacts. These scenarios do not speak to whether or not adverse environmental impacts may be considered de minimis, but rather speak to what constitutes the best technology available at a particular site for minimizing impacts that are not de minimis.

It is also important to clarify the burden regarding the applicability of the de minimis exception to a particular situation. An agency may apply a de minimis exception when it is not inconsistent with the underlying statute, and the agency bears the burden of demonstrating that it is appropriate to exempt a particular degree of impact as de minimis. *See Ober*, 243 F.3d at 1195; *Natural Resources Defense Council, Inc. v. United States EPA*, 966 F.2d 1292, 1306 (9th Cir.

1992); *Ala. Power*, 636 F.2d at 360. It is *not* the case, as Mirant appears to believe, that, before taking any action, the agency has the burden of demonstrating that an impact embraced by the relevant statute is *not* de minimis. Put differently, impacts are not presumed to be de minimis; rather, an agency must demonstrate that an impact *is* de minimis in order to exempt it from otherwise-applicable statutory requirements.

Thus, although the general principle is that EPA bears the burden of justifying each provision in a NPDES permit, EPA does *not* bear the burden of demonstrating that an identified adverse environmental impact is *not* de minimis. To the contrary, a permittee claiming that it should be exempt from the requirements of section 316(b) on the grounds that any adverse environmental impact is de minimis bears the burden of that demonstration.

EPA has yet to decide whether it is appropriate to read a de minimis exemption into CWA § 316(b). Neither the statute nor the regulations expressly state that such an exemption is or is not allowed. Rather, the statute only says that adverse environmental impacts must be minimized. One could argue that this language either bars a de minimis exemption or is ambiguous and, therefore, permits an exemption. This question is also not addressed overtly in the legislative history of § 316(b). To be sure, there is a single statement by one Congressman that might be pertinent – in the House Consideration of the Report of the Conference Committee for the final 1972 CWA Amendments, Representative Clausen stated that "[s]ection 316(b) requires the location, design, construction and capacity of cooling water intake structures of steam-electric generating plants to reflect the best technology available for minimizing *any* adverse environmental impact" (emphasis added). Congressional Research Service, *A Legislative History of the Water Pollution Control Act Amendments of 1972*, Vol. 1, 93d Cong., 1st Session, p. 264. However, this single statement by a single Congressman cannot be regarded to be determinative.

In any event, consistent with EPA's direct focus on entrainment and impingement rather than on population-level or ecosystem-level effects, EPA has carefully considered Kendall Station's entrainment and impingement impacts and finds that the adverse impacts from Kendall Station's CWIS's are not de minimis, given the facility's potential and reported impingement mortality and entrainment. *See generally* Responses to Comments Section 3. At the same time, however, EPA has presently concluded based on the available scientific information that *entrainment* should not pose a problem from September to February each year because no entrainable fish eggs or larvae are expected to be in the Lower Basin during that period. As a result, EPA's Permit Modification does not apply entrainment reduction technology requirements during that period because there should be no adverse impacts from entrainment. This is not a finding that entrainment impacts are de minimis during that period; it is a finding that there are *no* adverse impacts from entrainment at all during that period. *Impingement*, however, can be a problem year-round. Accordingly, the Permit Modification's impingement-related provisions apply year-round.

Finally, it is worth considering the logical implications of Mirant's arguments that the environmental impacts of its intakes fall below some critical threshold, whether that threshold is framed in terms of "population level effects," "de minimis impacts," or anything else. Mirant's argument appears to be that the documented and potential environmental impacts of its CWISs fall below some threshold below which EPA should not (or perhaps, in Mirant's view, cannot) mandate *any CWIS technology requirements at all beyond what Mirant is already operating*. That is the necessary logical conclusion of Mirant's argument: if the environmental impacts of its CWISs are below this (in Mirant's view) critical threshold, then by implication Mirant's existing traveling screens *already* reflect the best technology available for minimizing adverse environmental impact. To be clear, Mirant's threshold-based arguments are *not* arguments that Mirant should only be required to install a simpler or less expensive CWIS technology than EPA has proposed; they are arguments that Mirant need not make any improvements at all.

General Comment 2.04
[In Comments 1.10, 1.11, and a subcomment of 2.18 designated by EPA as Comment 2.18.5, Mirant objects to EPA's use of the cost estimates presented to EPA at a meeting on September 19, 2007 and submitted to EPA on October 29, 2007. In the interest of efficiency, EPA has combined the relevant portions of these comments, as follows:]

History
Mirant's consultants developed preliminary cost estimates on short notice in response to the Agencies' request dated August 24, 2007 to attend a meeting on September 19, 2007 to discuss BTA at the Kendall Station. At that meeting, Mirant expressly stated that its presentations were based on preliminary and incomplete analyses, and declined to leave behind any of those preliminary analyses (e.g., copies of the consultants' PowerPoint slides). EPA later issued a CWA § 308 request for copies of those slides. Mirant promptly complied with the request but noted that the analyses were "preliminary, rushed and incomplete" and should not be taken by the Agencies as Mirant's or its consultants' considered views. Indeed, Mirant's response specified that its intervening evaluations had determined that many of the technologies preliminarily discussed at the meeting of September 19 in fact were not "available" for Kendall Station.

Objection to reference without acknowledgement of qualifications
The SOB used cost figures from those presentations, but did not cite Mirant's explicit qualifications regarding those submissions. Mirant objects to the SOB's citation of those preliminary cost estimates without reference to the qualifications on, and history of, those estimates.

Objection to reliance on estimates
Mirant states that EPA may not rely on the preliminary cost analyses as realistic cost estimates for the technologies and design standards identified in the SOB. First, those analyses were explicitly preliminary, rushed and incomplete. Second, those analyses were undertaken with no awareness of the content of the Draft Permit Modification, which contains elements that are drastically different, more demanding, and more costly than had entered into the rough analyses underlying those figures. Third, those cost analyses did not include the costs of pilot studies, laboratory or field studies; costs to assess, collect and dispose of any materials that must be removed during excavation and dredging activities; costs of permitting processes; costs for the administration of contracts and for engineering and construction management by Mirant; or cost escalators for inflation to account for the likely increase in costs by the time of any actual implementation.

Mirant's decision not to provide updated cost estimates
Mirant states that it has not provided any further cost estimates with its comments for several reasons. First, the amount of time provided for comment on the Draft Permit Modification is insufficient for reasonable cost estimation to occur, particularly with respect to as complicated a setting as the Kendall Station. Second, and more important, the Draft Permit Modification, as noted in Mirant's other comments, does not specify any particular technology or set of technologies as BTA at Kendall Station. Instead, it only established design measures and calls for innovative remedies to be determined during post-effective-date enforcement proceedings with an uncertain schedule. In those circumstances, any immediate cost estimates would be no more reliable than the rushed analyses Mirant presented on September 19, 2007. Mirant believes that the Agencies must consider the costs of CWIS modifications before issuing the final Permit Modification. Mirant would be pleased to provide cost estimates, if afforded adequate preparation time and if asked to estimate the costs of a particular technology or set of technologies at specific locations. The Agencies should defer their issuance of the final Permit Modification until that information can be adequately developed.

General Response 2.04
In a nutshell, Mirant (1) provided EPA with cost estimates at a meeting that preceded issuance of the Draft Permit Modification by six months, (2) chose not to update this cost information, much of which is uniquely in Mirant's ability to develop, over the six months leading up to issuance of the Draft Permit Modification, and (3) objected, during the comment period, to EPA's use of the only cost information that Mirant ever provided, but provided no revised cost information during the comment period (or thereafter). As explained in more detail below, in its development of the Draft and Final Permit Modifications, EPA has acted reasonably in using the cost information provided by Mirant.

History
Mirant's recitation of the relevant history is largely accurate. At the September 19, 2007 meeting concerning the upcoming permit modification, David Webster, the Manager of EPA New England's Industrial Permits Branch, expressly invited all parties present, including Mirant, to submit any and all information that they would like EPA to consider in preparing the Draft Permit Modification. *See generally* AR 682. Notwithstanding this request, in the next five weeks, Mirant did not, in fact, submit any information concerning the costs of CWIS technologies.[1]

Consequently, on October 25, 2007, EPA issued a CWA § 308 information request to obtain copies of the presentations that Mirant and its consultants had already presented to EPA at the September 19, 2007 meeting. On October 30, 2007, in response to the CWA § 308 letter, Mirant submitted copies of these presentations, with the caveats identified in the comment. *See* AR 688. Mirant did not accompany its section 308 response with any updated cost estimates. Moreover, while Mirant qualified its submission with the statement that "[t]he slides and the oral presentations were the product of preliminary, rushed and incomplete analyses," Mirant further added:

---

[1] During that period, Mirant did submit a document, not related to costs, concerning impingement and entrainment data at a Mirant facility in New York. See AR 691.

> For that reason and because *Mirant Kendall committed to providing its full and complete analyses as soon as feasible*, Mirant Kendall did not distribute hard copies of these slides at the meeting. Rather, *Mirant Kendall set out to conduct a more thorough and comprehensive analysis on several of the many biological, hydrological, and technological issues concerning potential cooling water intake structures at Kendall Station. The purpose of these ongoing analyses is to provide the Agencies with thorough, useful and complete information that can be relied upon in the permitting process, as opposed to the incomplete and preliminary analyses set forth in the slides.*
>
> In order to help expedite the permitting process, Mirant Kendall has provided the results of its ongoing analyses in a rolling fashion. First, on October 5, 2007, Mirant submitted sampling data from the "Gunderboom" system installed at its Lovett facility. Second, on October 30, 2007, Mirant Kendall submitted several different analyses addressing the availability of cooling towers at Kendall Station. *Additional submittals are under preparation for submission as soon as feasible.*

AR 688 (emphases added). (Also on October 30, 2007, Mirant submitted an additional letter to EPA that included legal argument regarding section 316(b) and the availability of closed-cycle cooling at Kendall Station, but did not include revised cost estimates.)

Despite the above statements, Mirant did not provide the additional submittals, after all. The only additional material that Mirant gave EPA after its section 308 response were the 2006-2007 Charles River Monitoring Report, and a flow/velocity analysis for the Charles River—neither of which pertained to CWIS technologies or their costs. In short, in the four-and-a-half months between Mirant's October 30, 2007, section 308 response and the March 10, 2008, issuance of the Draft Permit Modification, Mirant did not submit to EPA any information changing the analyses that it had developed by September 19, 2007. Consequently, notwithstanding the caveats Mirant attached to its October 2007 submission, as of the date of the Draft Permit Modification, that submission contained the most recent, up-to-date cost information that Mirant had provided to EPA, and the best, reasonably available cost information in the record. (As explained below, it remains so even now.)

Objection to reference without acknowledgement of qualifications
EPA recognized the caveats that Mirant had attached to its section 308 response, and EPA expressly acknowledges them here. EPA also notes that no party was prejudiced by the Agency not explicitly repeating those caveats in the SOB. Mirant itself was aware of these caveats; MassDEP, MACZM, MADMF, CLF, and CRWA had attended the September 19, 2007 meeting and heard Mirant's caveats there; and no party other than Mirant commented regarding technology costs. In addition, EPA included Mirant's section 308 response, which stated the company's caveats, in the public administrative record. Thus, the record fully reflected Mirant's statements.

SOB's use of Mirant's cost estimates
In the SOB and in developing the Draft Permit Modification, EPA was entitled to rely on Mirant's most recent, up-to-date cost estimates for implementing technologies at MKS. As

stated above, Mirant's most recent, up-to-date cost estimates were those provided in its October, 30, 2007 section 308 response. This was the best, reasonably available information as to these costs at the time of issuance of the Draft Permit Modification. To be sure, in its response to EPA's CWA § 308 letter, Mirant had stated caveats regarding the likely precision of the estimates, concern that they had been hastily assembled, and its intention to provide further refined information in the future. Yet, some four-and-a-half months later, as EPA prepared to issue the Draft Permit Modification, Mirant had not provided any revised estimates.

Under these circumstances, it was entirely reasonable for EPA to proceed with issuance of the Draft Permit Modification and use the figures from Mirant's response to the § 308 letter in its analysis. Moreover, by including these estimates in the SOB, EPA provided Mirant and the interested public an opportunity to comment upon them, as well as further opportunity to submit revised estimates.

In this context, it is also important to remember the role that cost plays in CWA § 316(b) BTA determinations for NPDES permits. Cost is relevant for the purpose of determining the "availability" or feasibility of various technologies. Cost need not be precisely defined for this purpose. A reasonable assessment of costs is sufficient. Thus, using Mirant's cost estimates made sense, and continues to make sense, especially given that the permittee has never clearly argued that the technologies in question were economically unavailable, and certainly has never documented any such argument. (EPA recognizes that Mirant argues that a cost/benefit analysis is required here, a point which EPA disagrees with and addresses farther below, but a reasonable cost estimate, rather than a precise one, would suffice for a cost/benefit analysis as well.)

Final Permit Modification's use of Mirant's cost estimates
Mirant offers three reasons why EPA should not rely on the company's cost estimates. First, it says the estimates were "preliminary, rushed and incomplete." Second, it states that those analyses were undertaken with no awareness of the content of the Draft Permit Modification, which contains elements that are "drastically different, more demanding, and more costly than had entered into [its] rough analyses." Third, it argues that the costs that it presented on September 19, 2007 did not include the following factors: (1) the costs of pilot, laboratory or field studies; (2) the costs of assessing, collecting and disposing of any materials that must be removed during excavation and dredging activities; (3) the costs of permitting processes; (4) the costs of administering relevant contracts and of engineering and construction management by Mirant; or (5) the increased costs likely to result from inflation by the time of any actual implementation.

These arguments are vitiated, however, by Mirant's decision not to submit revised cost estimates. Mirant provided reasonable, if imperfect, cost estimates to EPA upon the Agency's request at the September 19, 2007, meeting. Mirant knew full well what the Agency's purpose was in obtaining these estimates: to support development of the Permit Modification. These cost estimates were the only ones that Mirant ever provided during the eight month period between its presentation to EPA on September 19, 2007, and the May 1, 2008 close of the public comment period (or, for that matter, in the more than six months between the close of the comment period and the issuance of the Final Permit Modification).[2] During the eight months between the meeting and the close of the comment period, Mirant had every opportunity to revise its estimates to correct any shortcomings it perceived—but Mirant provided no corrections or revisions. During the 52-day public comment period (and, as noted above, in the six months that followed), Mirant had an opportunity to revise its estimates in light of the specific requirements of the Draft Permit Modification—but Mirant provided no such revisions. And during these same time periods, Mirant had an opportunity to revise its estimates to include any costs that it felt should be added to reflect (a) pilot, laboratory or field studies, (b) the need to assess, collect and dispose of any materials that must be removed during excavation and dredging activities; (c) permit processes, the administration of contracts and engineering and construction management by Mirant; and (d) any appropriate cost escalators to account for the possibility that inflation might result in increases in costs by the time of any actual implementation—but Mirant provided no such revisions.

As such, Mirant's September 19, 2007 cost estimates remain the only cost estimates that Mirant has ever provided and they remain the best reasonably available information regarding the cost of implementing the technologies in question at MKS. Moreover, Mirant has not argued in any clear way that implementing the Final Permit Modification's cooling water intake structure requirements will be economically impracticable. In light of all this, it was entirely reasonable for EPA to rely on these figures for the analysis supporting this permitting determination. While Mirant has argued that it believes its prior cost estimates are too low for several reasons, it has not provided either revised cost estimates or further information to support a judgment regarding appropriate costs to reflect these factors. These undocumented claims are insufficient to warrant a revamped analysis by EPA or changes to the Draft Permit Modification.

Legal principles pertaining to Mirant's decision not to submit updated cost estimates
As a general principle, if a commenter in a public notice-and-comment proceeding wishes an agency to consider particular information, the commenter must supply that information to the agency. Comments must be provided both during the comment period and with reasonable detail and specificity. *See* 40 C.F.R. § 124.13. *See also, e.g., In re Spokane Reg'l Waste-to-Energy*, 2 E.A.D. 809, 816 (Adm'r 1989) ("Just as the opportunity to comment is meaningless unless the agency responds to significant points raised by the public, so too is the agency's opportunity to respond to those comments meaningless unless the interested party clearly states its position.") (internal quotation marks and citations omitted). *Cf. Vt. Yankee Nuclear Power Corp.* v. *Natural Resources Defense Council*, 435 U.S. 519, 553-54 (1978) ("Administrative proceedings should not be a game or a forum to engage in unjustified obstructionism by making cryptic and obscure reference to matters that 'ought to be' considered and then, after failing to do more to bring the matter to the agency's attention, seeking to have that agency determination vacated on the ground that the agency failed to consider matters 'forcefully presented.'"). This is particularly true in the specific context of a site-specific cost determination, where the facility often possesses information not available to EPA concerning site-specific issues that might affect the cost of using a technology at the particular site. *See Alaska Dep't of Envtl. Conservation v. EPA*,

[2] While EPA is not legally obligated to accept comments submitted after the close of the public comment period, it has discretion to do so. *See* Response to Comment 1.8; *see also, e.g.,* 2006 Response to Comments, Response to Comment C3, at C10 (accepting, considering, and responding to information that Mirant collected in 2005 and submitted afterwards, despite the 2004 close of the public comment period on the draft permit).

540 U.S. 461, 498 (2004) (upholding EPA's rejection of an economic infeasibility argument in a Clean Air Act "Best Available Control Technology" determination, because a finding of economic infeasibility would require financial data, which the regulated firm withheld).

Mirant's explanation of its decision not to provide revised cost estimates
Mirant offers two reasons for not providing revised cost estimates.

Mirant argues that "the amount of time provided for comment on the Draft Permit Modification is insufficient for reasonable cost estimation to occur." EPA disagrees. The comment period was adequate to generate reasonable cost estimates. Indeed, the comment period was exactly as long as Mirant asked it to be. *See* General Response 1.02. Mirant provided a preliminary cost estimate with caveats in its response to the CWA § 308 letter and then, in the following six months, it did not revise those estimates. Then, after EPA issued the Draft Permit Modification, Mirant requested only a modest extension to an already longer-than-required public comment period, and EPA granted that request.

Despite receiving the extension it requested, Mirant commented that it could not provide up-to-date cost information because the comment period was not long enough. Yet, since Mirant received the full extension that it requested, for a total comment period of 52 days (almost twice as long as the minimum required period), and the cost issue was not an issue newly raised as a result of the Draft Permit Modification, this comment is unpersuasive. Questions regarding the preferred CWIS technology, the cost of the potential systems, the optimal location to place such equipment at MKS, and how to design relevant permit conditions related to such technologies have all been at issue for some time.

Not only were these issues raised either specifically or generally as a result of EPA's CWA § 308 letter and Mirant's response to it, but these questions were at issue in the prior permit proceeding. It must be remembered that the current proceeding concerns a *modification* of the CWA § 316(b)-based limits in the permit previously issued by EPA. Questions regarding choosing between screening systems, the cost of such systems, the optimal location to place the equipment, and how to design appropriate permit conditions reflecting the performance capabilities of these systems were all at issue for that earlier permit proceeding as well. To the extent that Mirant believed that costs related to the technology would vary in a material way depending on the required location for the technology or the precise permit conditions that would apply, it could have prepared alternative cost estimates based on different assumptions regarding these factors. For example, Mirant could have estimated a range of costs for a barrier net depending on whether it would be located inside or outside the Broad Canal. Moreover, once the Draft Permit Modification was issued by EPA, Mirant could see the exact permit conditions being proposed and could have made any adjustments to the cost estimates that it deemed necessary due to those permit conditions. Nevertheless, Mirant did not provide revised cost estimates. Mirant appeared to have decided that such revisions were not needed. Mirant's present claim of insufficient time to prepare comments is unpersuasive.

Mirant also states that it could not provide more up-to-date cost information because the Draft Permit Modification underspecified the precise technology to be used, the location of that technology, and its methods of operation, and that that the initial cost estimates were generated without knowing the eventual proposed permit conditions, and did not include certain categories of costs described in the comment. Mirant states that it "would be pleased to provide cost estimates, if afforded adequate preparation time and if asked to estimate the costs of a particular technology or set of technologies at specific locations." Comment 1.11. But Mirant was given a reasonable opportunity to do so. With closed-cycle cooling ruled out, only a relatively small number of technologies and potential locations remained on the table, and sufficient time existed for Mirant to develop any revised cost estimates it deemed necessary to support reasonable decision-making for the NPDES permit. Mirant did not, however, provide any revisions to the figures it had provided to EPA in response to EPA's CWA § 308 letter.

In addition, the SOB "specifically request[ed] that commenters (especially those who may disagree with the proposed BTA determination in this Statement of Basis) explain what they believe constitutes BTA at this facility, and why." SOB at 6; *see also id.* at 27 (same). In this vein, Mirant could have elected to proceed by identifying either the least or the most costly option consistent with the Draft Permit Modification, and estimating its costs. Mirant also could have elected to proceed by identifying *either all or any subset* of the options consistent with the Draft Permit Modification, and estimating their costs. Alternatively, having proposed in its responses two options that it believes represent BTA (*see* Comments 4.45, 4.47, and Mirant Exhibit 13), Mirant could have elected to proceed by providing cost information for *those* two options. Instead, Mirant has disavowed its initial cost estimates but has not provided revised cost information to replace them. Rather, Mirant's only suggestion is that EPA "defer . . . issuance of the final Permit Modification until [cost] information can be adequately developed." Comment 1.11. EPA concludes that it was reasonable to rely on Mirant's earlier cost estimates and EPA declines Mirant's invitation to delay this long overdue NPDES permit reissuance so that Mirant can revise those values when the permit proceeding already provided Mirant an opportunity to do so. As EPA stated in another permit proceeding more than 32 years ago:

> There can be no question but that the factors listed in section 304(b)(1) are relevant to the imposition of effluent limitations in individual NPDES permits, just as they are to the establishment of industry-wide (or, typically, subcategory-wide) regulations by the Administrator. But the degree of consideration given to any such factor must depend, in the case of issuance of individual permits, *upon the amount of information available to the Regional Administrator, including that made available by the permit applicant*. The Regional Administrator may not disregard relevant information supplied to him by the applicant in formulating the terms of the particular permit, any more than the Administrator may disregard comparable evidence in proposing regulations. But the scope of the Regional Administrator's obligation is necessarily narrowed. . . . *To the extent that the applicant seeks to require the Regional Administrator to consider any particular factor during permit issuance, he is obligated to present evidence demonstrating the relevance of that factor to the appropriate limits for his particular facility. He may not adopt the expedient course of remaining silent and then complaining of the inadequacy of the Regional Administrator's consideration of such factors.*

Decision of the General Counsel No. 38 (In re Evansville Materials, Inc.), at 175 (Jan. 29, 1976) (emphases added). *See also Alaska Dep't of Envtl. Conservation v. EPA*, 540 U.S. 461, 498 (2004) (upholding EPA's rejection of an economic infeasibility argument in a Clean Air Act

"Best Available Control Technology" determination, because a finding of economic infeasibility would require financial data, which the regulated firm withheld).

Conclusion
EPA recognizes that Mirant's initial cost estimates were both accompanied by caveats and developed before Mirant was aware of the specific requirements of the Draft Permit Modification. Nevertheless, these estimates are the best reasonably available information regarding such costs and are reasonably adequate to support the determinations necessary for this Draft Permit Modification. Mirant's argument that it needs more time to refine these estimates is unpersuasive given that Mirant did not provide updated cost estimates despite having already had adequate opportunity to do so in the permit proceeding. As a result, EPA may reasonably rely upon those earlier estimates.

Comment 2.1

Mirant incorporates by reference its submission dated October 29, 2007, *The Legal Standard for Making "BTA" Determinations Using "Best Professional Judgment" Under § 316(b) of the Clean Water Act*, contained within A.R. 687. Mirant requests that the Agencies respond specifically to the legal arguments presented in that submission.

[For the convenience of the reader, EPA has included the following summary of the arguments raised by Mirant in the referenced document:]

1. Many of the factors identified in CWA §§ 301 and 304 are relevant to a BTA determination, but the list of factors in those statutes is not exclusive.
2. The holding of the United States Court of Appeals for the Second Circuit in *Riverkeeper, Inc., et al. v. EPA*, 475 F.3d 83 (2d Cir. 2007) ("*Riverkeeper II*"), *cert. granted sub nom. Entergy Corp. v. EPA*, 128 S. Ct. 1867 (2008), is not controlling for a permit issued to a Massachusetts facility because it is in conflict with an older First Circuit decision, *Seacoast Anti-Pollution League v. Costle*, 597 F.2d 306 (1st Cir. 1979), which upheld EPA's use of cost-benefit comparison using a "wholly disproportionate" standard.
3. EPA is required to determine whether "adverse environmental impact" is occurring, whether such impact is material or de minimis, and at what point such impact is minimized. Mirant specifically suggests that EPA evaluate these questions according to the principles in the Draft Guidance for Evaluating the Adverse Impact of Cooling Water Intake Structures on the Aquatic Environment (EPA, Office of Water Enforcement) (May 1, 1977) (hereafter "1977 Draft 316(b) Guidance").
4. EPA may not require any technology that is unproven or is not technically feasible for use at this site, and must consider whether the technology has been used at similar facilities. Specifically, Mirant states that EPA may not require technology for which (1) physical site constraints render the technology unavailable, (2) major alteration of the original facility design would be necessary, and/or (3) retrofitting is infeasible because of the age of the facility.

Response to Comment 2.1

EPA considered the cited submission in developing the draft permit modification. As a general matter, the SOB reflects EPA's views on the issues raised therein.

To begin with, EPA notes that the submission referred to, and purported to include, a document entitled "Non-316(b) Permitting Requirements Applicable to Mirant Cooling Water Intake Structure." However, the submission did not actually include such an attachment. The permittee did not correct this omission and submit this document before the close of the comment period, and therefore EPA did not receive the document within the comment period. Consequently, EPA is not obligated to consider or respond to any arguments raised in "Non-316(b) Permitting Requirements Applicable to Mirant Cooling Water Intake Structure." In its discretion, after the close of the comment period, EPA requested from Mirant a copy of this document, which Mirant then supplied. EPA took this document into consideration in formulating Response to Comment 2.23, and to the extent that a response to this document is required, Response to Comment 2.23 constitutes that response.

As a general matter, the SOB reflects EPA's views on the issues raised in the portion of Mirant's submission that was provided before the Draft Permit Modification issued. EPA provides the following additional specific responses:

1. *List of factors in CWA §§ 301 and 304*

EPA agrees that the list of factors in CWA §§ 301 and 304 may be relevant to BTA determinations under § 316(b), but should not be considered an exclusive list of such relevant factors. *See generally* General Response 2.01. Moreover, CWA § 304(b) itself specifies that in addition to the specific factors listed therein, EPA may consider "such other factors as the Administrator deems appropriate." It should also be understood that §§ 301 and 304 specifically pertain to effluent limitations, rather than intake requirements, but that these sections can be looked to by analogy for the purpose of identifying relevant factors to consider in determining BTA limits.

Mirant specifically notes that *Riverkeeper II* acknowledged energy impacts as a factor that EPA may consider. EPA agrees. *See* SOB at 15, 18, 19, 21, 42-43; Responses to Comments 4.24.7, 4.42.5 (considering energy impacts in response to specific Mirant comments); *see also* Response to Comment 2.13 (framework for considering energy impacts).

2. *Seacoast*

EPA disagrees with Mirant's interpretation of *Seacoast*. *See also* General Response 2.00.

3. *Adverse environmental impact*

EPA has in fact determined that an "adverse environmental impact" has occurred, continues to occur, and has the potential to continue to occur in the future. *See* SOB at 8-14. In doing so, EPA did, as Mirant suggests, consider the principles in the 1977 Draft 316(b) Guidance. *See* SOB at 10, 11. EPA considered: the numbers of fish impinged over eight years of sampling, including both the minimum and maximum; the species breakdown of fish impinged (including the fact that nearly 50% were river herring); the numbers of eggs and larvae entrained; the results of ichthyoplankton sampling in the river (and the fact that river herring constituted over 98 percent of eggs and over 75 percent of larvae sampled); and the fact that the facility withdraws a substantial percentage of the River's mean annual flow each day, resulting in a high potential for entrainment. *See* SOB at 10-13. EPA then concluded:

> In summary, losses of adult and juvenile finfish due to impingement, and losses of eggs and larvae due to entrainment, both of which result from Kendall Station's

> withdrawal of large volumes of cooling water from the Charles River, represent a significant adverse environmental impact. This is so when such losses are viewed by themselves, and even more so when viewed in the context of existing stresses from sources other than the facility.

Id. at 13-14. Of course, EPA has designed the permit's requirement for entrainment reduction technology to apply only during certain months of the year, based on scientific information indicating that during the other months no (or virtually no) fish eggs and larvae would be expected to be found in the water. Thus, EPA has looked at the question of whether there is an adverse environmental impact (or at least more than a de minimis impact) and concluded that for entrainment there is for a part of the year, but there is not for the other part of the year. *See* General Response 2.03.

With respect to Mirant's argument that EPA must consider "the magnitude of any resulting population effects at a particular site," to the extent that this argument may be interpreted to suggest that EPA must first find that the CWIS causes population or ecosystem effects before requiring any technology, EPA disagrees that CWA § 316(b) requires any such threshold determination. *See* General Response 2.02; *Riverkeeper, Inc. v. United States EPA,* 358 F.3d 174, 196 (2d Cir. 2004) ("*Riverkeeper I*") (in challenge to Phase I Rule, rejecting industry argument that EPA "should only . . . regulate impingement and entrainment where they have deleterious effects on the overall fish and shellfish populations in the ecosystem," and finding that "EPA's focus on the number of organisms killed or injured by cooling water intake structures is eminently reasonable."); *Riverkeeper II*, 475 F.3d at 125; 66 Fed. Reg. at 65,284-85, 65,292; *Decision of the General Counsel No. 63 (In re Central Hudson Gas & Elec. Corp., et al.)*, at 371, 381-82 (July 29, 1977); *Decision of the General Counsel No. 41 (In re Brunswick Steam Elec. Plant),* at 197, 203 (June 1, 1976); 41 Fed. Reg. 17387, 17389 (Apr. 26, 1976) (final CWA § 316(b) regulations later withdrawn by EPA after remand by federal court on procedural grounds) (noting that "[s]ome commenters recommended that the Development Document should provide that the proper test for minimizing adverse environmental impact is related to damage to the aquatic ecosystem and not to the number of fish and other aquatic organisms killed or damaged," but responding that damage to ecosystem is just one of many pertinent factors).

With respect to determining the point at which these adverse environmental impacts are minimized, as EPA explained, "[m]inimizing these adverse impacts means to reduce them as much as possible," consistent with consideration of other relevant factors in deciding the BTA. SOB at 18.

4. *Availability of technology*

EPA agrees with Mirant that EPA may not require any technology that is not technically feasible for use at this site. As a general matter, a technology might not be "available" at a particular site for a variety of reasons, e.g., physical site constraints. *See, e.g.,* SOB at 29-30, 37 (considering these issues).

With respect to whether a technology is "proven," whether the technology has been used successfully at facilities with the same or similar characteristics is one important factor for EPA to consider. Of course, a technology is not "unavailable" simply because it has not been used at an identical facility, or because other implementations have experienced technical difficulties. Successful use at other facilities is a factor for EPA to consider, not an absolute requirement.

Moreover, EPA is authorized to consider "transfer technologies" used in other industries or types of facilities if EPA reasonably finds such technologies to be transferable to the industry or facility in question. *See, e.g., Weyerhaeuser Co. v. Costle,* 590 F.2d 1011, 1054 n.70 (D.C. Cir. 1978). EPA may also consider "bench and pilot scale tests" of technologies. *Cal. & Haw. Sugar Co. v. EPA*, 553 F.2d 280, 287 (2d Cir. 1977). The information sources upon which EPA relies need not "completely duplicate[] the actual conditions" at the industry or facility in question. *See id.* In the SOB, EPA considered data from deployment of various technologies had been used successfully at analogous facilities, and in bench or pilot scale testing. *See generally* SOB at 31-36; see also Response to Comment 2.17.

EPA has carefully considered the above factors in developing this final permit modification. *See also* Response to Comments 2.21-2.23.

Comment 2.2

Mirant argues that the SOB's consideration of the BAT factors from CWA §§ 301 and 304 is superficial and inconsistent, and that it does not provide due consideration to site-specific costs, engineering constraints, and non-water-quality-related and other impacts of IM/E reduction approaches.

Response to Comment 2.2

See generally General Response 2.01.

In this particular case, EPA evaluated each candidate technology option in light of each of the section 304 factors, and eliminated candidate technologies on the basis of those factors. *See* Responses to Comments 2.13, 2.17.

Site-specific costs: EPA considered the estimated site-specific capital and O&M costs of each technology evaluated, and concluded that the cost of implementing any of the potential technologies could be reasonably borne by Mirant. *See* SOB at 38-39; Responses to Comments 2.18-2.19; *cf.* NPDES Permit Writer's Manual, at 71; 41 Fed. Reg. 17388 (April 26, 1976) (final CWA § 316(b) regulations withdrawn by EPA after remand by federal court) ("application of 'best technology available' should not impose an impracticable and unbearable economic burden on the operation of any plant subject to section 316(b)"). With respect to the particular technology cost estimates upon which EPA relied, see General Response 2.04.

Engineering constraints: EPA considered the engineering constraints associated with each candidate technology. *See* SOB at 39-42. Indeed, EPA eliminated technologies from further consideration based on such constraints. EPA also carefully considered the engineering constraints associated with the then-remaining technologies: barrier net systems, aquatic filter barriers, wedgewire screens, and aquatic filtration systems. In the SOB, EPA candidly acknowledged that engineering challenges were involved with each of these technologies, but judged that these challenges are not insurmountable and did not remove these technologies from consideration as BTA at Kendall Station. *See* SOB at 41-42. In the final permit modification, EPA has reaffirmed most of these findings, but has also, upon further evaluation, determined that several of the requirements of the Draft Permit Modification (maintenance of through-medium velocity at all points at all times, "gentle release" mechanism, requirement of no bypasses), as well as aquatic filtration system technology (e.g., Filtrex), are not "available" at Kendall Station at this time. *See generally* Responses to Comments 4.23-4.44.

Non-water quality impacts: EPA considered non-water quality impacts in the SOB, namely, air emissions, energy penalties, noise, visual aesthetics, and navigation and recreational uses of the Charles River. *See* SOB at 42-43. EPA concluded that the remaining technologies "are unlikely to present non-water quality impacts that cannot be minimized through mitigation or incorporating existing designated uses into the design of the technology." *Id.* at 42-43. Upon further consideration of comments, EPA has revised the Final Permit Modification to preclude obstruction of recreational uses from the Broad Canal. *See* Response to Comment 4.12. Regarding other non-water quality impacts, see Response to Comment Section 4 *passim*.

Comment 2.3
Mirant argues that *Riverkeeper II* is not applicable to this permit modification for three reasons: (1) *Riverkeeper II* contains no holdings on how to conduct site-specific BPJ determinations, but rather addressed the scope of EPA's rule-making authority under § 316(b); (2) *Riverkeeper II* is in conflict with *Seacoast*, and (3) in Mirant's view, the SOB is inconsistent with the 2004 Draft Permit Determinations Document, and (4) in Mirant's view, the SOB is inconsistent with the United States's brief in opposition to certiorari in the *Riverkeeper II* case.

Response to Comment 2.3
1. *Permitting vs. rulemaking:* While *Riverkeeper II* arose in a challenge to a rule, not a BPJ-based permit, it is well-established that EPA is subject to essentially the same statutory requirements when issuing a BPJ-based permit under a particular standard as when issuing a national regulation under that standard. *See* SOB at 17 & n.7, 19 & n.10; *cf.* NPDES Permit Writer's Manual, at 70.

2. *Seacoast*: See Response to Comment 2.1, part 2.

3. *2004 Draft Permit Determinations Document*: The Determinations Document was issued two and a half years before *Riverkeeper II*, and represented EPA's analysis of the governing legal framework in 2004. EPA's analysis of the governing legal framework in 2008 is found in the SOB and in this Response to Comments.

4. *Supreme Court proceedings:* EPA is currently complying with the *Riverkeeper II* decision. See General Response 2.00.

Comment 2.4
Mirant notes as well that, to the extent that it is relevant at all, *Riverkeeper II* is silent on most of the factors that the Agencies must consider in issuing a BPJ determination under CWA § 316(b). Specifically, the Court did not define how permit writers may evaluate whether IM/E is causing AEI or the point at which costs become unreasonably burdensome. Equally important, the Court did not define how permit writers should balance IM/E reductions against other relevant factors associated with a given technology, including its adverse environmental impact; energy impacts; non-environmental impacts such as recreational impacts; non-water related environmental impacts such as air emissions and noise; site-specific availability of technologies; and other factors that necessarily must be considered in issuing BPJ-based permitting requirements. Nothing in *Riverkeeper II* or indeed in CWA § 316(b) dictates how the Agencies must balance those factors against marginal AEI from existing IM/E and against marginal reductions in AEI from implementing IM/E reductions. For example, the impacts of intrusive IM/E reduction

technologies on other uses of the Charles River need not be catastrophic for the Agencies to determine that less intrusive, almost equally effective controls on IM/E constitute BTA. Accordingly, in finalizing the Permit Modification, the Agencies are not bound by *Riverkeeper II* or otherwise to elevate IM/E reductions above all other factors the Agencies must consider. They are not bound, in other words, to select only technologies that maximally reduce IM/E no matter the effects on other values affecting the location and the facility. Rather, the Agencies should address all of the pertinent factors and are free to develop a reasonable approach that establishes BTA in light of site-specific considerations.

Response to Comment 2.4
As indicated repeatedly in the record for this permit (and permit modification), EPA agrees that it is "not bound . . . to select only technologies that maximally reduce IM/E no matter the effects on other values affecting the location and the facility." EPA agrees that it has discretion to consider certain other factors, such as non-water environmental effects and energy effects, in determining the BTA under § 316(b). Along those lines, EPA could find a technology not to be the best available for minimizing adverse environmental effects because, for example, it would cause unacceptable adverse energy effects, recreational impacts, or non-water quality environmental impacts (e.g., air emissions, noise), or because its cost cannot be reasonably borne by the facility. Moreover, EPA has broad discretion in deciding how to consider such factors. These considerations were taken into account in the development of both the Draft Permit Modification and the Final Permit Modification. *See, e.g.,* Responses to Comments 4.12 (eliminating technology across mouth of Canal due to unacceptable recreational impact), 4.44 (eliminating aquatic filtration system because installation that could fit in Broad Canal would cause unacceptable head loss threatening plant operations).

EPA does not adopt all of Mirant's characterizations of the analytical process of a BPJ determination under section 316(b), e.g., that EPA "must balance those factors against marginal AEI from existing IM/E and against marginal reductions in AEI from implementing IM/E reductions." EPA's analytical process in developing the Draft Permit Modification and Final Permit Modification is set forth in the SOB and this document. To summarize, EPA considered a range of technologies; eliminated technologies that are not "available" at this site due to the types of issues discussed above; then eliminated technologies that do not reflect the "best" performance from among the available technologies; and analyzed the remaining set (i.e., those that are "available" and reflect "best" performance levels among the available technologies) to determine the BTA and design a set of permit requirements reflecting that BTA while allowing the permittee as much flexibility of design and implementation as possible. *See* Response to Comment 2.13.

Comment 2.5
EPA's suspension of the Phase II rule in the wake of *Riverkeeper II* means that the rule and its underlying determinations are not binding on the Agencies' current exercise of BPJ under CWA § 316(b). Similarly, the Phase I rule never has applied to an existing power plant such as the Kendall Station. Accordingly, the Agencies are free and are obligated to exercise their BPJ in accord with the pre-existing 1977 guidance that EPA issued to implement its permitting activities under CWA § 316(b).

Response to Comment 2.5
EPA agrees that the Phase II Rule and its underlying determinations are not binding on the Agencies' current exercise of BPJ under CWA § 316(b). *See* SOB at 5, 14-17, 32 n.24. *See also* 40 C.F.R. § 125.90(b). EPA also agrees that the Phase I rule has never applied to an existing power plant such as Kendall Station. *See* SOB at 8 n.1. The SOB cited the preamble to the Phase I Rule (and certain technical information developed for the now-suspended Phase II Rule) *only* for the underlying scientific research and analysis included there, and not for any of the substantive requirements or policy decisions involved in those rules. *Id.* Of course, EPA is free, in a BPJ permitting decision, to observe that EPA made a policy decision in the development of the Phase I Rule, to evaluate whether the underlying considerations that led to that policy decision could apply to the particular permitting decision, and, if appropriate, to reach a similar conclusion for similar reasons.

EPA also agrees that it is free to draw upon the principles of the 1977 Draft 316(b) Guidance where appropriate, and in fact has done so. *See* SOB at 10-11; Response to Comment 2.1, part 3.

EPA does not agree, however, that it is "obligated" to exercise BPJ in accordance with the 1977 Draft 316(b) Guidance. "The general consensus is that an agency statement, not issued as a formal regulation, binds the agency only if the agency intended the statement to be binding. The primary consideration in determining the agency's intent is whether the text of the agency statement indicates that it was designed to be binding on the agency." *Farrell v. Dep't of Interior*, 314 F.3d 584, 590 (Fed. Cir. 2002) (internal citations omitted); *Gen. Elec. v. EPA*, 290 F.3d 377, 381-83 (D.C. Cir. 2002) (same); *Dominion*, 12 E.A.D. at 686 n.319 (quoting *Farrell*). The guidance itself—which was only issued in draft, and never finalized—does not claim to be obligatory. *See* 1977 Draft 316(b) Guidance, at 4 ("Readers are cautioned not to depend too heavily on this manual."). Moreover, while the draft guidance remains "on the books," EPA has continued to emphasize its non-binding nature. *See* EPA Memorandum from Michael B. Cook, "Implementation of Section 316(b) in National Pollutant Discharge Elimination System Permits" (Dec. 28, 2000), at 2 ("Please note that the draft 1977 guidance and the two background papers do not impose legally binding requirements on EPA, the State, or the regulated community, and may not apply in a particular situation based on the circumstances. EPA and State decision-makers retain the discretion to adopt approaches on a case-by-case basis that differ from applicable guidance where appropriate. Any decisions on a particular facility should be based on the requirements of section 316(b)."). In fact, EPA has recently explained that "both the decision process and the evaluation criteria contained in the [1977] guidance have proven very difficult to apply consistently," 65 Fed. Reg. at 49,074, and that, therefore, it has chosen to depart from it in some aspects of decision-making. For these reasons, EPA is not legally bound to conform its BPJ permitting decisions to the 1977 Draft 316(b) Guidance. EPA's analysis is explained in detail herein and in the SOB.

Comment 2.6
The U.S. Supreme Court has granted certiorari and will review *Riverkeeper II* on the central issue of EPA's authority to conduct cost benefit analyses in making its BTA determinations under CWA § 316(b). The outcome of that review is currently unknown, but whatever the outcome, eventually EPA will either re-instate the suspended Phase II rule or promulgate an amended rule applicable to existing power plants such as the Kendall Station. In the event that

the re-instated or amended rule includes provisions that, as applied to Kendall Station, would materially alter the Agencies' determination of BTA under CWA § 316(b) as compared to the provisions in the Draft Permit Modification or the final Permit Modification, Mirant should be required to comply with the final rule rather than the Agencies' unbounded application of BPJ. In particular, the suspended Phase II rule included a well-considered set of schedules for the site-by-site evaluation and implementation of BTA and CWIS modifications to achieve BTA at existing facilities, e.g., the requirements for facilities to implement Comprehensive Demonstration Studies. The final Permit Modification should provide that, in the event that EPA reinstates the Phase II rule or promulgates an amended rule, the permittee may comply with the requirements of the rule rather than any inconsistent provisions in the permit.

Response to Comment 2.6
EPA disagrees with the comment. As of the date of this Final Permit Modification, the Phase II Rule has been suspended and a new rule has not yet been proposed, let alone finalized. EPA has explicitly stated that, for permits issued under these circumstances, permitting authorities should establish section 316(b) requirements on a BPJ basis for existing facilities not subject to categorical section 316(b) regulations. *See* 40 C.F.R. § 125.90(b); 72 Fed. Reg. at 37,108; SOB at 16. Moreover, "'the Region's obligation, as the permit issuer, is to apply the CWA statute and implementing regulations in effect at the time the final permit decision is made.'" *In re Dominion Energy Brayton Point, LLC (Formerly USGen New England, Inc.) Brayton Point Station*, 12 E.A.D. 490, 616 (EAB 2006) (quoting *In re Phelps Dodge Corp.*, 10 E.A.D. 460, 478 n.10 (EAB 2002)); *see generally id.* at 611-18; *see also* 40 C.F.R. § 122.43(b)(1) (defining "applicable requirement"). Furthermore, any future CWA § 316(b) rule applicable to existing power plants may have applicability dates rendering it inapplicable to Mirant, may not be self-executing (i.e., may require a new permit proceeding), may itself be subject to litigation, and/or may otherwise not be appropriate to apply. *Cf. Dominion*, 12 E.A.D. at 617 (noting that Phase II Rule expressly was only intended to apply to those permits for which applications were submitted after the effective date of the rule); 2006 Response to Comments, Response to H1, at H3 (noting that Phase II Rule's substantive requirements did not apply to facilities where the draft permit was proposed before the Phase II Rule took effect). EPA is neither obligated nor, arguably, authorized to issue a NPDES permit that would attempt to comply with CWA § 316(b) only by providing that the permittee may satisfy CWA § 316(b) by complying with unspecified regulatory provisions to be determined at an unknown future date. *See also* General Response 2.00.

Comment 2.7
[Mirant makes ten distinct points in this comment. For purpose of clarity, EPA has subdivided the comment into comments 2.7.1-2.7.10, and organized its responses accordingly. Cross-references to "Response to Comment 2.7" elsewhere in the document refer to the responses 2.7.1-2.7.10 collectively.]

Comment 2.7.1
The SOB provides no quantitative analysis of the magnitude and biology of the environmental impacts of impingement mortality and entrainment ("IM/E") at Kendall Station. For example, EPA New England did not perform any calculation of what those IM/E losses meant in terms of

equivalent adults or in relation to the overall population of the relevant species. Rather, EPA has assumed that any IM/E is itself an adverse environmental impact that requires minimization.

Response to Comment 2.7.1
The SOB does in fact provide quantitative analysis of the magnitude and biology of the environmental impacts of impingement mortality and entrainment at Kendall Station. *See* SOB at 10-14. Mirant appears to take the position that Kendall Station's killing of fish eggs, fish larvae and juvenile fish in the Charles River's Lower Basin does not in and of itself constitute an adverse environmental impact. However, EPA has determined that impingement and entrainment losses do constitute an adverse environmental impact. *See* General Response 2.02; *Riverkeeper I*, 358 F.3d at 196 (in challenge to Phase I Rule, rejecting industry argument that EPA "should only . . . regulate impingement and entrainment where they have deleterious effects on the overall fish and shellfish populations in the ecosystem," and finding that "EPA's focus on the number of organisms killed or injured by cooling water intake structures is eminently reasonable."); *Riverkeeper* II, 475 F.2d at 125; 66 Fed. Reg. at 65,284-85, 65,292. Moreover, EPA has interpreted § 316(b) to require that CWISs must reflect the BTA for minimizing adverse environmental impacts, whether or not those adverse impacts are considered to be "significant." *Decision of the General Counsel No. 41*, at 203 ("The [cooling water intake] structures must reflect the best technology available for *minimizing* . . . adverse environmental impact – significant or otherwise." (emphasis in original); *Decision of the General Counsel No. 63*, at 381-82 ("Under Section 316(b), EPA may impose the best technology available . . . in order to minimize . . . adverse environmental impacts – significant or otherwise."). *See also* Response to Comment 2.1, part 3. Even so, in this instance EPA determined that the historic and expected future impingement and entrainment levels at Kendall Station are significant. *See* SOB at 10-14.

As explained in more detail below, while analyses in terms of equivalent adults or in relation to the overall population of the relevant species can be helpful, EPA is not required to conduct them for every permit, and is not required to do so in this permit modification.

Comment 2.7.2
Population-level or equivalent-adult analyses are specifically called out in the 1977 Draft 316(b) Guidance.

Response to Comment 2.7.2
As noted above, the 1977 Draft 316(b) Guidance is not binding on this permit proceeding. See Response to Comment 2.5. That said, EPA examined the relevant section of the guidance. The guidance lists six factors that should be used in estimating the *magnitude* of an adverse environmental impact. *See* 1977 Draft 316(b) Guidance at 15. The first factor is "[a]bsolute damage (# of fish impinged or percentage of larvae entrained on a monthly or yearly basis)." *Id.* This is the factor upon which EPA principally relied in this case. *See* SOB at 10-14. It is true that the second factor listed is "[p]ercentage damage (% of fish or larvae in existing populations which will be impinged or entrained, respectively)." 1977 Draft 316(b) Guidance at 15. However, the six factors are linked by the term "or," meaning that the draft guidance was not suggesting that in every single permitting decision all six factors should be estimated. Stated differently, the draft guidance indicates that in some cases an assessment of just one of the

factors could be sufficient to assess the magnitude of the adverse environmental impact. Moreover, the draft guidance is focused on assessing the *magnitude* of a cooling water intake structure's adverse environmental impacts and certainly does not suggest no adverse impact should be considered to exist unless the percentage losses suffered by the populations of particular species are quantified.

Most importantly, while the 1977 Draft 316(b) Guidance remains available for use as appropriate, EPA has, as a matter of policy, chosen (both in national regulations and in this BPJ permit proceeding) to assess adverse environmental impact in a manner different from the approach that Mirant advocates. *See* General Response 2.02; Response to Comment 2.5.

Comment 2.7.3
Even if CWA § 316(b) did not compel such an evaluation, the Agencies ought to perform one, so they will have some basis for what is likely to be gained by reducing IM/E and can make informed judgments about whether that is worth the adverse impacts that stem from various alternatives.

Response to Comment 2.7.3
While such a study might provide interesting information, EPA has elected not to conduct such a study in this instance, for the following reasons:
1. EPA has already determined that the facility's CWIS is causing AEI based on the absolute levels of impingement and entrainment; thus, population-level studies might or might not provide an additional independent basis for finding AEI, but the AEI determination would not change.
2. Population-level modeling is difficult to apply consistently, is fraught with complexity, often yields ambiguous or debatable results, and consequently sometimes muddies, rather than clarifies, the situation. *Cf.* 66 Fed. Reg. at 65,293-295; 65 Fed. Reg. at 49,074. *See also* 2006 Response to Comments, Response to Comment H15, at H42, and Response to Comment I11, at I12.
3. Population-level modeling requires a significant expenditure of time and resources. In theory, every permitting decision could benefit from an unlimited expenditure of time and public money on scientific studies. However, EPA has case-specific discretion to determine whether a given study sufficiently adds to the store of knowledge needed for the Agency to apply the relevant legal standards in order to justify the time and money involved. Sometimes, a population-level study will be warranted. In this specific instance, EPA has determined that a population-level study is not necessary in order to proceed with this permit modification.

Comment 2.7.4
The SOB does not evaluate whether some or all of the effects of impingement and entrainment at Kendall Station in fact are de minimis, even though the Agencies have recognized that de minimis impacts may not need to be minimized.

Response to Comment 2.7.4
See General Response 2.03.

The SOB, after citing known information concerning impingement and entrainment at the facility, as well as information regarding egg and larval densities and the facility's intake flow, concluded that "losses of adult and juvenile finfish due to impingement, and losses of eggs and larvae due to entrainment, both of which result from Kendall Station's withdrawal of large volumes of cooling water from the Charles River, represent a significant adverse environmental impact." SOB at 13. A "significant" impact is, by definition, not a "de minimis" impact. By concluding that the AEI is "significant," EPA necessarily declined to find the adverse environmental impact to be "de minimis." *See also* Responses to Comments 3.1-3.6. At the same time, EPA is not applying the Permit Modification's entrainment reduction technology requirements from September through February because it has determined, based on the best available information, that entrainable organisms are not expected to be in the Lower Basin of the Charles River during those months.

Comment 2.7.5
The SOB does not evaluate what level of AEI from IM/E at Kendall Station's CWIS exists at present or would exist post the proposed modifications, or the impacts of reductions brought about by the proposed modifications on the local or regional populations.

Response to Comment 2.7.5
To begin with, EPA estimates that the technologies selected will virtually eliminate impingement of adult and juvenile fish, in light of the requirements for maximum mesh-size and intake velocity. Unfortunately, with respect to eggs and larvae, it is not possible to quantify the effectiveness of a given exclusion (or screening) technology in a specific water body before implementation and completing what are often extremely challenging follow-up studies. *See* SOB at 26-27. There are certainly limits to what the screening systems can achieve and their performance is likely to be affected by the specific conditions in the water body in question as well as by the characteristics of the specific species being affected. By limiting the maximum mesh-size of the exclusion technology, and comparing that to the size of the eggs and larvae expected to be present in the Lower Basin of the Charles River, EPA can predict that entrainment will be substantially reduced (even if not completely eliminated) by such technology. It is far more difficult, however, to estimate the percentage of the formerly entrained organisms that will survive being impinged on the exclusion technology. If they are to survive, they must be safely removed from technology and returned to the Lower Basin and not re-impinged. Mirant has provided information suggesting that survival will be low, especially for the herring species impacted at Kendall Station, but EPA believes the information suggests that a substantial portion will survive. Thus, the permit's requirements reflect the available technology for minimizing the existing adverse environmental impacts of entrainment at Kendall Station.

Of course, the SOB does provide, where known, the reported effectiveness of various technologies that were implemented at other locations. *See generally* SOB at 31-35. That said, it is unlikely that any of these technologies would perform at precisely the same level of effectiveness at Kendall Station. Again, EPA is confident that the technologies required by this Final Permit Modification will virtually eliminate current impingement mortality for juvenile and adult fish, and should also reduce the current mortality of entrained organisms from Kendall Station's CWIS. For eggs and larvae, EPA cannot forecast precise reductions in entrainment, or more importantly precise levels of survival for any organisms that will be impinged on the new technology, due to the wide range of factors involved (river flows, effectiveness of technology when deployed in particular location, fish behavior, etc.). Indeed, in its comments on the 2004 Draft Permit, Mirant specifically pointed out the difficulties inherent in mathematically comparing historical baseline entrainment to entrainment after installation of an exclusion technology. *See* Comments of Mirant Kendall, LLC on Draft National Pollutant Discharge Elimination System Renewal Permit No. MA0004898 (Oct. 14, 2004) [hereafter "Mirant Comments on 2004 Draft Permit"], Comment H24, at 113.

Moreoever, CWA 316(b) does not require EPA to render such quantitative forecasts, and certainly not to specify permit requirements in terms of such numbers:

> [A] permit need not … contain a 'performance standard' expressed in terms of the amount of environmental harm to be avoided by compliance with § 316(b). Rather, restrictions under § 316(b) need only reflect the best technology available for minimizing adverse environmental impact. . . . [T]he statute does not require that these cooling water intake structure regulations be expressed in terms of a level of performance which specifies the degree of adverse environmental impact, attributable to the intake structure, which is tolerable. Nor is it clear how compliance with a standard so expressed could effectively be monitored and enforced. The structures must reflect the best technology available for minimizing (i.e., 'reducing to the smallest possible amount or degree') adverse environmental impact – significant or otherwise. All environmental harm should be avoided, but the continued operation of a facility will, in most cases, prevent this result. Under § 316(b), EPA is confined to the establishment of technical parameters governing the optimal location, design, construction and capacity of intake structures. . . . In other words, the goal of best technology available under § 316(b) is to minimize all adverse environmental impacts – not to reduce the impact to a pre-determined level.

Decision of the General Counsel No. 41, at 202-03; *see also* Response to Comment 2.26.1.

In order to understand better the AEI caused by Kendall Station's CWIS, the Final Permit Modification also requires a biological monitoring program. In another set of comments, Mirant objects to this program as overbroad. *See generally* Mirant Comments, section 5. EPA recognizes that there is a subtle difference between this comment and those comments: this comment objects that EPA did not adequately *predict* the AEI that would remain after implementation of the Final Permit Modification's requirements, whereas the other comments object to requirements to *measure* certain aspects of the AEI after implementation of the Final Permit Modification's requirements. Nevertheless, it is worth noting that Mirant is simultaneously (1) complaining that EPA has not adequately predicted what it expects to happen after the Final Permit Modification is implemented, and (2) objecting to permit requirements to measure what actually happens after the Final Permit Modification is implemented. *See* Response to Comment 5.1.

Finally, Mirant objects that the SOB does not evaluate the impacts of reductions brought about by the proposed modifications on the local or regional populations. As noted above, EPA is not required to, and has exercised its discretion not to, analyze current AEI in terms of population-level effects. *See* General Response 2.02; Response to Comment 2.7.3. As also noted above, it is extremely difficult to estimate the absolute or percentage reductions of I/E of eggs and larvae from installation of a given technology in a given waterbody. The same considerations apply to estimating population-level effects from installation of a given technology in a given waterbody, and therefore EPA has not made such estimates here.

Comment 2.7.6
The SOB does not evidence any effort to evaluate and compare potential methods of IM/E reduction or other measures to determine which would most reduce AEI from the impingement and entrainment at Station's CWIS. Rather, the SOB simply identifies several IM/E reduction technologies that it deems available without determining which is "best," and without making any effort to compare their relative effectiveness in improving the overall biological welfare of the affected populations.

Response to Comment 2.7.6
As stated above, EPA estimates that any of the technologies selected will virtually eliminate impingement of adult and juvenile fish. Unfortunately, with respect to eggs and larvae, it is extremely difficult to quantify the effectiveness of a given technology in a specific waterbody before implementation. Based on the information in the record, EPA judges that any technology designed and operated according to the conditions specified in the Final Permit Modification will achieve approximately equal performance. See Response to Comment 2.7.5. Moreover, the Final Permit Modification is designed to be flexible and would not be violated if a technology, properly installed and operated, is unexpectedly disappointing in its performance. Thus, although there is some uncertainty regarding the relative effectiveness of the various BTA technologies at reduction of impingement and entrainment of eggs and larvae, Mirant suffers no prejudice as a result of that uncertainty. Furthermore, if Mirant believes that it can estimate which specific technology from among the remaining possibilities will best reduce the mortality of currently entrained organisms – though it has not provided such an estimate in its comments – it will be free to install that best performing technology.

Comment 2.7.7
The SOB does not conduct any analysis of the technologies' relative cost-effectiveness.

Response to Comment 2.7.7
This is not an instance where EPA selected one of the particular technologies and proposed to require that Mirant use that particular technology, yet left open the question of whether an alternative technology might achieve essentially the same benefits but at a markedly lower cost. *See generally* SOB at 15. Rather, EPA has structured its BTA determination as a suite of design and operational standards rather than a single technology. Consequently, the permittee can evaluate a range of technologies and implement any technology that it prefers, and which satisfies the applicable standards, for cost-effectiveness or any other reason. *See id.* at 39; *see also* Response to Comment 2.20.

Comment 2.7.8

The SOB does not evaluate other important conditions in the Charles River - such as generally low flow rates that cause the "river" to function as a lake, or seasonally high flow rates that cause advection of organisms out of the freshwater system into the sea - to evaluate the extent to which different technologies for reducing IM/E would work to reduce overall AEI, or not.

Response to Comment 2.7.8
The SOB explicitly discusses the low flow environment in the Charles River, its resultant similarity to a lake, and the resulting consequences for effectiveness exclusion technologies. *See* SOB at 40, 46. As a result of considering these conditions, EPA proposed to require, when necessary, an induced sweeping velocity. *See id.* at 40 & n.28, 46; Response to Comment 4.25.

Regarding advection, see Response to Comment 3.4.2. Moreover, Mirant has not identified any technologies that it believes would reduce AEI more or less than others in light of advection, nor proposed a different technology, not considered by EPA, in light of this issue.

Comment 2.7.9
The SOB is also at variance with EPA New England's own practices both on other determinations and even at earlier stages of this case. The record of the recently concluded Brayton Point NPDES permit evidences elaborate analyses by the Agencies of the magnitude of environmental impacts of that Station's IM/E on affected biota and of the benefits of the Agencies' selected BTA. And EPA New England included similar analyses of equivalent adults, etc., in the Determinations Document it issued in 2004 when it proposed to approve the fine mesh barrier net proposed by Mirant in 2001. DD at pp. 200 to 216. EPA New England has advanced no reason not to renew those analyses now.

Response to Comment 2.7.9
As a general matter, the fact that EPA conducted "elaborate analyses by the Agencies of the magnitude of environmental impacts of that Station's IM/E on affected biota and of the benefits of the Agencies' selected BTA" in the Brayton Point permit proceeding does not mean that such analyses are necessary in every case. Each BPJ permit is developed by an individualized, site-specific analysis, and Mirant cites no rule of law, nor is EPA aware of one, suggesting that, for every NPDES permit containing section 316(b) conditions, EPA must include the same types of analysis that were generated for the development of the Brayton Point permit. Indeed, if EPA were required to perform such resource-intensive analyses for every permit with section 316(b) conditions, NPDES permitting for power plants and other facilities with cooling water intake structures would grind to a halt. *See also* Response to Comment 2.19.5. The analysis conducted for the Brayton Point permit was reasonable in light of the facts of that situation and the legal regime applicable at the time. Similarly, the analysis conducted for this Permit Modification is reasonable in light of the relevant facts and law.

With respect to the Determinations Document, the comment is partly misleading with respect to the relevant history. Mirant's comment correctly states that "EPA New England *included* similar analyses of equivalent adults, etc.," in that document (emphasis added). To be precise, EPA considered and included *Mirant*'s equivalent adult analyses in the Determinations Document. The analyses to which the comments refer were provided by Mirant in its 2001 permit application. *See* Determinations Document at 207 ("Detailed discussions of the major assumptions underlying the population size estimates and the Equivalent Adult Loss Analysis are presented in Mirant's Permit Application (Appendix 5-6, February 2001).")

EPA found the information that Mirant presented to be useful and incorporated it into the Determinations Document:

> For the five species where larval entrainment was documented, the estimated percent mortality caused by Kendall Station entrainment ranged from a high of 29 % for white perch larvae in 1999 to a low of approximately 1.3 % for yellow perch larvae in 1999. The estimated percentage of river herring larvae mortality from entrainment was substantial, with approximately 14 % mortality in 1999 and 23% in 2000. In this specific case, EPA takes the position that where egg and larval fish productivity and entrainment mortality can be estimated with reasonable confidence, mortality percentages resulting from entrainment at these levels is a serious concern. Under this protocol, entrainment of river herring and white perch are of concern to EPA. Entrainment of sunfish larval fish barely reached a level of 5% estimated mortality in 1999, and was below that level in 2000. Because sunfish were documented spawning in the Broad Canal, in close proximity to the CWIS, however, the potential for elevated entrainment mortality of these fish is of concern to EPA, especially under lower river flow conditions. This concern is evaluated with the understanding that future station operation as a base load plant may include the withdrawal of the maximum flow of 80 MGD for more extended periods than was withdrawn in 1999 and 2000. This increased water withdrawal has the potential to increase entrainment rates at the CWIS and this impact should be addressed in the determination of BTA.

Determinations Document at 213.

As part of its equivalent adult analyses, Mirant found that the estimated mortality of adult equivalents from eggs and larval fish entrained at Kendall Station amounted to 2% of all river herring and 3% of all white perch in 2000 (1% of river herring and 13% of white perch in 1999). *See id.* at 213-16. EPA found such data useful when Mirant submitted it in 2001, and therefore included it in the 2004 Draft Permit Determinations Document.

During the six months between EPA's September 2007 meeting with Mirant and the March 2008 issuance of the Draft Permit Modification, Mirant did not submit any revised adult equivalent analyses. As noted above, EPA is not obligated to develop such data on its own for every draft permit. In this case, EPA determined that, based on the existing information concerning adverse environmental impact, the uncertainties regarding the precise performance levels of exclusion technologies (whose performance is less-well-understood than closed-cycle cooling), the marginal benefit to be gained from additional types of scientific analyses, and the resources that would be involved, it was not necessary to conduct such "elaborate analyses." *See* Response to Comment 2.7.3. Consequently, EPA did not develop its own adult equivalent analysis for the SOB.

As part of its comments on the Draft Permit Modification, Mirant submitted an updated adult equivalent analysis (the Normandeau Report), which relies not only on more recent data, but also on new assumptions and methods that were not part of its earlier adult equivalent analyses. Consequently, Mirant has seemingly disavowed the earlier analysis cited in the Draft Permit Determination Document, in favor of its more recent analysis which claims far lower impacts than its previous analyses. *See* Comment 3.4 (noting that the analysis in the Normandeau Report "supplants all prior assessments"). As explained in more detail in Response to Comments Section 3, the Normandeau Report relies on several dubious assumptions. These problems cast doubt on the validity of the particular impact assessments in the Normandeau Report, and also point out the potentially questionable value of adult equivalent analyses, in that slight changes of assumptions can result in dramatic changes in estimated impact. *See* Response to General Comment 3.0; Response to Comment 3.4.2. Of course, these issues do not mean that adult equivalent analyses are never useful. Rather, the point here is simply that adult equivalent analyses are just a tool, and are neither essential to a proper permitting decision nor determinative of such a decision's outcome.

Comment 2.7.10
The lack of an evaluation of the magnitude and nature of the biological impacts of IM/E at the Station's CWIS leaves the Agencies without a legally adequate basis for determining what specifically constitutes BTA here under CWA § 316(b). Prior to issuing the final Permit Modification, the Agencies must conduct a thorough evaluation of those impacts and any AEI, and use the results to inform their selection of BTA.

Response to Comment 2.7.10
EPA has adequately evaluated IM/E impacts from the Station's CWIS and has properly concluded that adverse environmental impacts exist which must be minimized through the use of the BTA. *See* Responses to Comments 2.7.1-2.7.4, 2.7.9. Although additional analyses might provide cumulatively relevant data, EPA is not legally required to conduct such analyses, *see* General Response 2.02; Responses to Comments 2.7.2, 2.7.5, 2.7.9, and has explained why it has not chosen to do so in this case, *see* Responses to Comments 2.7.3, 2.7.9. EPA has provided an adequate basis for determining the BTA in the SOB and in these Responses to Comments.

Comment 2.8
Mirant acknowledges that the Phase I Rule (which is not applicable to Kendall Station) and the Phase II Rule (which has been suspended) treat IM/E as AEI that must be minimized, but asserts that "the Agencies are entirely free to assess the actual levels of AEI caused by IM/E at Kendall Station and, per applicable guidance and precedent as described above, must do so."

Response to Comment 2.8
Mirant's comment recognizes that the Phase I and II Rules treated IM/E as AEI that must be minimized. Mirant goes on, however, to argue that EPA must take a different approach here. Yet, the phrasing of Mirant's comment assumes its conclusion. By stating that the Agencies may assess "the actual levels of AEI caused by IM/E," Mirant appears to assume that losses of adult and juvenile fish, and fish eggs and larvae, due to impingement and entrainment are not themselves adverse environmental impacts. *See* General Response 2.02. This assumption is incorrect.

EPA agrees that neither the Phase I Rule nor the suspended Phase II Rule compel EPA to take any particular approach to the assessment of adverse environmental impact in this permitting decision. EPA also agrees that it would be within the Agency's discretion to decide to conduct a study regarding population-level effects of the impingement and entrainment losses at Kendall Station. EPA does not, however, agree that it is required to conduct a population-level study in order to issue a NPDES permit containing requirements under CWA 316(b). For reasons elaborated above, EPA has chosen not to do in this instance. *See* Response to Comment 2.7.3.

Comment 2.9
In the SOB, EPA New England concludes that the IM/E at the Kendall Station has an "important adverse effect on the River's overall health" that it is "important" to address because the Charles River has been designated as an impaired waterway and has been the subject of major efforts to improve water quality. Any conclusion of AEI under CWA § 316(b), however, cannot be justified on either of those grounds. The state's designation of the Charles River as impaired did not identify IM/E at Kendall Station as a stressor or other cause of impairment, much less find that it was an important or significant source of AEI. Indeed, EPA New England's most recent public grading of water quality in the Charles River, which raised the grade to B++, attributed the remaining problems exclusively to harmful bacteria and nutrients, neither of which are attributable to the Kendall Station. The Agencies may not assume or conclude that IM/E at Kendall Station is having a significant or any adverse environmental impact that must be remedied just because the Charles River is suffering from other problems and is the beneficiary of other improvements. Rather, CWA § 316(b) and issuance of a BPJ-based NPDES permit requires the Agencies actually to show that IM/E is causing meaningful AEI.

Response to Comment 2.9
EPA agrees that it could not "assume or conclude that IM/E at Kendall Station is having a significant or any adverse environmental impact that must be remedied *just because* the Charles River is suffering from other problems and is the beneficiary of other improvements." (Emphasis added.). That is not what EPA has done.

At the outset, it is important to emphasize that there is no threshold requirement of "significance" (beyond, perhaps, *de minimis*) that AEI must meet in order for CWA 316(b) requirements to apply. "Under Section 316(b), EPA may impose the best technology available with regard to the design, location, construction and capacity (volume of water withdrawn) of a cooling water intake structure in order to minimize (reduce to the smallest possible amount or degree) adverse environmental impacts – *significant or otherwise*. . . . *Any* adverse environmental impact must be minimized under Section 316(b)." Decision of the General Counsel No. 63 (emphases added); *see also* General Responses 2.02-2.03; SOB at 18.

Rather, EPA first explained that "[t]he principal adverse environmental impacts typically associated with cooling water intake structures evaluated by EPA are impingement, entrainment and related effects," and then noted that "[i]n addition to considering these adverse impacts directly, their effects as cumulative impacts or stressors in conjunction with other stressors on affected species should also be considered." SOB at 10. That was the purpose of noting the background conditions and other stressors in the Charles River. Indeed, the SOB clearly delineated the role of these other stressors in EPA's conclusion:

> In summary, losses of adult and juvenile finfish due to impingement, and losses of eggs and larvae due to entrainment, both of which result from Kendall Station's withdrawal of large volumes of cooling water from the Charles River, represent a significant adverse environmental impact. *This is so when such losses are viewed by themselves, and even more so when viewed in the context of existing stresses from sources other than the facility.*

SOB at 13-14 (emphasis added). Thus, EPA concluded that the losses from Kendall Station's CWIS represent a significant adverse environmental impact "when such losses are viewed by themselves." As noted above, there is no threshold requirement of "significance" under CWA 316(b). Nevertheless, EPA evaluated the magnitude of the losses and concluded that the losses represent a "significant" AEI.

EPA then noted that the AEI is "even more [significant] when viewed in the context of existing stresses from sources other than the facility," e.g., the other stresses mentioned on p. 10 of the SOB. To remove any doubt: EPA's conclusions that (1) the losses from Kendall Station's CWIS constitute an adverse environmental impact, and (2) its entirely supererogatory finding that this AEI is "significant," *do not rely* on the presence or magnitude of other stressors in the River.

That said, EPA is unaware of any reason why CWA § 316(b) would prohibit EPA from taking note of those other stressors, and EPA has generally taken such stressors into consideration. *See* Phase I Final Rule Preamble, 66 Fed. Reg. at 65,263 ("The Agency believes that cooling water intakes potentially contribute additional stress to waters already showing aquatic life impairment from other sources such as industrial discharges and urban stormwater."); Determinations Document at 191-93; *cf.* 40 C.F.R. § 125.84(b)(5)(ii) (in Phase I Rule, requiring additional steps to be taken if **"**there are or would be undesirable *cumulative stressors* affecting entrainable life stages of species of concern" and standard technology-based requirements would still contribute unacceptable stress) (emphasis added). Moreover, EPA has long emphasized that the magnitude or seriousness of the adverse impacts should be assessed on a case-by-case basis taking into account the facts related to ecosystem and natural resources in question. *See* 41 Fed. Reg. 17,388 (Apr. 26, 1976) (later withdrawn); 1977 Draft 316(b) Guidance, at 11-15. Thus, a given level of losses from an otherwise healthy ecosystem or fish population might be less environmentally significant than similar or even smaller losses from a stressed ecosystem or fish population.

Thus, EPA emphasized, the AEI from Kendall's CWIS is "even more" significant when viewed in the context of other stresses. For this reason, EPA determined that overall conditions in the River "underscore[] the importance of ensuring that CWA § 316(b)'s requirements are properly applied here to address entrainment and impingement impacts from Kendall Station's CWISs." SOB at 10.

The Commonwealth of Massachusetts concurs with EPA's conclusions on this point as evidenced in the state's water quality certification and the findings and comments of its coastal zone management and fisheries agencies.

Comment 2.10
The SOB relies on excerpts from Decisions of the General Counsel, Nos. 41 and 63, for the proposition that a CWIS must reflect BTA to minimize AEI whether or not the AEI is considered to be significant. But that does not mean EPA can ignore the magnitude of AEI in determining what constitutes BTA. Indeed, Decision of the General Counsel, No. 63 also specifies that in conducting BPJ determinations just like this one: "EPA ultimately must demonstrate that the present value of the cumulative annual cost of modifications to cooling water intake structures is not wholly out of proportion to the magnitude of the environmental gains (including attainment of the objectives of the Act and Section 316(b)) to be derived from the modifications." *Seacoast* upheld and requires that approach, as well. Accordingly, the Agencies may not issue the final Permit Modification under CWA § 316(b) without determining the environmental baseline and environmental "gains" of the proposed modification, which requires them to conduct an assessment of the impact of IM/E at Kendall Station.

Response to Comment 2.10
EPA did not "ignore the magnitude" of AEI in determining what constitutes BTA. One well-established measure of the magnitude of AEI is "[a]bsolute damage (# of fish impinged or percentage of larvae entrained on a monthly or yearly basis)." 1977 Draft 316(b) Guidance at 15. This is the factor upon which EPA principally relied. *See* SOB at 10-14. *See also* Responses to Comments 2.7, 2.8, and General Response 2.02.

Mirant correctly notes that *Decision of the General Counsel No. 63* stated that EPA must compare "the magnitude of the environmental gains (including attainment of the objectives of the Act and Section 316(b)) to be derived from [proposed CWIS] modifications" to the costs of such modifications, and determine whether those costs are "wholly out of proportion" to the environmental gains. That form of cost-benefit comparison was in fact EPA's policy and practice for many years. *See* Determinations Document at 194-96. As explained in the SOB, however, *Riverkeeper II* changed the underlying legal landscape. *See* SOB at 15-16. Thus, the comparison of "magnitude of environmental gains" to "the present value of the cumulative annual cost" of CWIS improvements is not an appropriate basis for decision-making, and is therefore not necessary to examine, under current law. In addition, EPA does not agree with Mirant's statement regarding the import of *Seacoast* and has discussed the decision in other responses above.

Comment 2.11
Mirant states that in these comments and in its attached report, MK Modification Comments, Exhibit No. 5, a much greater understanding of the Lower Charles River Basin has evolved with the availability of a long-term sampling program, and it is now clear that the biological impact of IM/E at Kendall Station is much less than had been estimated in the record available to the Agencies in 2004. Before issuing the final Permit Modification, CWA § 316(b) and exercise of BPJ require the Agencies to consider those data and analyses, and to use those data to determine the magnitude of AEI and what reductions in AEI are likely from any modifications imposed by the final Permit Modification.

Response to Comment 2.11

EPA has reviewed all of Mirant's comments and Exhibit No. 5. *See generally* Responses to Comments Section 3. Regarding reductions in AEI likely to result from the Final Permit Modification, see Response to Comment 2.7.5.

Comment 2.12
Under the 1977 Guidance, the Decisions of the General Counsel and *Seacoast*, the Agencies should not issue the final Permit Modification under CWA § 316(b) without evaluating whether the costs of a proposed modification are wholly out of proportion to the environmental benefits. To evaluate that, EPA New England must first assess the current magnitude of AEI to establish the baseline against which to compare potential modifications. Then EPA New England must determine what type of reductions, if any, are needed so that the AEI due to IM/E reach a de minimis level. Beyond mere recitation of IM/E and conclusory finding of AEI, the SOB contains no such analysis, which the Agencies must conduct before issuing the final Permit Modification.

Response to Comment 2.12
As explained in the SOB, *Riverkeeper II* changed the underlying legal landscape. *See* SOB at 15-16. Thus, an evaluation of "whether the costs of a proposed modification are wholly out of proportion to the environmental benefits" is not an appropriate basis for decision-making, and is therefore not necessary to examine, under current law. Moreover, even if the "wholly disproportionate test" did apply to this permit modification, EPA does not concede that Mirant has properly characterized the analysis that would be required.

EPA has in fact assessed the current magnitude of AEI to establish the baseline against which to compare potential modifications. *See* SOB at 10-14. Mirant has made clear its belief that deaths of fish, fish larvae, and fish eggs due to impingement and entrainment do not, of themselves, constitute AEI. EPA, which is charged with administering section 316(b) of the Clean Water Act, has a different view. *See* General Response 2.02; Responses to Comments 2.7, 2.8.

EPA has also determined what type of reductions, if any, are needed so that the AEI due to IM/E is minimized. Those reductions are the reductions achievable with the best-performing technologies that are available for use at Kendall Station. *See generally* SOB at 26-48.

Comment 2.13
In considering and reaching a reasonable balancing of the other BAT factors that the SOB acknowledges the Agencies should consider, the magnitude of existing AEI and potential reductions in AEI must be known. Instead, the SOB simply assumes that maximal reductions in IM/E are needed and considers the other BAT factors dismissively. Prior to issuing the final Permit Modification, the Agencies must balance those factors reasonably against the potential benefits of IM/E reductions. A small improvement in AEI actually caused by Kendall's CWIS, for example, may not be justifiable if the associated technology would cause great disruptions to the ecology of the Broad Canal and to recreational uses of the Charles River. But to evaluate that and similar issues, the Agencies first must determine the baseline of AEI and the benefits of AEI reduction.

Response to Comment 2.13

Magnitude of existing AEI. The magnitude of existing AEI is known (or at least reasonably well estimated). EPA has assessed the current magnitude of AEI. *See* SOB at 10-14. Mirant has made clear its belief that deaths of fish, fish larvae, and fish eggs due to impingement and entrainment do not, of themselves, constitute AEI. EPA, which is charged with administering section 316(b) of the Clean Water Act, has a different view. *See* Responses to Comments 2.7.1-2.7.10, 2.8, General Response 2.02.

Magnitude of potential reductions in AEI. EPA is not required to, and in this case has exercised its discretion not to, attempt to produce a quantitative forecast of the potential reductions in AEI from use of a particular CWIS technology. *See* Responses to Comments 2.7.3, 2.7.5, 2.8. As explained above, EPA concludes that impingement mortality would be virtually eliminated by compliance with the permit's requirements, but our current state of knowledge does not permit meaningful numeric estimates of the reduction in the mortality of currently entrained organisms that will be achieved by compliance with the permit. EPA does, however, reasonably conclude that entrainment is likely to be significantly reduced by use of the exclusion technologies meeting the permit's requirements and that some degree of survival of newly impinged organisms is likely. This will effectively minimize the adverse impact of entrainment by reducing the mortality of entrained organisms over the current condition, which involves once-through cooling without any entrainment reduction technology.

"[T]he SOB simply assumes that maximal reductions in IM/E are needed and considers the other BAT factors dismissively." The SOB does indeed begin from the starting point that section 316(b) requires the BTA for "minimizing" AEI, which means reducing the adverse impacts of entrainment and impingement to the greatest degree. *See* SOB at 18. The SOB then eliminates certain technologies from consideration as being either not the "best" at this requirement, or not "available" at the site. Finally, the SOB considers the factors from section 304 of the Act to determine whether any technologies should be eliminated on those bases. *See* SOB at 36-43. EPA did in fact eliminate two technologies due to engineering issues, but concluded that "[n]o available option could be eliminated based on the age of the facility or cost impracticability." *Id.* at 43. Finally, the SOB acknowledged that "the installation and operation of available alternative technologies, such as fine-mesh barrier nets, aquatic filter barriers, wedgewire screens, and aquatic filtration systems, present unique engineering challenges and some non-water quality impacts," but determined that these issues could be overcome. *Id.* Subsequent analysis developed for the final permit modification reaffirmed most of these findings, but also revealed that several of the requirements of the Draft Permit Modification (maintenance of through-medium velocity at all points at all times, "gentle release" mechanism, requirement of no bypasses), as well as aquatic filtration system technology (e.g., Filtrex), are not "available" at Kendall Station at this time. *See generally* Responses to Comments 4.23-4.44. EPA does not consider these evaluations to be "dismissive."

"The Agencies must balance those factors reasonably against the potential benefits of IM/E reductions." EPA does not agree that it must "balance" the section 304 factors against "the potential benefits of IM/E reductions." First, as noted, these factors apply here *by analogy*; they may help guide EPA's analysis, but do not legally apply of their own force. *See* SOB at 18-19, 21-22; General Response 2.01. Consequently, it is difficult, if not impossible, to say that EPA "must" apply these factors in a particular way as part of a section 316(b) determination. To the

contrary, "the statute does not specify any particular technology to be used or what methods the Agency . . . should use to make section 316(b) determinations." *Dominion*, 12 E.A.D. at 501. "Because section 316(b) refers to sections 301 and 306 but provides a different standard . . . it is permissible for the EPA to look to those sections for guidance but to decide that not every statutory directive contained therein is applicable to" decision-making under § 316(b). *Riverkeeper I*, 358 F.3d at 174. Second, even when determining *BAT* (where these factors, apply of their own force), the Act does not mandate any particular structure for EPA's analysis, certainly not that EPA must "balance" these factors against "potential benefits." *See* SOB at 21-22 & n.16. Instead, even in applying the BAT standard, EPA has the discretion to reasonably consider and then weigh these factors into its decision.

Here, EPA identified the generally best-performing technology (closed-cycle cooling); eliminated it from consideration for site-specific reasons; considered a range of other technologies; eliminated several due to poorer (i.e., not the "best") performance relative to other technologies; evaluated whether to eliminate any of the remaining technologies due to the considerations provided by section 304; eliminated others after considering the engineering aspects; and, in the SOB, was unable to eliminate any more based on the other section 304 factors. (In the Final Permit Modification, EPA has also eliminated as unavailable an aquatic filtration system such as Filtrex, due to the interaction between available space in the Broad Canal and the problem of head loss. *See* Response to Comment 4.44.) Consequently, any of the remaining set of available technologies would, when implemented according to specified conditions, constitute Best Technology Available. This is a perfectly rational method of evaluating Best Technology Available.[3]

"A small improvement in AEI actually caused by Kendall's CWIS, for example, may not be justifiable if the associated technology would cause great disruptions to the ecology of the Broad Canal and to recreational uses of the Charles River." EPA agrees with this general proposition. For this reason, EPA has added a requirement that the technology may not block access to the Broad Canal. *See* Response to Comment 4.12. This may preclude a *particular method of installation* of a barrier net or aquatic filter barrier, though it will not preclude such technologies from being deployed in other locations. Similarly, if EPA had reason to believe that any technology under consideration "would cause great disruptions to the ecology of the Broad Canal and to recreational uses of the Charles River," EPA would consider whether this detriment would preclude the technology from being determined to be the BTA. *See generally* Responses to Comments Section 4.

Comment 2.14

While the legal discussion within the SOB identifies most of the factors that the Agencies must address in issuing a BPJ-based determination under CWA § 316(b), the SOB does not provide a full or consistent evaluation and explanation of those factors for Kendall Station. For example, in considering engineering aspects of potential control technologies, the SOB rejects fine mesh

---

[3] This methodology is roughly consistent with EPA's methodology for evaluating Best Achievable Control Technology under the Clean Air Act. *See* Draft New Source Review Workshop Manual (Oct. 1990), *available at* http://www.epa.gov/ttn/nsr/gen/wkshpman.pdf, at B.5-B.9. Of course, the BACT standard under the Clean Air Act has no role in this determination; EPA notes the consistency of methodology merely as an additional indicator of the method's reasonableness.

traveling screens on the principal bases (a) that engineering of a fish return system would require substantial construction and potentially the alteration of a historic seawall and be "technologically difficult," and (b) that the ability of such technology to maximize the ultimate survival of otherwise entrainable organisms is "uncertain." Yet in considering other technologies such as wedgewire screens that also present "engineering challenges," the Agencies conclude without any explanation that those challenges are "not insurmountable." As shown by Mirant's comments later on, in fact many of those challenges are insurmountable at this location for reasons that the SOB did not explore. Prior to issuing the final Permit Modification, the Agencies must fully and consistently evaluate each proposed AEI minimization approach under each of the necessary factors, and provide a full explanation of how they balanced those factors in reaching their final determination of BTA.

Response to Comment 2.14
This comment consists of a general complaint that EPA has not fully or consistently evaluated the section 304 factors, and specific examples.

With regard to the specific examples, EPA has addressed this comment in the context of specific comments pertaining to specific technologies. See Responses to Comments 4.7 (fine-mesh traveling screens), 4.40-4.44 (other technologies, including wedgewire screens).

With regard to the general complaint, the commenter is obligated to specifically identify the scope of its comment. *See In re Westborough*, 10 E.A.D. 297, 304 (EAB 2002) (permit issuers need not "guess the meaning behind imprecise comments"). Beyond the specific examples cited, EPA cannot discern which technologies and which factors Mirant believes have not been "fully and consistently" evaluated. Therefore, to the extent, if any, that this comment may have been intended to embrace additional examples beyond those cited, it is not a comprehensible comment, let alone a significant one, and requires no response.

Comment 2.15
The SOB also contains numerous explanations that are no more than conclusory or circular findings. For example, as commented above, the SOB finds that AEI is significant because IM/E exists without any demonstration that the particular levels of IM/E at Kendall Station have any significant impact. Similarly, the SOB finds that the engineering challenges of inducing flow at Kendall Station are not insurmountable just because it says so, without any support in the record. In issuing the final Permit Modification, the Agencies must provide more than such conclusory and circular explanations for each of its final determinations.

Response to Comment 2.15
This comment consists of a general complaint that EPA has relied on conclusory or circular findings, and specific examples.

With regard to the specific examples, EPA has addressed this comment in the context of specific comments pertaining to specific technologies. *See* General Response 2.02; Responses to Comments 2.7, 2.8 (adverse environmental impact); Response to Comment Section 3 *passim* (same); Response to Comment 4.25 (engineering challenges regarding inducing flow).

With regard to the general complaint, the commenter is obligated to specifically identify the scope of its comment. *See In re Westborough*, 10 E.A.D. 297, 304 (EAB 2002) (permit issuers need not "guess the meaning behind imprecise comments"). Beyond the specific examples cited, EPA cannot discern which "conclusory and circular explanations" Mirant believes EPA has relied upon. Therefore, to the extent, if any, that this comment may have been intended to embrace additional examples beyond those cited, it is not a comprehensible comment, let alone a significant one, and requires no response.

Comment 2.16
[Mirant makes five distinct points in this comment. For purpose of clarity, EPA has subdivided the comment into comments 2.16.1-2.16.5, and organized its responses accordingly. Cross-references to "Response to Comment 2.16" elsewhere in the document refer to the responses 2.16.1-2.16.5 collectively.]

Comment 2.16.1
The SOB suggests that the requirement in CWA § 316(b) to select the BTA to "minimize" AEI means that the permit must require Kendall Station to reduce IM/E "as much as possible." The Draft Permit Modification indeed does seek that result, as if CWA § 316(b) makes it mandatory to do anything possible to reduce IM/E. CWA § 316(b), however, also allows and requires a permit writer to consider additional factors: whether a technology is "available" and "best" in the site-specific circumstances, and by analogy, the BAT factors. The decisions of EPA's General Counsel, although not cited in the SOB, are also clear that the goal of minimizing AEI must be understood as meaning: reduce AEI as much as possible in consideration of the other elements of the full standard.

Response to Comment 2.16.1
EPA agrees that the requirement in CWA § 316(b) to select the BTA to "minimize" AEI means that the permit must require Kendall Station to reduce IM/E "as much as possible," consistent of course with the other elements of the BTA standard. Ideally, "[a]ll environmental harm should be avoided," although this goal is of course qualified by the reality that "the continued operation of a facility will, in most cases, prevent this result." *Decision of the General Counsel No. 41*, at 203.

EPA agrees that CWA 316(b) requires a permit writer to consider whether a technology is "available" and "best" in the site-specific circumstances, and EPA has, by analogy, considered the section 304 factors as part of this consideration. EPA has, "in consideration of the other elements of the full standard," eliminated the best performing technology in the industry (closed-cycle cooling) and one high-performing technology (aquatic filtration systems) on the grounds that they are not "available" at Kendall Station at this time.[4] That same consideration of the other elements of the full standard has not, however, led to the conclusion that the remaining technologies are unavailable.

[4] Similarly, EPA has determined that variable speed pumps (which, depending on the particular operational profile of a facility, can result in substantial capacity reductions) are not (at least by themselves) the "best" technology for minimizing AEI at Kendall Station. *See* SOB at 30. *See also* Response to Comment 4.7 (regarding fine-mesh traveling screens).

EPA has reviewed the cited Decisions of the General Counsel in full, and finds nothing contrary to the legal framework stated in the SOB, except with regard to cost-benefit comparison, regarding which see Responses to Comments 2.10, 2.12.

Comment 2.16.2
The balance of the SOB, however, plainly stresses minimization of IM/E as the dominant consideration and shortchanges its analysis of whether the proposed technologies actually are "available" or "best" in the setting of the Kendall Station.

Response to Comment 2.16.2
EPA set minimization of AEI through impingement and entrainment as the goal, and analyzed which technologies were "available" and which of the "available" technologies met the requirement of being "best" at minimizing adverse environmental impact. In the SOB, EPA eliminated one technology that it deemed not "available" at Kendall Station: closed-cycle cooling (due to space considerations). *See* SOB at 29-30. EPA also eliminated several technologies that might be "available" but do not perform at the "best" level. *See* SOB at 30-31, 35-36. EPA evaluated each of available technologies in light of the section 304 factors to determine if any should be eliminated on those bases. *See id.* at 39-40. After the above analyses, the remaining candidates were all deemed equally capable of satisfying CWA 316(b), and the draft permit modification was written to allow any of them. This is an appropriate method of determining the best technology available for minimizing adverse environmental impact. *See* Response to Comment 2.13.

The Final Permit Modification follows the same general approach. One CWIS technology (aquatic filtration system) was found to be unavailable in the Broad Canal at this time and the Final Permit Modification does not rely upon it. In addition, after consideration of public comments, three technology-based requirements (pertaining to the release mechanism, through-medium velocity, and bypasses), were found to be unavailable as proposed in the Draft Permit Modification, and consequently revised in the Final Permit Modification.

In short, EPA has reasonably eliminated from consideration technologies that are not "available" and those which are not the "best" at minimizing adverse environmental impact. EPA's analysis has not "shortchanged" the analysis of the availability of technologies or whether they constitute the best technologies. The fact that Mirant may disagree with some of EPA's conclusions does not establish that EPA shortchanged the analyses.

Comment 2.16.3
For example, the SOB determines that technology to induce sweeping flow is available to reduce impingement of entrainable organisms based exclusively on one presentation of slides identifying induced turbulent flow as a concept worthy of study to accomplish a different purpose, reduction of impingement of larger organisms.

Response to Comment 2.16.3
See Response to Comment 4.25, especially Response to Comment 4.25.8.

Comment 2.16.4

In issuing the final Permit Modification, the Agencies must balance the goal of minimizing AEI against the other elements of the standard under CWA § 316(b), and provide a full explanation of how it does so.

Response to Comment 2.16.4
See Response to Comment 2.13 regarding the appropriate analytical framework for the different elements of the standard under CWA § 316(b). In light of the requirements of section 316(b), EPA has modified or eliminated certain requirements in the Final Permit Modification in light of new information, or upon fresh consideration in response to comments. *See, e.g.,* Response to Comment 4.24.1 (gentle release).

Comment 2.17
The SOB at p. 18 suggests that the BTA standard under CWA § 316(b) requires the Agencies to select the technology that will reduce AEI from Kendall Station's CWIS "to the smallest possible extent" as long as the technology is feasible from a technological and economic standpoint. By setting design standards as permit requirements based on "innovative" technologies that are only theoretically effective or feasible at this location, the SOB does not meet that standard under CWA § 316(b). The SOB clearly did not find that any of those technologies are in fact feasible to install at Kendall Station. Rather, the SOB acknowledges that each of those technologies is "an emerging technology, not a fully-proven industry standard." SOB at p. 48. Nor was the SOB finding that any of those technologies would be effective at reducing AEI - rather, the Draft Permit Modification proposes extensive monitoring explicitly to find that out. SOB at p. 47.

The Agencies are not authorized, however, to select and impose technologies as BTA for Kendall Station that they have not shown and documented are feasible and effective at this location. A theoretically "best" technology is not BTA if it cannot be effectively deployed at Kendall Station - as the Agencies recognized in determining that conversion of Kendall Station's once-through cooling system to a closed-cycle cooling system is not feasible. SOB at pp. 21, 29-30. Likewise, the Agencies should also recognize that theoretically "best" technologies that are experimental, that have never been deployed or even tested at any power plants, and that would require some unidentified "innovation" to work in the "challenging" context of Kendall Station, also are not "available" within the meaning of CWA § 316(b). CWA § 316(b) does not require expensive experiments; rather, the Agencies may only select as BTA existing technologies that they can show are actually feasible to install here. Even if the technologies proposed in the SOB had been deployed elsewhere, that would not make them "best" or "available" for Kendall Station. The unique flow patterns at Kendall Station, and the presence of saline anoxic waters in the immediate vicinity, each mean that technologies that might be effective elsewhere will not be effective here. Mirant recognizes that in the context of setting industry-wide effluent limitations under the BAT standard, EPA can require one industry to adopt technology from another industry, but EPA first must determine that the transfer technology is available outside the initial industry, that the technology is transferable, and that it will work. Here, the SOB has not shown that any of the primary exclusion technologies proposed in the SOB meet any of those standards for any power plants, much less that they would be feasible and effective at Kendall Station. In developing the final Permit Modification, the Agencies must select as BTA only technologies that they can show would actually be feasible and effective in the particular setting of Kendall Station.

Response to Comment 2.17

Before responding to the individual elements of this comment, it is important to reiterate that EPA candidly and unambiguously explained the challenges facing it in developing this permit modification, including uncertainty about the effectiveness of each technology evaluated at Kendall Station in light of site-specific factors. *See* SOB at 26-27. But when Congress enacted the Clean Water Act, it knew that there would be circumstances where knowledge was uncertain, where state-of-the-art technologies had not yet become routine, or where local conditions made it difficult to predict how well a given technology would perform at a given site. And yet Congress commanded EPA to "require that the location, design, construction, and capacity of cooling water intake structures reflect the best technology available for minimizing adverse environmental impact." CWA § 316(b). Section 316(b), like other provisions of the Act, should be construed with Congress's ambitious statutory purposes in mind. *See, e.g., PUD No. 1 of Jefferson County v. Wash. Dep't of Ecology*, 511 U.S. 700, 704 (1994) ("The Federal Water Pollution Control Act, commonly known as the Clean Water Act . . . , is a comprehensive water quality statute designed to 'restore and maintain the chemical, physical, and biological integrity of the Nation's waters.' The Act also seeks to attain 'water quality which provides for the protection and propagation of fish, shellfish, and wildlife.'") (internal citations omitted). In light of the goals and mandates of the Act, "EPA is compelled to exercise its judgment in the face of scientific uncertainty unless that uncertainty is so profound that it precludes any reasoned judgment. Even 'probative preliminary data not yet certifiable as 'fact' may provide an appropriate basis for promulgation of regulations. Generally, 'it is only when a model bears no rational relationship to the characteristics of the data to which it is applied that we will hold that the use of the model was arbitrary and capricious.'" *Miami-Dade County v. United States EPA*, 529 F.3d 1049, 1065 (11th Cir. 2008) (per curiam) (citations omitted); *see also NRDC v. Costle*, 568 F.2d 1369, 1380 (D.C. Cir. 1977) ("[T]his ambitious statute is not hospitable to the concept that the appropriate response to a difficult pollution problem is not to try at all.").

In the SOB, EPA openly acknowledged the challenges facing it, did not conceal data gaps or known or suspected disadvantages of the various technological options, and set forth all the facts for the public's consideration:

> As explained in more detail below, while there is a range of alternatives for minimizing the adverse environmental impacts of the CWISs, some of which are quite promising, there is no panacea. Each alternative has advantages and disadvantages, both inherent to the technology and as applied specifically in the Lower Charles River Basin, and no one alternative commends itself as perfect, proven, and fully protective of the environment. Some of the alternatives hold promise but have not yet amassed significant supporting case study data; others have reportedly proven successful elsewhere, but their application at Kendall Station might be complicated by site-specific factors; and others effectively address some problems but are ineffective with respect to others.
>
> EPA's task in this case is to use its best professional judgment – the Agency's opinion developed after consideration of the relevant issues and the best, reasonably available data – to develop permit conditions that reflect the best technology available for minimizing adverse environmental impacts at Kendall Station. To that end, the Agency

> has proposed flexible yet environmentally protective permit conditions that allow the permittee to select from among several aquatic organism "exclusion technologies" that meet specified technology-based design standards . . . .
>
> EPA recognizes that the available technological options are innovative, and that none of the technologies that would meet the design standards have been tested in this particular water body. Nevertheless, CWIS technological alternatives that satisfy the permit conditions in the draft permit modification will reflect what EPA has determined, in its best professional judgment, represents the best technology available for minimizing adverse environmental impacts at Kendall Station.

SOB at 26-27. Finally, EPA requested the assistance of interested parties and the general public in developing a final determination:

> To assist EPA in developing the final permit and BTA determination, the Agency invites public comment concerning (a) any technology or set of technologies (whether or not evaluated in this Statement of Basis) that the commenter believes constitutes the Best Technology Available, and/or (b) any set of permit conditions (whether or not evaluated in this Statement of Basis) that the commenter believes will reflect the correct BTA. While EPA welcomes all comments regarding CWA § 316(b) issues pertinent to the Kendall Station permit, whether the commenter agrees or disagrees with EPA's conclusions thus far, EPA also specifically requests that commenters who disagree propose their own alternative BTA determinations and permit limits and explain why they believe their proposals will satisfy the requirements of CWA § 316(b). After the close of the public comment period, EPA will review its proposed BTA determination and permit limits in light of alternative BTA analyses put forth by commenters, and all other pertinent comments and information, and determine whether to revise its BTA determination and/or permit limits in response.

Id. at 27. (EPA appreciates that Mirant responded to the invitation by providing its own BTA proposals, which are addressed below in the Responses to Comments 4.45 and 4.47.)

With that in mind, EPA responds to the specific points in this comment as follows:

1. The SOB fully acknowledged that the technologies considered in its BTA determination are emerging technologies, not fully-proven industry standards. (Other than closed-cycle cooling, there *is* no fully-proven industry standard for minimizing impingement and entrainment in all aquatic settings.) EPA also agrees that if a technology is not feasible to install and operate at a particular location, then it is not "available." *See, e.g.,* SOB at 29-30 (eliminating closed-cycle cooling due to space constraints). However, EPA is not required to demonstrate to a mathematical certainty that each technology option can be "effectively" used at Kendall Station. *See* Response to Comment 2.1 part 4. Where Mirant has provided specific and persuasive evidence that a technology is not feasible to install and operate at Kendall Station, EPA has eliminated that technology from further consideration. *See, e.g.,* Response to Comment 4.44.1 (eliminating aquatic filtration system as a technology option due to technological infeasibility under current configurations). But, in other cases, the record does not support such a finding. In

many of those other instances, EPA is aware of engineering challenges, but EPA's professional engineering judgment is that the technology could, in fact, be installed and operated at Kendall Station—concededly, not without difficulty, but the standard is not whether a technology would be *easy* to implement, but rather whether it is *available*. Again, where Mirant has shown the engineering challenges to be insurmountable, EPA has not hesitated to eliminate the option from further consideration. But where the record consists of EPA's technical judgment standing against Mirant's generalized complaint that EPA has failed to meet its burden, EPA has relied on its technical judgment.

2. EPA found that each of the technologies considered to represent BTA would be effective at reducing AEI. In fact, EPA specifically eliminated technologies that would *not* be effective at reducing AEI. *See, e.g.,* SOB at 30 (variable speed pumps), 31 (retrofitting existing screens with fish buckets and a return system), 32 (the type of fine-mesh barrier net system proposed by Mirant in its permit application). By contrast, EPA found that technologies such as an appropriately sized fine-mesh barrier net, a coarse mesh barrier net (for the limited purpose of preventing impingement of adult and juvenile fish), an aquatic filter barrier, or wedgewire screens *could* effectively reduce AEI. *See* SOB at 32-35. Moreover, it is important to take note of EPA's permitting approach. Rather than requiring Mirant to meet a specified performance standard (e.g., percentage of entrainment reduced from a baseline), EPA selected the best technologies available, developed somewhat generic design and operational standards that could be met by any of several technologies, and proposed a permit modification that would require Mirant to install and operate the technology according to those design or operational standards. The permit modification does *not*, however, prescribe exactly which technology must be used or hold Mirant to any specific performance standards. Thus, if Mirant satisfies the design and operational standards, but site-specific or other operational conditions render it less effective than EPA envisioned, that reduced effectiveness will not be held against Mirant. *See* Response to Comment 2.7.6.

3. EPA does not agree that, *per se*, a technology *must* be eliminated from consideration merely because it is (1) experimental, (2) has never been deployed or tested at a power plant, or (3) would require creativity to overcome site-specific challenges. *See* Response to Comment 2.1 part 4. Moreover, three of the specific alternatives that EPA identified as examples of technologies that would satisfy BTA have been demonstrated to be feasible for use at power plants, including, in some instances, plants that are much larger than Kendall Station and correspondingly withdraw much more water. *See, e.g.,* SOB at 31 (barrier nets), 33-34 (aquatic filter barrier), 34 (wedgewire screens); Responses to Comments 4.42 (aquatic filter barrier), 4.43 (wedgewire screens).

Based on currently available aquatic filtration system technology and design configurations, an aquatic filtration system such as Filtrex is not "available" at Kendall Station at this time. See Response to Comment 4.44. Consequently, no further response regarding Filtrex is necessary.

4. See Responses to Comments 4.17.2 (flow patterns at Kendall Station and saline anoxic waters), 4.24 (gentle release), 4.25 (sweeping flow).

Comment 2.18

[Mirant makes several distinct points in this comment. For purpose of clarity, EPA has subdivided the comment into comments 2.18.1-2.18.6, and organized its responses accordingly. Cross-references to "Response to Comment 2.18" elsewhere in the document refer to these responses collectively.]

Comment 2.18.1
A technology so costly that it is unaffordable by an ongoing business is not truly available.

Response to Comment 2.18.1
In most cases, a technology so costly that it is unaffordable by an ongoing business will not be considered "available" in a site-specific BPJ application of CWA § 316(b), although this may not be outcome-determinative in every case. *See* Response to Comment 2.22. In this case, there is no evidence in the record suggesting that any technology identified as BTA in this permit modification cannot be afforded by Mirant.

Comment 2.18.2
Under *Seacoast*, in choosing among BTA alternatives the Agencies may consider whether site-specific costs of one option are wholly disproportionate to the benefits.

Response to Comment 2.18.2
See Responses to Comments 2.1, 2.3.

Comment 2.18.3
In *Riverkeeper II*, the Court agreed that the Agencies have the authority to consider which of roughly equally beneficial alternatives is the most cost-effective.

Response to Comment 2.18.3
EPA agrees with the general thrust of this statement, but not the precise phrasing. The *Riverkeeper II* court framed the cost-effectiveness standard as whether a technology achieves "essentially" the same benefits as the best-performing technology, but at a "markedly" lower cost. *See* 475 F.3d at 100-01. In addition, the metric used by the Second Circuit was the degree of IM/E reduction (which EPA regards to constitute adverse environmental impact).

Comment 2.18.4
For example, while the SOB describes it as a matter of unavailable space, SOB at pp. 29 to 30, the underlying reason that closed-cycle cooling towers are not BTA at the Kendall Station is that it would be too costly for Mirant to acquire the necessary space on adjacent properties in a well-developed urban area. Thus that technology is not available at Kendall Station.

Response to Comment 2.18.4
EPA has eliminated closed-cycle cooling from further consideration for the reasons stated on pp. 29-30 of the SOB. Mirant seems to suggest that a problem of inadequate space at a facility to install equipment can always be translated into an issue of how much it would cost to purchase additional land to accommodate the equipment. EPA does not agree that this will be so in all cases. In some cases, space for equipment may be lacking because a site is bordered by wetlands or other sensitive resources. Alternatively, the necessary space may already be occupied by

other buildings, or particular uses may be barred by various legal requirements, or owners may be unwilling to sell for various reasons. In this case, the record does not indicate whether Mirant's supposition (i.e., that lack of space on-site is simply a cost issue) would apply, but since this comment simply purports to provide additional or alternative reasons to reject an option that EPA has already rejected for reasons stated, no response is required.

Comment 2.18.5
Mirant objects to EPA's use of the preliminary cost estimates that Mirant's consultants developed on short notice in response to the Agencies' request dated August 24, 2007 to attend a meeting on September 19, 2007 to discuss BTA at the Kendall Station. Moreover, those estimates did not and could not address the proposed BTA requirements in the Draft Permit Modification, many elements of which were not known or discussed in preparing those estimates.

Response to Comment 2.18.5
See General Response 2.04.

Comment 2.19
[Mirant makes five distinct points in this comment, which objects to the SOB's conclusion that Mirant can bear the cost of any of the technologies considered. For purpose of clarity, EPA has subdivided the comment into comments 2.19.1-2.19.5, and organized its responses accordingly. Cross-references to "Response to Comment 2.19" elsewhere in the document refer to the responses 2.19.1-2.19.10 collectively.]

Comment 2.19.1
Mirant Corporation is not the permittee, which as indicated on the face of the Draft Permit Modification, is Mirant Kendall, LLC. Purely as a matter of corporate law and NPDES permitting, the financial status of Mirant Corporation is irrelevant to whether Mirant Kendall, LLC can bear the costs of the proposed technologies.

Response to Comment 2.19.1
EPA disagrees that "the financial status of Mirant Corporation is irrelevant."

Under *Riverkeeper II*, the inquiry is whether "'the initial and annual costs of applying the technology . . . can be *reasonably borne*'" by the facility. 475 F.3d at 99 (quoting *Riverkeeper I*, 358 F.3d at 195 (quoting *Chem. Mfrs. Ass'n v. EPA*, 870 F.2d 177, 262 (5th Cir. 1989))) (emphasis added by *Riverkeeper II*); *cf.* NPDES Permit Writer's Manual, at 71 ("[C]onditions [should be] achievable at a cost that the facility can afford."). The question presented by this comment is: If a facility's owner has structured its corporate arrangements so that the facility is owned by a corporation which is in turn wholly owned by another corporation, may EPA consider the finances of the parent corporation, or must it treat the (non-publicly-held) immediate owner of the facility as if it were a standalone entity?

EPA is not aware of any determinative law on this point. However, there is a well-developed jurisprudence under a similar standard under a different section of the CWA. Under CWA § 309(d), in developing a civil penalty for a CWA violation, EPA must consider "the economic impact of the penalty on the violator." 33 U.S.C. § 1319(d). Obviously, this is not an enforcement matter, and CWA § 309(d) does not apply of its own force. Nevertheless, the "economic impact of the penalty on the violator" standard of CWA § 309(d) is similar to the "reasonably borne" standard that courts have applied to BAT and BTA under CWA §§ 301, 304, and 316, and both standards share two important factors: EPA bears the ultimate burden of proof, but the facility may uniquely possess information favorable to it which would be difficult (in some cases impossible) for EPA to obtain. And the "economic impact of the penalty on the violator" standard is in turn nearly identical to "ability to pay" standards in penalty provisions of other statutes administered and enforced by EPA. Consequently, EPA has examined the jurisprudence that has developed under the "economic impact of the penalty on the violator"/"ability to pay" standard with respect to layered corporate ownership of facilities.

Under that standard, it is well-established that EPA is *not* restricted to considering the finances of the immediate owner. *See United States v. Union Twp.*, 150 F.3d 259, 268-69 (3d Cir. 1998) (in CWA § 309(d) case, considering parent corporation's finances in evaluating the economic impact of the penalty on a violator); *Atl. States Legal Found., Inc. v. Universal Tool & Stamping Co.*, 786 F. Supp. 743, 753 (N.D. Ind. 1992) (same); *In re New Waterbury, Ltd.*, 5 E.A.D. 529, 547-48 (EAB 1994) (finding that respondent had ability to pay TSCA penalty based on the finances of the corporate owner of respondent's general partner); *see also In Re Carroll Oil Co.*, 10 E.A.D. 635, 665 (EAB 2002) (RCRA penalty case).

While, as noted, the "ability to pay" or "economic impact" standards for assessing penalties do not apply of their own force, there is an undeniable similarity between the inquiries of whether a company is "able to pay" a sum of money and whether it can "reasonably bear" a sum of money. The "ability to pay" and "reasonably borne" analyses focus on the same issue: whether a cost may be borne by a specific entity. If a parent corporation's financial information is relevant in the "ability to pay" context, it should also be in the "reasonably borne" context.

Several factors support this approach in this instance.

1. Mirant has (lawfully) structured its finances in a way that inhibits examination of the individual station's finances. While Mirant Corporation is a publicly-held corporation, its wholly-owned subsidiary Mirant Kendall, LLC is not publicly traded and is not subject to extensive financial disclosure requirements. For example, consider Mirant Corporation's most recent annual report. Mirant's report contains little to indicate that it makes firm distinctions between parent and subsidiary; to the contrary, it tends to treat them as an undifferentiated whole. *See, e.g.,* Mirant 2007 Annual Report and Notice of 2008 Annual Meeting and Proxy Statement, Section II, at 14 ("*Our* costs of complying with environmental laws, regulations and permits are substantial, including significant environmental capital expenditures.") (emphasis added), 21 (listing 33 employees that "we" employed in Cambridge, Massachusetts).[5] Indeed, EPA was unable to find in Mirant's publicly available financial reports any information specific to Mirant Kendall, LLC; for example, the most granular level of financial detail in Mirant's 2007 Annual Report is for Mirant's entire Northeast Region, which includes Mirant's Bowline, Canal, Lovett, Kendall and Martha's Vineyard facilities. *See id.* at 9, 31. While Mirant reports that its Northeast Region experienced a net loss from continuing operations before reorganization items

---

[5] *Available at* http://www.mirant.com/investor_relations/pdfs/2007AnnualRptNoticeof2008AnnualMtgProxyStmt.pdf.

and income taxes, *see id.* at 43, it also reports that, with a single exception, all of the other facilities in this region had net capacity factors less than half of Kendall Station's, *see id.* at 31.[6] Furthermore, much of the cause of the net loss for the Northeast Region appears to be attributable to impairment losses at Lovett Station. *See id.* at 44. In short, Mirant's financial reports make it difficult, if not impossible, for EPA to ascertain the financial situation of Mirant Kendall, LLC, as opposed to Mirant Corporation. EPA also notes that in its dealings with Mirant with regard to both the Kendall Station and Canal Station permits, a lead role has been played by a single company official, Shawn Konary (Mirant's director of environmental affairs for its generating stations in the northeastern United States).

2. Mirant has expressly declined to provide EPA with financial data specific to Kendall Station. As a general principle of public notice and comment, if a commenter wishes an agency to consider a particular body of information, the commenter must supply that information to the agency. *See, e.g., In re Spokane Reg'l Waste-to-Energy*, 2 E.A.D. 809, 816 (Adm'r 1989) ("Just as 'the opportunity to comment is meaningless unless the agency responds to significant points raised by the public,' so too is the agency's opportunity to respond to those comments meaningless unless the interested party clearly states its position.") (quoting *Northside Sanitary Landfill, Inc. v. Thomas*, 849 F.2d 1516, 1520 (D.C. Cir. 1988) (internal citations omitted); *see also Vt. Yankee Nuclear Power Corp.* v. *Natural Resources Defense Council*, 435 U.S. 519, 553-54 (1978) ("Administrative proceedings should not be a game or a forum to engage in unjustified obstructionism by making cryptic and obscure reference to matters that 'ought to be' considered and then, after failing to do more to bring the matter to the agency's attention, seeking to have that agency determination vacated on the ground that the agency failed to consider matters 'forcefully presented.'"). This is particularly true in the specific context of an affordability determination, where the facility often possesses information not available to EPA that is relevant to the facility's claims. In such cases, if the permittee believes that the affordability analysis in a draft permit is incomplete or inaccurate, it is incumbent upon the permittee to supplement and correct it during the public comment period, not just complain about its inadequacy. In the enforcement context, the Board has held:

> Where ability to pay is at issue going into a hearing, the Region will need to present some evidence to show that it considered the respondent's ability to pay a penalty. The Region need not present any *specific* evidence to show that the respondent *can pay* or obtain funds to pay the assessed penalty, but can simply rely on some *general* financial information regarding the respondent's financial status which can support the *inference* that the penalty assessment need not be reduced. Once the respondent has presented *specific* evidence to show that despite its sales volume or apparent solvency it cannot pay any penalty, the Region as part of its burden of proof in demonstrating the "appropriateness" of the penalty must respond either with the introduction of additional evidence to rebut the respondent's claim or through cross examination it must discredit the respondent's contentions.

New Waterbury, 5 E.A.D. at 542-43 (emphases in original). *See also Decision of the General Counsel No. 38* (In re Evansville Materials, Inc.), at 175 ("To the extent that the applicant seeks to require the Regional Administrator to consider any particular factor during permit issuance,

[6] The single exception was Lovett Station in New York, which has since closed.

[it] . . . may not adopt the expedient course of remaining silent and then complaining of the inadequacy of the Regional Administrator's consideration of such factors."). In this case, since Mirant declined to provide facility-specific financial data (data in Mirant's unique possession) during the public comment period, Mirant's objections to EPA's use of the only information that the Agency could reasonably obtain are not persuasive. *See Alaska Dep't of Envtl. Conservation v. EPA*, 540 U.S. 461, 498 (2004) (upholding EPA's rejection of an economic infeasibility argument in a Clean Air Act "Best Available Control Technology" determination, because a finding of economic infeasibility would require financial data, which the regulated firm withheld).

For the above reasons, the financial status of Mirant Corporation is relevant in determining whether the costs associated with the section 316(b) requirements in the Final Permit Modification can be reasonably borne by the facility.

Comment 2.19.2
Mirant Kendall, LLC is a single-purpose limited liability corporation that owns and operates the Kendall Station and must either achieve profitability through its operations at the Kendall Station or go out of business. No investor, whether Mirant Corporation or any other person, can incur capital and operating costs to operate the Kendall Station at a loss.

Response to Comment 2.19.2
See Response to Comment 2.18.1.

Comment 2.19.3
Mirant Kendall, LLC is not a "regulated utility" able to recover its costs under a guaranteed rate of return. Rather, it is an independent power producer in a competitive market. Mirant's ability to sell power entirely depends on its ability to produce it at a competitive price. Adding any significant costs, whether or not mandated by regulations and permits, necessarily hinders its competitiveness.

Response to Comment 2.19.3
EPA recognizes that "[a]dding any significant costs" could affect Mirant's competitiveness in the deregulated electricity market. However, an option is not eliminated from consideration simply because it would "hinder [a facility's] competitiveness." Rather, the test from *Riverkeeper II* is whether "'the initial and annual costs of applying the technology . . . can be *reasonably borne* by the industry.'" 475 F.3d at 99 (quoting *Riverkeeper I*, 358 F.3d at 195 (quoting *Chem. Mfrs. Ass'n v. EPA*, 870 F.2d 177, 262 (5th Cir. 1989))) (emphasis added by *Riverkeeper II*).

Mirant suggests that, under a competitive electricity market, costs of Clean Water Act compliance must be absorbed by individual companies, rather than passed on to ratepayers. This suggestion is, however, somewhat misleading. In a regulated market, utilities receive advance approval to undertake expenditures and are authorized to charge rates that recover those costs and essentially guarantee certain rates of return. In the deregulated market that Kendall Station participates in, the prices that Mirant can charge, and the rates that consumers pay, are determined in a different manner. In the deregulated market, Kendall Station may or may not ultimately be able to pass along its Clean Water Act compliance costs to consumers. Of course, if it can pass the costs along, the costs will likely reduce Mirant's profits to an extent versus what they would be if the company did not have to spend any money on complying with the law. In addition, Mirant neglects to note that its competitors in the New England electric power market (including older facilities) are also subject to the Clean Water Act, and in some cases have made substantial investments to upgrade their cooling water intake structures.[7] Furthermore, Kendall Station and its competitors are all subject to a variety of laws and regulations that lead to differing expenditures at different facilities based on their circumstances. For example, coal burning plants likely face different air pollution control expenditures, while open-cycle cooling plants will face different expenditures than facilities that use closed-cycle cooling.

Comment 2.19.4
The Agencies are called upon here to make a site-specific BPJ determination, not to evaluate whether those costs are bearable by the parent company or across the power generation industry. The generalized costs of a type of technology that might be bearable by the industry are not necessarily bearable for the specific application of that technology at a particular facility. In considering costs here, accordingly, the only relevant approach is to consider how the costs affect the ability of the particular facility, Kendall Station, to maintain profitability over time.

Response to Comment 2.19.4
EPA has explained why it deems it appropriate to consider Mirant's financial capabilities when determining whether various intake technologies are reasonably available at Kendall Station. As noted above, EPA lacks access to the finances of Kendall Station in particular, and Mirant has declined to provide such information. By refusing to provide facility-specific financial information, Mirant has forfeited any argument that EPA must focus on the long-range profitability of Kendall Station in particular. See Responses to Comments 2.19.1-2.19.3. Furthermore, given the relatively modest costs of the BTA technologies in question, it seems unlikely that these technologies would be economically unavailable to Kendall Station even if assessed based on facility-specific finances.

Comment 2.19.5

As examples of when EPA has conducted cost analyses at a level of depth, detail, and complexity that Mirant believes is necessary, Mirant specifically cites the permit proceeding for Brayton Point Station, and the development of the national Phase I and II rules.

Response to Comment 2.19.5
EPA disagrees with the comment. First, as a matter of law, under the analogous BAT standard, "[n]umerous courts have held that, while the Agency must consider costs in assessing BAT, it need not perform a cost-benefit analysis, *nor is there a specific formula that the Agency must use in considering costs*." *Dominion*, 12 E.A.D. at 545 (emphasis added). Second, the level of complexity, depth, and detail of cost analysis appropriate for a particular decision depends on the nature of the decision. The Phase I and Phase II Rules were national regulations applicable to

---

[7] EPA does *not* make this point to suggest that, because some other facilities have upgraded their CWISs, therefore Mirant should too. This is a site-specific BPJ determination that does not depend on such considerations. Rather, EPA notes this simply to refute the implication that Kendall Station alone is burdened by the costs of section 316(b) of the Clean Water Act.

hundreds of facilities. The permit for Brayton Point Station required retrofitting a one-billion MGD facility with a 72-cell closed-cycle cooling system, at a potential capital cost to the permittee of as much as *120 million dollars*.

EPA takes the compliance costs involved at Kendall Station (and all facilities) seriously, but it must be understood that they are an order of magnitude smaller than those at Brayton Point. For example, Mirant's preliminary estimate of the costs of a fine-mesh barrier net were $1.9 million in capital costs (along with $200,000 in annual O&M costs). *See* SOB at 38. Even if that estimated capital cost was understated by a factor of five, it would still be less than a *tenth* of the cost of the closed-cycle cooling retrofit at Brayton Point. (The other technologies evaluated in the SOB are more expensive than a barrier net, but the permit modification allows Mirant to choose any technology that satisfies the design and operational standards.)

Moreover, EPA expressly stated that the cost assessment that it developed for Brayton Point Station was not intended to be precedential:

> Indeed, EPA may have engaged in a more detailed, sophisticated assessment of benefits and costs than EPA has ever undertaken for the § 316(b) conditions for an individual NPDES permit. This work has been difficult, time-consuming, and expensive. These unfortunate by-products of more sophisticated analysis are, of course, compounded to some extent by the fact that complex analyses tend to prompt more complex comments which, in turn, take more time to consider and address. EPA has been mindful of the expenditure of public resources required to undertake this work, as well as the fact that this NPDES permit is long overdue (the current permit "expired" in July 1998) and the power plant continues to damage the ecosystem of Mount Hope Bay in the meantime. Nevertheless, EPA believes that the issues raised by this permit are extremely significant for the public and its natural resources as well as for the permittee. Therefore, the Agency has taken the time needed to conduct an analysis that is more than reasonable and appropriate under the applicable legal framework.
>
> *EPA would not necessarily repeat an analysis of this depth and detail for many other permits*, but EPA thinks it appropriate for the Agency to tailor the scope and type of analyses undertaken for case-by-case § 316(b) permit determinations to match the importance and type of issues presented. The analysis the Agency conducted here *was warranted by the facts of the case.*

Responses to Comments, Public Review of Brayton Point Station NPDES Permit No. MA0003654, at IV-17 to IV-18, *available at* http://epa.gov/ne/braytonpoint/pdfs/finalpermit/sectionIV.pdf (Oct. 3, 2003) (emphases added). It defies common sense to insist that the same type of economic study that EPA conducted for a closed-cycle cooling retrofit estimated at over a hundred million dollars is necessary or appropriate for every NPDES permit with CWA § 316(b) requirements. *See also* Response to Comment 2.7.9.

To be sure, the fact that Mirant is a smaller facility than Brayton Point means that it may have less revenue to offset costs of even substantially less expensive CWIS technologies. But the record available to EPA—as initially set forth in the SOB, and supplemented in these responses, but unfortunately *not* supplemented by Mirant—does not provide any evidence to suggest that Mirant could not afford to install and operate the technologies discussed.

Comment 2.20

Mirant argues that EPA is required to conduct a "cost-effectiveness" analysis, in which it would consider the costs of potential technologies and their relative effectiveness, and then determine and select the most cost effective of the available technologies. According to Mirant, a technology should not be imposed if it costs substantially more per year than another technology that would be nearly as effective. For instance, if it would cost an additional $500,000/year to implement a technology that is estimated to prevent the loss of just 20 or 30 equivalent adult fish as compared to the less costly technology, and if 20 to 30 fish are immaterial to the health of the populations in the Charles River (as they are), the Agencies should choose the less costly technology.

Mirant acknowledges that *Riverkeeper II* indicated that whether EPA should conduct a comparative analysis of the cost-effectiveness of different technologies may be optional. Mirant believes, however, that such an analysis is mandatory in the current circumstances where there is minimal AEI and there are such wide ranges of technologies and cost at issue.

Response to Comment 2.20

Mirant asserts that cost-effectiveness analysis is not merely *authorized*, nor even simply *advisable*, but actually *mandatory*.

At the outset, it is worth explaining what "cost-effectiveness" means under current law. "Cost-benefit analysis, like BPT, compares the costs and benefits of various ends, and chooses the end with the best net benefits. By contrast, cost-effectiveness considerations, like BAT, determine which means will be used to reach a specified level of benefit that has already been established." *Riverkeeper II*, 475 F.3d at 98.

According to *Riverkeeper II*, the appropriate methodology is to begin by identifying "the most effective technology that may reasonably be borne by the industry," which "constitutes the benchmark for performance," after which "EPA may then consider other factors, including cost-effectiveness, to choose a less expensive technology that achieves essentially the same results as the benchmark." 475 F.3d at 99-100.

Crucially, however, the *Rivekeeper II* court stated that "EPA is by no means required to engage in cost-effectiveness analysis. Indeed, to require the Agency to conduct cost-effectiveness analysis would transform such analysis into a primary factor in choosing BTA, which clearly is contrary to the technology-forcing principle that animates the CWA." *Riverkeeper II*, 475 F.3d at 99 n.12. In other words, the Court of Appeals has categorically rejected the assertion (made here by Mirant) that EPA is required to conduct a comparative analysis of the cost-effectiveness of different technologies.

In any event, because of the manner in which EPA has structured its BTA determination and the resulting conditions in the Draft and Final Permit Modification, cost-effectiveness analysis is unnecessary here. According to *Riverkeeper II*, cost-effectiveness analysis allows EPA to, when confronted with two technologies achieving essentially the same results, but at markedly different costs, select the cheaper option. In this case, however, EPA has identified the three most effective available technologies as reflecting the Best Technology Available, but has determined that *any* technology (including technologies, if any, not evaluated in the SOB) that meets specified design parameters, and is operated pursuant to specified operational parameters, will constitute the Best Technology Available. Mirant has complete discretion to select *any* technology that meets those parameters, for any reason whatsoever, including cost. EPA is *not* requiring Mirant to use the most expensive of the available technologies, such that Mirant may reasonably question whether the second-most-effective technology achieves "essentially the same results" at a markedly lower cost. Nothing in the Final Permit Modification prevents Mirant from choosing the least expensive technology that satisfies the design and operational standards. *See also* Response to Comment 2.7.7.

A simple thought experiment will demonstrate the non-necessity of EPA engaging in cost-effective analysis here. Suppose, hypothetically, that EPA commissioned a blue-ribbon panel of biologists, engineers, and economists to study the economics of cost-effectiveness, and the panel emerged with a report stating that a barrier net system at Kendall Station would cost $100 to save 99-101 fish, whereas an aquatic filter barrier at Kendall Station would cost $150 to save 100-103 fish. (Suppose further that the report's findings were undisputed, were not mired in delays, and were not another topic for appeal.) The outcome of this study on the Final Permit Modification would be precisely nil. EPA would not revise the Final Permit Modification to require Mirant to install a barrier net system (the cheaper but slightly less effective technology) and prohibit Mirant from installing an aquatic filter barrier (the more expensive but slightly more effective technology). Nor would EPA revise the Final Permit Modification to require Mirant to install an aquatic filter barrier (the slightly more effective technology) and prohibit Mirant from installing a barrier net system (the slightly less effective technology). To the contrary, EPA would continue to allow Mirant to select either of the two—or any other technology satisfying the design and operational standards. The cost-effectiveness study would have absolutely no effect on the permit conditions. The permit already allows Mirant to use the most cost-effective technology that meets the permit's design and operational standards.

Indeed, other than delay, the only discernable difference between EPA commissioning a cost-effectiveness study and EPA *not* commissioning such a study is whether Mirant or the public pays for a study to determine what will cost Mirant the least money.

In the past, Mirant has urged EPA to allow the company to evaluate several compliance options and then select the option that the company deems to most cost-effective:

> The [Phase II] Rule specifically provides that permittees will have substantial flexibility to evaluate and choose among five compliance options for achieving these performance standards. . . . The Phase II Rule contemplates that *permittees will have an opportunity to evaluate their compliance options and demonstrate compliance using the most cost-effective option or options*.

Mirant Comments on 2004 Draft Permit, Comment H2, at 94 (emphases added). To be sure, this comment was posed in a different context: Mirant's insistence that the permit allow Mirant to select among options under the now-suspended Phase II Rule. But the point remains: in the past Mirant urged EPA to allow the company to conduct its own cost-effectiveness analysis and give the company "an opportunity to evaluate [its] compliance options and demonstrate compliance using the most cost-effective option or options," yet now Mirant insists that the statute does not allow EPA to do just that. If allowing the company to evaluate multiple compliance options and select what it believed to be the most cost-effective was contrary to law and prejudicial to the permittee, it is doubtful that the company would have proposed it so vigorously in the past.

Since a cost-effectiveness analysis is not required by law, would have no effect on permit conditions, and would serve no public purpose, and the absence of such analysis causes no prejudice to the permittee, EPA has exercised its discretion not to perform such an analysis.

Comment 2.21
Mirant states that EPA must consider the non-water quality impacts of proposed BTA requirements, including in particular recreational and navigational uses of the Charles River. Mirant states that, as explained in detail in the comments in Part 4 of its comments, several of the technologies deemed acceptable in the SOB will involve significant adverse impacts on recreational and navigational users of the Charles River and the Broad Canal.

Response 2.21
EPA is authorized to consider, and has considered, the non-water quality impacts of proposed BTA requirements, including recreational and navigational uses of the Charles River and the Broad Canal. *See generally* Responses to Comments 2.2, 2.4. EPA's responses to specific comments are grouped with those specific comments. *See generally* Responses to Comments Section 4.

Comment 2.22
Mirant states that among the adverse non-water quality impacts of potential technologies, the Agencies must also consider the adverse impacts were the cost of BTA requirements to contribute to the closure of Kendall Station. Mirant has demonstrated previously in the record of these NPDES renewal proceedings that its ability to operate in the competitive regional electricity market will be drastically impaired if the in-stream thermal limits within the 2006 final Permit become effective. The Draft Permit Modification would pile on uncertain new costs, increasing the likelihood that the Station can operate only at a loss and therefore, will be shut down.

The closure of the Station would be bad for the environment in multiple ways. It is important for the Agencies to recognize, first, that Kendall Station does not just generate electricity, though that is its principal source of revenue. Kendall Station also supplies steam for the district heating and cooling system in Cambridge and Boston and, as a combined heat and power (CHP) facility, does so in an extremely efficient manner. Specifically, natural gas is used to fuel a combustion turbine that spins a generator that produces 170 megawatts (MW) of electricity – the equivalent of powering 170,000 homes. The "waste" heat from the combustion turbine is sent to a Heat Recovery Steam Generator ("HRSG"), in which steam is produced. This steam from the HRSG is sent to three steam turbines on-site that generate an additional 40 to 60 MW of electricity and process steam. The steam that is produced as a by-product of generating electricity is distributed as high quality, cost-effective energy to hundreds of commercial entities such as Massachusetts General Hospital. By capturing waste heat and recycling it into additional forms of energy, Kendall Station can operate at upwards of 60% efficiency, nearly twice the national average for a power generating facility. Increased efficiency saves money and fuel. Increased efficiency of energy utilization decreases the amount of fossil fuel consumed per unit of energy used and leads to a significant reduction in air emissions compared to conventional simple-cycle power plants.

Were Kendall Station shuttered, its steam customers would need to find alternative sources either by investing substantial capital costs, individual, less efficient and environmentally more impacting steam boiler operations or by turning to other sources that also are less efficient and emit more air pollutants per unit of steam output than Kendall Station. Additionally, the central location of Kendall to the load or usage center significantly reduces the electrical line losses inherent in transmission (approximately 8%). Eliminating electrical line losses by being proximate to the load center reduces the overall amount of electricity that needs to be generated, therefore reducing fuel consumption and emissions. Before issuing the final Permit Modification, the Agencies can and should consider whether and how the proposed modifications will cause adverse non-water environmental impacts by depriving the community of Kendall Station's CHP benefits.

Response to Comment 2.22
Mirant presents a "parade of horribles" that, it asserts, could ensue if the section 316(b) requirements of the Final Permit Modification forced the station's closure. The scenario Mirant paints in this comment is untethered to any record evidence whatsoever suggesting that the requirements of the Final Permit Modification could lead to station closure.

As a general matter, the CWA is technology-forcing:

> [T]he most salient characteristic of this statutory scheme, articulated time and again by its architects and embedded in the statutory language, is that it is technology-forcing. The essential purpose of this series of progressively more demanding technology-based standards was not only to stimulate but to press development of new, more efficient and effective technologies. This policy is expressed as a statutory mandate, not simply as a goal.

Natural Resources Defense Council, Inc. v. EPA, 822 F.2d 104, 123-24 (D.C. Cir. 1987). Moreover, "the Act's supporters in both Houses acknowledged and accepted the possibility that its 1977 requirements might cause individual plants to go out of business. They self-consciously made the legislative determination that the health and safety gains that achievement of the Act's aspirations would bring to future generations will in some cases outweigh the economic dislocation it causes to the present generation." *Weyerhaeuser Co. v. Costle*, 590 F.2d 1011, 1037 (D.C. Cir. 1978); *Am. Iron & Steel Inst. v. EPA*, 526 F.2d 1027, 1052 (3d Cir. 1975) ("[W]hile it is clear that the Administrator must consider cost, some amount of economic disruption was contemplated as a necessary price to pay in the effort to clean up the nation's waters, and the Administrator was given considerable discretion in weighing costs."); *cf. Am.*

Iron & Steel Inst. v. OSHA, 939 F.2d 975, 1002 (D.C. Cir. 1991) (noting similar potential outcomes under a different technology-forcing statute); *see also Union Elec. Co. v. EPA*, 427 U.S. 246, 269 (1976) ("Technology forcing is a concept somewhat new to our national experience and it necessarily entails certain risks.").

That said, in developing CWA § 316(b) requirements on a BPJ basis, EPA usually will not require a facility to install a technology if the facility cannot reasonably bear the costs. If EPA had a basis to conclude that Mirant could not reasonably bear the cost of a specific CWIS technology, EPA would likely remove that technology from consideration. *See* Response to Comment 2.18.1. This would be so regardless of Kendall Station's air emissions profile and commercial steam capacity (although EPA does not dispute Kendall Station's relative efficiency in these areas).

Mirant elected not to submit cost information to EPA. To be specific, the company submitted preliminary cost information, which it has now disavowed and claims EPA cannot use, but has declined to submit cost information which it would not object to EPA using. *See* General Response 2.04. Mirant, not EPA, is in the best position to judge Mirant's financial position; Mirant has the greater expertise in forecasting its fuel costs, electricity prices, commercial steam prices, labor costs, opportunity costs, value of the underlying land, and so forth. Mirant is also in a better position to judge the specific costs Mirant (as opposed to a generic facility) would incur in installing and operating the various technologies considered in the SOB. Yet Mirant declined to provide EPA with cost information, even after requesting and receiving an extension to the public comment period. *See* Response to Comment 2.19.

There is no evidence in the record suggesting that any of the technologies that would satisfy the proposed permit conditions cannot be reasonably borne by Mirant (and therefore would require the facility to close). The best reasonably available information suggests the contrary. Therefore, there is no reason for EPA to specifically analyze the resulting non-water-quality effects of this scenario.

Comment 2.23
Mirant objects that the SOB does not address the question of whether installation of the technologies it offers as potentially feasible would be able to be permitted. According to Mirant, any installation outside of the Broad Canal in the more actively used portions of the Lower Basin, and even any installations that hamper use of the Broad Canal, will face daunting obstacles to be permitted, and if permitted, are likely to involve hefty "compensatory mitigation" costs that cannot be predicted but will drive up the costs of CWIS modifications. Mirant states that, before issuing the final Permit Modification, EPA must determine that any required modifications can be permitted and permitted without unreasonable expense.

Response to Comment 2.23
EPA disagrees with the comment.

First, Mirant mischaracterizes the relevant legal standard. It is not unprecedented for a NPDES permit to require construction of a treatment facility, installation of a CWIS technology, etc., and for that additional technology to be potentially subject to permitting requirements beyond EPA's.

As a general matter, EPA agrees that if applicable law prohibits installation of a CWIS technology, or if a government agency whose permission is required in order to install that technology denies permission, then the technology is not "available." *See In re Dominion Energy Brayton Point, L.L.C.*, NPDES Appeal No. 07-01 (EAB, Sept. 27, 2007) (Order Denying Review) [hereafter "*Dominion II*"], slip op. at 36 ("[If the implementation of closed-cycle cooling towers at BPS would not be legally possible due to the noise impacts, then it may be unreasonable to consider it the best technology available."); *Dominion*, 12 E.A.D. at 700 ("[P]resumably, if a technology cannot legally be used because of its noise impacts, this could render said technology 'unavailable.'").

Mirant argues that "before issuing the final Permit Modification, EPA must determine that any required modifications can be permitted." However, it would be impossible to make such a determination because permitting agencies will not generally grant advisory opinions on how they would respond to a possible project in advance of an actual proposal. EPA is not required, in a NPDES permit, to demonstrate that permits will be granted by other permitting authorities for project for which permit applications have not yet been submitted. Rather, the only question EPA can reasonably be expected to address is whether compliance with the CWA § 316(b) conditions of the NPDES permit *will likely violate* applicable law. *See Dominion II*, slip op. at 41 (stating in dictum that "the imposition of closed-cycle cooling *likely will not result in an irreconcilable conflict* with the Massachusetts noise regulations") (emphasis added); *Dominion*, 12 E.A.D. at 702 (twice describing the relevant legal question as whether the technology "*will likely violate* Massachusetts' . . . regulations") (emphasis added). This is a very different burden than the one Mirant seeks to impose on EPA: to determine in advance that all permitting authorities with jurisdiction over a particular proposal will in fact grant the permit.

Second, in this case, EPA has no reason to believe that any of the technologies identified as satisfying BTA would likely result in an irreconcilable conflict with applicable federal, state, or local requirements. Indeed, Mirant has not identified any such irreconcilably conflicting requirements. Nor did any of the relevant potential permitting agencies identify any such conflicting requirements. (Copies of the public notice and draft permit modification were transmitted to, among others, representatives of MassDEP, MA CZM, MA DMF, MA Riverways, the Army Corps of Engineers, the City of Cambridge, and the MA Historical Commission. None informed EPA of any conflicting requirements.)

To be sure, it is possible that the design of any given technology might need to be adjusted to satisfy a particular permitting authority's requirements. But that is a reconcilable conflict, not an irreconcilable one. Indeed, Mirant's previous history attempting to obtain permits for a river-bottom diffuser indicates that it has been able to skillfully navigate multiple permit proceedings and successfully obtain a variety of permits for projects in the Charles River:

> [A]s part of the permitting for the upgrade, Mirant proposed to construct a new outfall and diffuser to the middle of the Basin as part of the upgrade. The pros and cons of the new outfall were reviewed through multiple public notice and comment proceedings, leading to the issuance of approvals to construct the outfall by every agency needing to provide its approval. Those include the Secretary of the Massachusetts Office of Environmental Affairs, the Energy Facilities Siting Board, the Cambridge Conservation

> Commission, the U.S. Army Corps of Engineers, the Massachusetts Office of Coastal Zone Management, and even DEP.

Mirant Comments on 2004 Draft Permit, Comment E1, at 70. Indeed, Mirant has in the past not been concerned with these requirements even with reference to CWIS technologies:

> Mirant recognizes that any change in its proposal to install a fine mesh barrier net might affect other permit requirements, such as the § 404 permit, the Water Management Act permit, the Conservation Commission OOC, Siting Board, Cambridge Planning Commission, and Chapter 91 and CZM approvals, which would have to be addressed before any alternative technology could be used. This should not foreclose consideration of other alternatives, however, as § 316(b) is the primary regulatory provision governing the CWIS.

Id. at Comment H7, at 99.

Moreover, Mirant states that required permits "are likely to involve hefty 'compensatory mitigation' costs that cannot be predicted," yet "EPA must determine that any required modifications can be . . . permitted without unreasonable expense." Since Mirant concedes that any such costs "cannot be predicted," it defies logic to suggest that EPA must (1) predict the costs that cannot be predicted, and (2) determine that the unpredictable costs will not be "unreasonable" – a term that appears to be completely untethered from any standard ever used by EPA (let alone approved by a court) for cost analysis under CWA § 316(b).

EPA has reviewed the federal and state legal requirements outside of NPDES permitting that could be applicable to installation of an aquatic organism exclusion technology and/or coarse mesh barrier net in the Broad Canal. (As explained above, EPA has determined that the cooling water intake structure must be located within the Broad Canal, and may not be located in the Lower Basin. *See* Response to Comment 4.12.) Based on this review, and in consultation with MassDEP, EPA has determined that none of these non-NPDES requirements are likely to result in an irreconcilable conflict. In short, notwithstanding the possibility of additional permitting transactions, these technologies remain "available" in the Broad Canal.

EPA reviewed the relevant authorities of the following federal, state, and local agencies: Army Corps of Engineers (including Section 10 of the Rivers and Harbors Act of 1899, Section 404 of the Clean Water Act, and the Massachusetts Programmatic General Permit); United States Coast Guard; Massachusetts Historical Commission; Cambridge Historical Commission; Cambridge Conservation Commission; Massachusetts Department of Environmental Protection (including Section 401 of the Clean Water Act, the Public Waterfront Act, and the Coastal Wetlands Restriction Act); the Massachusetts Environmental Policy Act (MEPA) Unit of the Massachusetts Executive Office of Environmental Affairs; Massachusetts Office of Coastal Zone Management (including Federal Consistency Review, Municipal Harbor Plans, and Designated Port Areas); Massachusetts Department of Conservation and Recreation; and Massachusetts Energy Facilities Siting Board.

As a result of this review, EPA determined that a cooling water intake structure to be constructed in the Broad Canal would or could require permits, licenses, or other forms of approval from the following entities: Army Corps of Engineers, Massachusetts Department of Environmental Protection, Massachusetts Historical Commission, Cambridge Conservation Commission, and Massachusetts Office of Coastal Zone Management.

Before discussing the individual authorities of these agencies, it is worth discussing navigational impacts. The proposed exclusion technologies would limit, to some extent, navigation or passage within the Broad Canal. The combination of the proposed public walkway (which is not subject to NPDES permitting), and a bounded induced flow system, could reduce the Canal's navigable width from its existing width of approximately 100 feet by approximately half.

However, in reality, impediments to navigation will likely be quite limited. First, the Final Permit Modification has been modified to explicitly prohibit location of an exclusion technology across the mouth of the Broad Canal in a manner that entirely obstructs navigation. *See* Response to Comment 4.12. Second, maritime use of the Broad Canal is already extremely limited. At the entrance to the Canal there are two drawbridges which, according to U.S. Coast Guard regulations, need not open for the passage of vessels. *See* 33 C.F.R. § 117.591(f). Clearance to pass beneath these bridges is approximately five feet. The Canal itself is narrow, provides no destination for maritime traffic, and includes no boat ramp or other means of entry for watercraft. While it is possible for small rowing shells, canoes and kayaks to access the canal, none of the proposed exclusion technologies would impede the navigation of such craft. Put differently, while it is possible for the installation of an aquatic organism exclusion technology to impede the navigation of certain larger vessels through the Canal, it is extremely unlikely that such vessels could (or would) enter the Canal even under present conditions. For this reason, EPA concludes that navigational impacts will be quite low.

Cambridge Conservation Commission
Installation of any of the cooling water intake structure technologies would likely require an Order of Conditions from the Cambridge Conservation Commission (CCC). The CCC is responsible for enforcing the Massachusetts Wetlands Protection Act, M.G.L. ch. 131 § 40, at the local level. Under the Wetlands Protection Act, projects affecting wetlands, including rivers and riverfront areas, are required to avoid impacts where possible and minimize and mitigate unavoidable impacts. The CCC would consider the environmental impacts of the project and, if appropriate, grant an Order of Conditions aimed at limiting those impacts. Mirant previously obtained an Order of Conditions for its barrier net pilot project. While the CCC has discretionary power to deny Mirant's proposal for the installation of exclusion technologies in the Basin, neither history nor any facts in the record suggest that it would. In sum, the requirements of the Final Permit Modification are not likely to result in an irreconcilable conflict with the Wetlands Protection Act.

Massachusetts Historical Commission
Installation of any of the cooling water intake structure technologies would likely require review by the Massachusetts Historical Commission (MHC) for compliance with Section 106 of the National Historic Preservation Act of 1966 and M.G.L. ch. 9, §§ 26-27C. Kendall Station is located within the Charles River Basin Historic District, which encompasses both banks of the

Charles River from Eliot Bridge to the Charles River Dam. The law requires an assessment of the effect of the proposed project on historic properties and the exploration of alternatives to reduce any impact. Installation of the exclusion technologies can be done with minimal impact to the historic seawall and is not likely to have adverse impacts on historic properties. *See* Response to Comment 4.16.2. Thus, the requirements of the Final Permit Modification are not likely to result in an irreconcilable conflict with Section 106 and state historical properties requirements.

Army Corps of Engineers
Installation of any of the cooling water intake structure technologies would likely require a permit under Section 10 of the Rivers and Harbors Act of 1899, issued by the Army Corps of Engineers (Corps), for installation of a structure in waters of the United States. *See* 33 U.S.C. § 403. If the project requires the discharge of dredged material, a permit might be required under either CWA § 404, 33 U.S.C. § 1344, or section 103 of the Marine Protection, Research and Sanctuaries Act (MPRSA), 33 U.S.C. § 1413, depending on where the aquatic discharge would occur. When considering the grant of a Section 10 permit, the Corps will engage in a public interest balancing of the benefits and detriments of the project (including conservation, economics, aesthetics, general environmental concerns, cultural values, flood hazards, navigation, shore erosion and accretion, recreation, water supply and conservation, water quality, energy needs, safety needs, and welfare of the people) and a permit will be granted unless the proposal is found to be contrary to the public interest. If the project requires a Section 404 permit, the Corps will evaluate the proposed activity to identify the Least Environmentally Damaging Practicable Alternative for handling the dredged material and will again undertake a public interest review. Each of these permits requires an assessment of the proposed action's environmental effects, a balancing of the benefits and detriments of the project and analyses of alternatives to limit the environmental impacts of the project. No element in the process represents an absolute bar to installation of any of the proposed exclusion technologies.

The results of the above permitting procedures cannot be forecast with certainty, but given the purposes of the CWIS technologies (i.e., compliance with the Clean Water Act and minimization of adverse environmental impact) and the low impacts of the technologies themselves as described in these Responses to Comments, EPA does not foresee any irreconcilable conflicts. Moreover, EPA provided a copy of the Draft Public Modification to the Corps at the outset of the public comment period, and the Corps did not provide any adverse comments. In sum, the requirements of the Final Permit Modification are not likely to result in an irreconcilable conflict with the Corps's Section 10 or Section 404 permitting requirements

MassDEP – Section 401 Water Quality Certification
If a Section 404 permit is needed, state water quality certification from MassDEP will be necessary. MassDEP reviews the proposed dredge and/or fill projects for compliance with Massachusetts Surface Water Quality Standards, 314 C.M.R. § 4.00, and the Massachusetts Wetlands Protection Act, M.G.L. ch. 131 § 40. These regulations have been coordinated with the Wetlands Protection Act. As a result, most projects approved by the local conservation commission, in this case the CCC, do not need further state review under the 401 Program. These projects are automatically certified when they obtain an Order of Conditions. Other project activities have been certified by the DEP through its certification of the Corps of

Engineer's Massachusetts Programmatic General Permit. *See* 314 C.M.R. § 9.03. If a project will result in a loss of no more than 5000 square feet of bordering and isolated wetlands and land under water or calls for dredging of less than 100 cubic yards, is otherwise in compliance with the Wetlands Protection Act, and has received a Final Order of Conditions, an individual 401 Water Quality Certification may not be required. *See id.* Thus, water quality certification may not required for the installation of the cooling water intake structure. That said, in light of MassDEP's close involvement in the development of this Final Permit Modification, EPA has consulted with MassDEP and, without predetermining the result of a Section 401 certification request, has determined that there are no known or reasonably foreseeable insurmountable obstacles to obtaining certification, should it be required. Consequently, the requirements of the Final Permit Modification are not likely to result in an irreconcilable conflict with a Massachusetts's Section 401 water quality certification.

MassDEP - Public Waterfront Act (MGL Chapter 91)
Installation of any of the cooling water intake structure technologies would likely require a Chapter 91 Waterways License from MassDEP. Under Chapter 91, projects are reviewed to ensure they: (1) do not unreasonably interfere with navigation, (2) are structurally sound, (3) provide a proper public purpose, (4) do not interfere with public rights or rights of adjacent property owners, (5) will not adversely affect natural resources, and (6) preserve Designated Port Areas (DPA) for maritime industrial use. The Chapter 91 regulations seek to prevent projects from causing significant interference with the public right of navigation and free passage in all waterways.

According to MassDEP, a cooling water intake structure to be constructed in the Broad Canal would be regulated as a water dependent accessory to an existing (water dependent) use. As explained above, navigation will be impaired, but only to a limited extent. The regulations give DEP discretion to determine what is a "significant" interference with navigation and to permit certain navigational interferences with mitigation. *See, e.g.,* 310 C.M.R. § 9.35(2)(a) (authorizing DEP to require "warning devices and other navigational aids as it deems appropriate to reduce interference with navigation").

Finally, there are no state harbor lines (which complicate construction of projects extending seaward from such lines) in the Broad Canal, and the harbor lines in the Charles River Basin would permit a project to extend seaward 20 feet from the existing seawall.

The other factors are unlikely to pose insurmountable problems. The cooling water intake structures would presumably be structurally sound; would likely provide a proper public purpose, i.e., environmental protection; would not interfere with public rights (except for the limited impacts to navigation in the Broad Canal discussed above) or rights of adjacent property owners; would aid, rather than adversely affect, natural resources; and would not affect any Designated Port Areas, since the Charles River Basin and Broad Canal are not in any such area.

Based on the above factors, EPA, in coordination with MassDEP, without predetermining the result of a Chapter 91 license application, has determined that there are no known insurmountable obstacles to obtaining a Chapter 91 license. Thus, the requirements of the Final Permit Modification are not likely to result in an irreconcilable conflict with Chapter 91.

Massachusetts Office of Coastal Zone Management
The Massachusetts Office of Coastal Zone Management (MACZM) conducts Federal Consistency Review of federal activities conducted in the Massachusetts coastal zone. Pursuant to the Coastal Zone Management Act of 1972, as amended, 16 U.S.C. §§ 1451 *et seq.*, 15 C.F.R. § 930, and the Massachusetts Federal Consistency Review Procedures, 301 C.M.R. § 21.00, the state reviews federal activities in the coastal zone to ensure consistency with the enforceable policies of the federally approved state coastal zone management program. Consequently, any project in the coastal zone operating under a federal license or receiving federal funds must be approved by MACZM.

MACZM has determined that the Final Permit Modification is consistent with its enforceable program policies. *See* Response to Comment 1.6; AR 775.

Additional MassDEP Response to Comment 2.23
[MassDEP provided the following additional information to EPA, which EPA adopts in full as a portion of its response to Comment 2.23.]

The Department of Conservation and Recreation (DCR) has authority under M.G.L. c. 92, § 33 to issue permits for commercial uses of land under its jurisdiction. DCR has jurisdiction over the Charles River Basin. MassDEP has reviewed the concept of the exclusion technology with officials from DCR, and MassDEP has been informed by DCR counsel that construction and installation of the exclusion technology described in the permit will not require a permit from DCR. Because the Final Permit Modification will require that the exclusion technology not block navigation into and up through the Canal, it is not likely to result in an irreconcilable conflict with DCR's permitting requirements.

The Massachusetts Environmental Policy Act (MEPA) Office in the Massachusetts Executive Office of Environmental Affairs conducts environmental impact reviews of certain projects requiring state agency action under G. L. c. 30, § 61. In addition, the Energy Facility Siting Board has authority under G.L. c. 164, § 69J to require a project applicant to obtain approval for construction of proposed facilities. Given the scope of the previous review of Mirant's project by the MEPA Office and the Siting Board, it is reasonably likely that it will be sufficient for Mirant to simply notify the MEPA Office and the Siting Board of the proposed project change, without any further review, as the intent of the modification is to substantially reduce the adverse environmental impacts of a previously reviewed project.

It also appears unlikely that dredging would be required to install the structure and standard time of year and work in water conditions for construction activities would be imposed under the federal Clean Water Act and Massachusetts water quality certification regulations. There is no reason to presume that the project would not meet the applicable wetland's regulatory performance standards applied through the City of Cambridge Conservation Commission. The short term impacts from construction would be more than offset by the anticipated improvement of water quality to the benefit of aquatic organisms from the operation of the exclusion technology.

Comment 2.24
Mirant notes that it is required to construct a public walkway within the Broad Canal. Mirant has proposed an integrated system of public walkways in the canal, boat landings and a pocket park that will substantially enhance and foster recreational activities in the Canal. Mirant states that EPA is required to consider the walkway requirement and the design and engineering constraints that it may impose upon technological choices under CWA § 316(b). Mirant states that it addresses those constraints in other comments.

Response to Comment 2.24
The anticipated presence of a public walkway is not necessarily determinative of the BTA in this case, but EPA has considered Mirant's obligation to construct a walkway, and any design or engineering implications that it might have for CWIS technologies, based on the specific comments raised. *See* Response to Comment 4.3. EPA concludes that the requirements of Permit Modification can be complied with at the same time that the walkway requirements are satisfied.

Comment 2.25
Mirant argued in its comments on the 2004 draft permit that the Massachusetts Water Quality Standards were not applicable to CWIS because the Mass WQS contained no standards applicable to the intake of water as distinguished from discharges of wastewater. The Agencies disagreed, relying on general language in the Mass WQS. Nonetheless, MassDEP proceeded to amend the Mass WQS to attempt to fix the problem. See 314 CMR 4.05(3)(b)2.d., effective December 29, 2006, which added a new subsection just baldly stating that MassDEP "has the authority" to condition a CWIS to ensure the withdrawal activity complies with the MassWQS. Even as amended, however, the Mass WQS do not provide any authority for either MassDEP or EPA New England to regulate the CWIS under those MassWQS. First, as to EPA New England, amendments to the Mass WQS are not "applicable" under CWA S 401(a)(1) until they have been approved under CWA § 303. As EPA has not yet approved the amendments, see A.R. No. 694, they provide no authority to EPA New England. Second, the amendments are not authorized by Massachusetts law because the Massachusetts Clean Waters Act, M.G.L. c.21, §§ 26-53 does not provide MassDEP with authority to regulate intakes. Mirant notes that the question of MassDEP's authority is under litigation in Entergy Nuclear Generation Company v. Massachusetts Department of Environmental Protection, Suffolk Super. Court, No. 07-0366-H. Third, even were the amendment applicable, a bare assertion of authority does not provide any meaningful standards. The MassDEP regulations still provide no guidance whatsoever to MassDEP, to EPA New England or to permittees concerning what technologies are necessary for a CWIS to meet the Mass WQS. Nor has MassDEP promulgated any policies or guidance on the matter. Accordingly, the Mass WQS provide no authority and no meaningful basis for determining what requirements are needed in the final Permit Modification.

Comment related to Comment 2.25 from Yan Au of CLF
We agree with MassDEP and EPA that the Massachusetts (water) quality standards should apply to the cooling water intake structures.

Response to Comment 2.25 and related comment

EPA agrees with CLF (and MassDEP) that the Massachusetts water quality standards apply to Kendall Station's cooling water intake structures. *See* SOB at 23-25.

Both MassDEP and EPA have long interpreted Massachusetts's water quality standards as applicable to cooling water withdrawals. *See generally Dominion*, 12 E.A.D. at 619-41; SOB at 24-26. Massachusetts's December 29, 2006 amendments to the Massachusetts WQS, in addition to clarifying the state regulations, confirm the reasonableness of EPA's previous interpretation. With respect to formal approval, EPA is still reviewing the state's submission of its December 29, 2006 amendments to the Massachusetts WQS. SOB at 26. As noted in the SOB, however, on July 29, 2007, EPA provided a letter to Massachusetts stating that "there is nothing in the CWA that prohibits MassDEP from adopting and enforcing WQS related to CWISs to ensure that water withdrawals are conducted in a manner that protect[s] designated and existing uses and compl[ies] with narrative and numeric criteria." *Id.* (quoting Letter from Stephen S. Perkins, EPA, to Arleen O'Donnell, MassDEP (July 29, 2007), at 3). Moreover, since EPA agrees with Massachusetts's interpretation of its pre-December 29, 2006 water quality standards as applicable to cooling water withdrawals, 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.

EPA does not agree with Mirant's claim that the Massachusetts WQS (before or after the December 29, 2006 amendments) do not provide meaningful standards or are too vague to apply. States are authorized to apply designated uses and narrative water quality criteria to their water bodies, and when they do, EPA must ensure that NPDES permits include any requirements necessary to achieve such narrative criteria and designated uses. *See* 40 C.F.R. §§ 122.44(d)(1), 131.3(b), 131.11(b)(2); *see generally Am. Paper Inst. v. United States EPA*, 996 F.2d 346 (D.C. Cir. 1993). Moreover, the Supreme Court has expressly upheld the validity of enforcing water quality standards' narrative criteria and/or designated uses, and not solely with regard to the effects of the discharges that may trigger the CWA § 401 process. *See PUD No. 1*, 511 U.S. at 718 (generally), 723 (upholding state certification conditions to protect designated use of fish habitat), 714-718 (rejecting arguments that a state may only require compliance with specific criteria). Neither the CWA nor EPA regulations require states to adopt "policies or guidance" to further explain narrative criteria or designated uses in order to make them enforceable. Moreover, EPA has extensive experience applying narrative water quality standards and designated uses to develop NPDES permit conditions, including experience applying the Massachusetts WQS to CWISs for power plants in Massachusetts, such as Brayton Point Station and Mirant's own Canal Station.

Comment 2.26
[Mirant makes seven distinct points in this comment, which argues that the Draft Permit Modification is defective because it does not propose a specific location or technology for required CWIS modifications. For purpose of clarity, EPA has subdivided the comment into comments 2.26.1-2.26.7, and organized its responses accordingly. Cross-references to "Response to Comment 2.26" elsewhere in the document refer to the responses 2.26.1-2.26.7 collectively.]

Comment 2.26.1

The Draft Permit Modification does not actually propose a specific location or technology for required CWIS modifications, and does not establish any quantitative standard for reductions in IM/E. Rather, it identifies several technologies and locations that it claims might constitute BTA under its proposed "design standards." If issued as a final Permit Modification, the actual decisions about location and technology would be determined only after the modification became effective and beyond review as a permit requirement. The SOB presents that approach as providing "flexibility" to Mirant to select and implement what it, the permittee, "determines is the most appropriate technological option available" to meet the proposed design standards.

Response to Comment 2.26.1
As background, is worth noting that in its comments on the 2004 Draft Permit, Mirant stated:

> Mirant does not believe that . . . the statute . . . allow[s] EPA to dictate the location of [the] CWIS. Rather, . . . EPA's charge is to set standards for minimizing adverse environmental impact, and those standards must be based on the "best technology available" with respect to location and the other statutory factors. Permittees are free to meet those standards in any way they choose, however.

Mirant Comments on 2004 Draft Permit, Comment H23; *see also* Response to Comments on 2004 Draft Permit, Response to Comment H23, at H49. Of course, those comments were based on the legal understanding at the time, which has changed, and, as Mirant has noted, it is free to change its position. *See* Response to Comment 1.3.

Mirant objects that "the actual decisions about location and technology would be determined only after the modification became effective and beyond review as a permit requirement." But it would be *Mirant*, not EPA, that would make those decisions. For example, consider the "actual decision[] about . . . technology." Since Mirant is free to choose any technology that satisfies the design and operational parameters specified in the permit – and subject to comment and potential appeal – the fact that it can make this decision after the modification becomes effective and beyond review as a permit requirement causes it no harm whatsoever. It is free to choose whichever technology—barrier net, aquatic filter barrier, wedgewire, or otherwise—that meets those standards. Moreover, nothing in the draft or final permit modification forced (or continues to force) Mirant to make the "actual decision[] about . . . technology . . . after the modification [becomes] effective and beyond review as a permit requirement." Mirant is free to make those decisions now, if it so chooses. (Regarding location, the Final Permit Modification specifies that the aquatic organism exclusion technology must be placed within the Broad Canal. *See* Response to Comment 4.12.)

Mirant also objects that the permit modification "does not establish any quantitative standard for reductions in IM/E." EPA agrees that the permit modification does not establish any quantitative standard for reductions in IM/E. However, neither section 316(b) nor any provision of law requires CWIS requirements to consist of quantitative standard for reductions in IM/E. Section 316(b) requires EPA to "require that the location, design, construction, and capacity of cooling water intake structures reflect the best technology available for minimizing adverse environmental impact." 33 U.S.C. § 1326(b). The statute does not, however, specify a particular method by which those requirements must be expressed, so long as they "reflect the best technology available."

Over the past four decades, several general approaches have emerged for specifying BTA requirements. First, EPA can identify which CWIS technology or technologies reflect the Best Technology Available at the particular facility, and specify that the permittee must use that particular CWIS technology or technologies. In that scenario, the permittee must use the specified technology—period. This technique is typically used where the permittee proposes a particular technology and EPA agrees that the permittee's proposal reflects the Best Technology Available for that facility; in such cases, EPA may specify permit conditions requiring use of the particular technology that the permittee has proposed. The fact that other technologies might also reflect BTA is irrelevant in such a circumstance—where EPA and the permittee agree that a particular technology satisfies BTA, it is perfectly appropriate to frame the permit conditions in terms of that particular technology.

Second, EPA can identify which CWIS technology or technologies reflects the Best Technology Available, determine the impingement and/or entrainment reduction that would be achieved by use of that CWIS technology, and specify a *biological impingement/entrainment-based* performance standard, i.e., reduction of impingement and/or entrainment by percentage from some baseline, that the permittee must meet. *See generally Riverkeeper II,* 475 F.3d at 105-08 (discussing numerical performance standards in Phase II Rule); 40 C.F.R. § 125.94(b) (suspended Phase II Rule specifying BTA via percentage reductions in impingement and entrainment). In that scenario, the permittee can select any technology that achieves those numerical performance results. EPA has long maintained, however, that CWA § 316(b) does not *require* permit conditions to be expressed in terms of such performance standards. *See Decision of the General Counsel No. 41,* at 203 ("[T]he statute does not require that these cooling water intake structure regulations be expressed in terms of a level of performance which specifies the degree of adverse environmental impact, attributable to the intake structure, which is tolerable.").

Third, EPA can determine which CWIS technology or technologies reflects the Best Technology Available; identify the *technical parameters* (e.g., engineering characteristics such as capacity, mesh size, or intake velocity) that characterize that technology or technologies; and then frame permit conditions in terms of those technical parameters governing the optimal location, design, construction and capacity of the CWIS. *See generally Decision of the General Counsel No. 41,* 202-03. In that scenario, the permittee can select any technology that meets those technical parameters. *Cf. NRDC v. EPA*, 822 F.2d 104, 122-23 (D.C. Cir. 1987) (noting the difference between "dictat[ing] that a specific treatment technology be employed" and "require[ing] that a system be operated as designed and according to the conditions of the NPDES permit," and observing that, while the Act permits EPA to apply the first method, the second method is more consistent with Congress's intent as evinced by legislative history).

The third technique—specification of the technical parameters—is probably the most prevalent. For example, EPA's regulations and permits that have determined closed-cycle cooling to be BTA do not actually require the facility to install closed-cycle cooling. Instead, they require reduction of flow (capacity) to a level commensurate with that which can be attained by closed-cycle cooling. *See, e.g.,* 40 C.F.R. § 125.86(b)(1)(i); *Decision of the General Counsel No. 41,* at

203. In such circumstances, the permittee may comply via any method that results in this flow reduction, including, e.g., reusing or recycling water withdrawn for cooling purposes in subsequent industrial processes. *See id.* § 125.86(b)(1)(ii). EPA considers any such flow reduction, no matter how achieved, as "reflecting" the Best Technology Available for minimizing adverse environmental impact. *See* Proposed Phase I Rule, 65 Fed. Reg. at 49,087 ("Facilities that reuse 100 percent of the water withdrawn from waters of the U.S. for cooling purposes would be considered to have achieved the flow reduction requirements (i.e., reduce intake flow to a level commensurate with that which can be attained by a closed-cycle recirculation cooling water system that has minimized makeup and blowdown flows)."); *Decision of the General Counsel No. 41,* at 203 ("If the capacity of an intake structure is so restricted, the adverse environmental impact of the intake structure will have been minimized to a given level regardless of whether the company installs a cooling tower. That is, the limitation on intake volume—not the cooling towers—protects the endangered aquatic organisms."); *cf. NRDC v. Costle*, 568 F.2d 1369, 1380 (D.C. Cir. 1977) ("[W]hen numerical effluent limitations are infeasible, EPA may issue permits with conditions designed to reduce the level of effluent discharges to acceptable levels. This may well mean opting for a gross reduction in pollutant discharge rather than the fine-tuning suggested by numerical limitations. But this ambitious statute is not hospitable to the concept that the appropriate response to a difficult pollution problem is not to try at all.").

The Final Permit Modification here makes use of this third technique: it specifies technical parameters that can be satisfied with at least three technologies (barrier net, aquatic filter barrier, or wedgewire screen). EPA decided not to write the permit conditions via the first technique (requirement of a specific technology) because the three technologies would achieve essentially equivalent results and EPA does not have a sufficient basis to require one and prohibit the other two. Furthermore, EPA decided not to write the permit conditions via the second technique (numerical performance standards) because the precise impingement and entrainment reductions achievable at Kendall Station by any of the identified technologies can neither be predicted nor guaranteed. *See* SOB at 6 ("Because of unavoidable uncertainty about exactly how these technologies will perform at Kendall Station, no specific numeric standard is imposed for the reduction of either entrainment or impingement mortality . . . ."); Response to Comment 2.7.5; *see also* Final Phase II Rule Preamble, 69 Fed. Reg. at 41,600 (noting "the uncertainty inherent in predicting the efficacy of any one of these technologies," including but not limited to "higher mortality rates at sites where there may be more fragile species that may not have a high survival rate after coming in contact with fish protection technologies at the cooling water intake structure"); *Decision of the General Counsel No. 41,* at 203 ("Nor is it clear how compliance with a standard so expressed [i.e., numerical performance standards] could effectively be monitored and enforced.") Instead, EPA decided to write the permit conditions by specifying the technical parameters governing the optimal design of the CWIS aquatic organism exclusion technology. This is legal under section 316(b), consistent with EPA practice, and reasonable under the circumstances here. Indeed, this approach is consistent with Mirant's own comments suggesting that the extent to which aquatic organisms will survive being caught on the exclusion technology is unclear and that, as a result, a performance standard requiring a particular rate of survival would be inappropriate.

Comment 2.26.2
In other words, the Agencies have not proposed BTA; instead they have proposed general design standards - "gentle removal" and inducing a constant "sweeping" flow in flow-challenged waters - that would not be fleshed out until the permittee becomes subject to largely unreviewable enforcement proceedings.

Response to Comment 2.26.2
In response to comments, EPA has replaced the "gentle removal" requirement. *See* Response to Comment 4.24.1.

The requirements of the Final Permit Modification are sufficiently precise to inform the permittee of its obligations. Where Mirant has specifically commented that a provision of the Draft Permit Modification was unduly vague, EPA has clarified the provision in the Final Permit Modification. *See, e.g.,* Response to Comment 4.38.2.

The comment's reference to "largely unreviewable enforcement proceedings" is baffling. EPA administrative enforcement proceedings before an Administrative Law Judge are subject to review before the Environmental Appeals Board, and, if the Board renders a final decision unfavorable to Mirant and Mirant chooses to appeal, the United States Court of Appeals for the First Circuit. Civil enforcement proceedings initiated in the United States District Court for the District of Massachusetts are, of course, subject to review by the assigned district judge, and the district court's decision would be subject to review in the United States Court of Appeals for the First Circuit. *See also* Response to Comment 2.27. While there is no pre-enforcement review of an EPA non-penalty administrative compliance order issued under CWA § 309(a), judicial review occurs if and when EPA goes to court to enforce the order.

Comment 2.26.3
These are not well-established good design standards commonly known and understood by environmental engineers. These are unprecedented, confessedly innovative and challenging, and likely unachievable standards that the proposed Permit Modification would make enforceable as effluent limitations in a NPDES permit, subject to the full panoply of criminal, civil and administrative remedies under the CWA and its state counterparts.

Response to Comment 2.26.3
The "gentle removal" requirement has been replaced. *See* Response to Comment 4.24.1. The "sweeping flow" requirement is an example of transfer technology—an innovative application of a mature technology—and EPA's expert consultants have demonstrated that it is achievable. *See* Response to Comment 4.25. EPA agrees that non-compliance with permit conditions would potentially be subject to enforcement under the terms of the CWA.

Comment 2.26.4
That approach, however, is not appropriate and would be arbitrary, capricious and not according to law. First, it largely abdicates the Agencies' responsibility under CWA §§ 316(b), 402(a), 33 C.F.R. §§ 122.43(a), 122.44, and parallel state provisions to determine the requirements upon a discharge when issuing NPDES permits. On its face the SOB indicates it is leaving it to the permittee to determine the content of BTA, but that is the Agencies' duty, not the permittee's.

Response to Comment 2.26.4

Mirant argues that EPA's approach—specification of design and operational standards, rather than a requirement to install a particular CWIS technology—"largely abdicates the Agencies' responsibility . . . to determine the requirements upon a discharge when issuing NPDES permits" and "leav[es] it to the permittee to determine the content of BTA." This is both factually and legally inaccurate.

The SOB did *not* leave it to the permittee to determine the content of BTA. The SOB evaluated candidate technologies, determined that *four* of them would represent Best Technology Available when installed and operated pursuant to stated conditions, and specified those conditions. In the Final Permit Modification and this Response to Comments, EPA has replaced one of those conditions (gentle removal), modified two others (regarding uniformity of through-medium velocity, and bypasses), reaffirmed the validity of another (sweeping flow), and determined that one of the four technologies (aquatic filtration system) would in fact likely not be available at this time. Thus, the technologies that would satisfy the primary BTA requirement are (1) a 0.5mm-mesh barrier net, (2) a 0.5mm-mesh aquatic filter barrier (e.g., Gunderboom MLES), or (3) a 0.5mm-slot wedgewire screen. In each case, the technology must be sized appropriately to achieve a 0.5fps through-medium velocity, which is largely a function of surface area and total intake flow, and be accompanied by an induced sweeping flow. There is no mystery involved. Mirant is free to choose any of the above technologies. *Cf. NRDC v. Costle*, 568 F.2d 1369, 1380 (D.C. Cir. 1977) ("Of course, when alternative techniques are available, Congress intended to give the discharger as much flexibility as possible in choosing his mode of compliance.").

Mirant's insistence that EPA *reduce* Mirant's flexibility by narrowing down the list of complying technologies is puzzling. The Final Permit Modification allows Mirant to select from at least three choices that have been used at other power plants. It is difficult to comprehend how Mirant would be in a *better* position if EPA gave Mirant only *one* choice.

Indeed, Mirant has in the past *insisted* upon the sort of flexibility that the Draft Permit Modification allows and to which Mirant objects. In its comments on the 2004 Draft Permit, Mirant extolled the virtues of flexibility and a permittee's ability to select among compliance options:

> The [Phase II] Rule specifically provides that permittees will have *substantial flexibility to evaluate and choose among five compliance options* for achieving these performance standards. . . . The Phase II Rule contemplates that *permittees will have an opportunity to evaluate their compliance options and demonstrate compliance using the most cost-effective option or options*. . . . In short, *an opportunity to select among performance options* must precede and inform data collection efforts required by the Phase II Rule.

Comments of Mirant Kendall, LLC on Draft National Pollutant Discharge Elimination System Renewal Permit No. MA0004898 (Oct. 14, 2004), Comment H2, at 94 (emphases added). To be sure, this comment was posed in a different context: Mirant's insistence that the permit allow Mirant to select among options under the now-suspended Phase II Rule. But the point remains that Mirant has in the past urged EPA to allow it to select among options, but now insists that

EPA provide only one option. If allowing the company to evaluate multiple compliance options and select from among those options was neither legal nor rational, EPA doubts that Mirant would have proposed it so vigorously in the past. *See generally* Response to Comment 1.3.

Comment 2.26.5
Second, by not including the content of BTA, a final Permit Modification with such general design standards would deprive the permittee and other interested persons from seeking review of the actual content of BTA at Kendall Station, because that content would not be known until the permit became effective after all appeals were completed.

Response to Comment 2.26.5
EPA disagrees with this comment. The BTA in this case is based on particular technical parameters which have been subject to review and comment and which can be appealed. Moreover, under the terms of the Final Permit Modification, *Mirant* will select which technology to install, as long as it satisfies the permit's required technical parameters. It is exceedingly unlikely that Mirant will have an interest in obtaining judicial review of its own choice. (The permit modification does not include a process for EPA approval of Mirant's choice; Mirant may make any selection that satisfies the permit requirements, without needing to obtain further permission from EPA.) With respect to other interested persons, the fundamental structure of the permit modification—i.e., specification of design and operational parameters, with the permittee being able to install and operate any technology that satisfies those parameters—was submitted for public comment, and no party other than Mirant itself commented adversely on this flexible approach.

Comment 2.26.6
Third and even more perniciously, such a scheme would leave the permittee subject to enforcement under standards that have not been shown to be, and are not, attainable.

Response to Comment 2.26.6
As noted elsewhere in this Response to Comments, EPA agrees that some of the proposed conditions of the Draft Permit Modification (gentle removal, maintenance of through-medium velocity at all points and at all times, and a complete bypass prohibition) may not be technologically available at this time, and has revised those requirements accordingly in the Final Permit Modification. EPA has also demonstrated that the sweeping flow requirement is in fact attainable. Consequently, all of the standards of the Final Permit Modification are attainable and available at Kendall Station.

Comment 2.26.7
The risks of being deemed in violation of the permit would force the permittee to accede to whatever the Agencies belatedly determine constitutes BTA and to whatever schedules of implementation the Agencies enforce. In issuing the final Permit Modification, the Agencies accordingly must consider these and other comments and make the determinations as to location, technology and design specifically mandated under CWA § 316(b) and the NPDES permitting program.

Response to Comment 2.26.7
The comment seems to be based on the false impression that the permit modification provides for a further review step under which Mirant would, after the permit becomes effective, be subject to a "belated[]" EPA determination of BTA. Neither the Draft Permit Modification nor the Final Permit Modification contained, or even alluded to, anything of the sort. EPA has determined that the permit requirements reflect BTA. Put differently, any technology that satisfies the permit requirements is, by definition, the Best Technology Available. Mirant need not submit detailed plans and request EPA approval; to the contrary, Mirant can install the technology of its choice after the Final Permit Modification becomes effective. Put simply, Mirant appears to be objecting to a permit requirement that does not exist.

With respect to implementation schedules and administrative compliance orders, see Responses to Comments 2.26.2, 2.27.

Comment 2.27
Mirant requests that, whatever technologies are selected as BTA in the Final Permit Modification, the Final Permit Modification should incorporate a reasonable schedule and sequence for piloting and implementation of any modifications. Mirant states that EPA is authorized to include a compliance schedule in the permit under 40 C.F.R. 122.47.

Mirant specifically identifies several grounds for this request: (1) the need for pilot testing, (2) the need for non-NPDES related permitting from several federal, state and local regulatory agencies, and therefore the fact that immediate compliance will not be feasible at the time the final Permit Modification becomes effective, (3) the risk that, absent such a schedule, Mirant would become subject to immediate citizen suit enforcement and "unbearable pressures to accede to others' interpretations of the vague permit requirements," (4) the obligation of Mirant's parent company to report any material violations of environmental laws.

Response to Comment 2.27
NPDES permits may not require compliance schedules for CWA § 316(b) requirements. "The permit may, when appropriate, specify a schedule of compliance leading to compliance with CWA and regulations. . . . Any schedules of compliance under this section shall require compliance as soon as possible, *but not later than the applicable statutory deadline under the CWA*." 40 C.F.R. § 122.47(a)-(a)(1) (emphasis added). This is the case for cooling water intake requirements under § 316(b), just as it is for effluent limits under the CWA. The applicable statutory deadline for CWA § 316(b) derives from CWA § 301 and elapsed long ago—well before Mirant even submitted its permit renewal application in 1993. *See Cronin v. Browner*, 898 F. Supp. 1052, 1060 (S.D.N.Y. 1995) ("[T]he mandatory deadlines established in sections 301 and 306, are properly applied to regulations issued pursuant to section 316(b)."). "Insofar as . . . § 316(b) [does not] . . . specify a time limitation for the application of best technology available, the ultimate compliance date under § 316(b) is governed only by § 301(b)(2)(A) *which requires compliance not later than July 1, 1983*." *Decision of the General Counsel No. 41*, at 197 (emphasis added) (citing previous version of CWA § 301(b)(2)(A); subsequent amendments to the CWA extended the compliance date from July 1, 1983 to March 31, 1989).

Consequently, EPA's established practice has been to structure the permit to require immediate compliance, but then to issue an administrative order under CWA § 309(a). For example, in the Brayton Point Station permit, which required retrofitting to closed-cycle cooling, EPA explained in the Response to Comments:

> ***Compliance Schedule.*** It is obvious that BPS will need a certain amount of time to install the cooling system upgrades to enable it to comply with the new permit limits. The CWA, however, prohibits a compliance schedule from being included in the permit under the present circumstances. Therefore, the permit is written to require immediate compliance, but EPA expects to impose a reasonable compliance schedule in an Administrative Compliance Order issued pursuant to CWA § 309(a). It is important that compliance be attained expeditiously because of the environmental damage the plant's cooling system is causing and will continue to cause until the permit's limits are complied with. EPA and the MA DEP expect to discuss this compliance schedule further with the permittee. The Agency notes that the permittee has estimated a 47-month schedule to install the needed equipment, whereas EPA has estimated a 39-month schedule.

Responses to Comments, Public Review of Brayton Point Station NPDES Permit No. MA0003654 (Oct. 3, 2003), at I-6, *available at* http://epa.gov/ne/braytonpoint/pdfs/finalpermit/sectionI.pdf; *id.* at VI-2 ("The conditions in this Final Permit will be effective 60 days after issuance. Therefore, a compliance schedule will be needed. Since it is not appropriate to include such a schedule in the permit itself, EPA expects to include a compliance schedule in an administrative compliance order issued under CWA § 309(a). The Agency has authority to issue a compliance order under CWA § 309(a) either unilaterally or after negotiating a schedule with the permittee. EPA expects to try to negotiate a schedule with BPS."), *available at* http://epa.gov/ne/braytonpoint/pdfs/finalpermit/sectionVI.pdf. Shortly after the Board's final decision in that case, EPA did, in fact, issue a negotiated administrative compliance order that provided a 61-month schedule for construction, permitting, and testing of the closed-cycle cooling system.

Here, too, once the new final permit conditions become effective, EPA anticipates issuing an administrative compliance order (preferably negotiated, but unilaterally if necessary) with a schedule for implementing these BTA requirements. *See* SOB at 44. Issuance of such an order can accommodate construction, permitting, and testing. While EPA cannot comment on Mirant's reporting obligations under securities law, EPA notes that the owner of Brayton Point Station is also a publicly-held corporation.

Finally, EPA notes that the legal regime is somewhat different for permit conditions that derive from state water quality standards. "EPA may include a compliance schedule in a federally issued NPDES permit only when the state water quality standards or implementing regulations contain a provision authorizing such a compliance schedule." *In re D.C. Water & Sewer Auth.*, NPDES Appeal Nos. 05-02, 07-10, 07-11, 07-12, slip op. at 26-27 (EAB, Mar. 19, 2008); *In re Star-Kist Caribe, Inc.*, 3 E.A.D. 172 (Adm'r 1990), *modification denied*, 4 E.A.D. 33 (EAB 1992). The Massachusetts water quality standards allow, but do not require, compliance schedules. *See* 314 C.M.R. 4.03(1)(b) ("A permit may, when appropriate, specify a schedule leading to compliance with the Massachusetts and Federal Clean Water Acts and regulations.”). Because a NPDES permit *cannot* contain a compliance schedule for section 316(b) requirements, and *may but need not* contain a compliance schedule for compliance with Massachusetts water quality standards, in this instance the requirements are best harmonized by adhering to EPA’s general practice, i.e., issuing an administrative compliance order to define a schedule for construction, implementation, and testing.

3. COMMENTS ON ENVIRONMENTAL IMPACT

General Comment 3.0
[Section 3 of Mirant's comments begins with an un-numbered introductory paragraph. EPA has styled this as General Comment 3.0.]

In proposing the Draft Permit Modification, the Agencies have declined to conduct any more than a conclusory analysis of whether impingement or entrainment at Kendall Station actually is having a significant adverse environmental impact ("AEI"), just as they similarly declined in the Determinations Document and the Response to Comments that underlay the 2004 Final Permit. The Agencies' reticence to evaluate the significance of any AEI is particularly troublesome where (a) Mirant Kendall had made substantial submissions on the issue, based on extensive monitoring and analysis, and (b) the Draft Permit Modification would impose similar monitoring and analysis requirements as an annual permit requirement. The Agencies, as commented later, should not impose expensive monitoring and analysis requirements only to produce results they will refuse to assess on the record or ignore.

CWA § 316(b) and the requirements of a BPJ determination in issuance of a NPDES permit require the Agencies to assess the magnitude and nature of any AEI in a much more detailed way prior to determining the content of BTA. The following comments and the accompanying attachments provide a basis for that evaluation.

In particular, at Mirant Kendall's request, Normandeau Associates has prepared a report, the River Herring and White Perch Impact Assessment For Mirant Kendall Station (the "Normandeau Report"), based on Normandeau's assessment of the data and knowledge gained from its biological monitoring program since 1999. In preparing the final Permit Modification, the Agencies must consider and address each of the findings in the Normandeau Report as they affect the magnitude and nature of any AEI from impingement mortality and entrainment (IM/E) at the Kendall Station.

General Response 3.0
This comment is largely prefatory to specific comments to which EPA has responded in detail below. EPA also provides the following general response:

The central theme to the comments submitted by Mirant in Section 3 is that there is no (or is only a legally "de minimis") adverse environmental impact from impingement and entrainment at Kendall Station. As Mirant notes, it made largely the same argument in its 2004 comments on the Draft Permit. *See, e.g.,* Mirant Comments on 2004 Draft Permit, Comment H10. In its 2006 Response to Comments, EPA responded to a wide range of comments essentially raising the same points that Mirant raises in its Section 3 comments here. *See generally* 2006 Response to Comments, Section H. Since 2006, Mirant has submitted more recent data, and has recalculated projected impacts to the lower Basin under different assumptions.

While EPA has reviewed and responded in detail to each of the individual comments in this section, several recurring points bear emphasis, and apply to every comment in this section.

First, Mirant's argument must be set in the context that its current CWIS technology—an average flow generally equal to the flow of the entire lower Charles River Basin, and five times the flow of the river under low flow conditions; traveling screens with a 3/8" inch mesh; a through-screen velocity of approximately 0.9 fps; and a fish removal plan consisting of disposing of impinged fish three times per day—does not reflect the "best technology available" by any measure. *See* SOB at 7-13; Draft Permit Determination Document at 13. Thus, all the arguments claiming that the environmental impact of Kendall Station's CWISs is not "adverse," not "significant," or is "de minimis" must be read in this light. *See* General Response 2.03.

Second, as a legal matter, "adverse environmental impact" under section 316(b) is not defined in terms of any particular "significance" threshold, or scale (e.g., population as opposed to individual). *See* General Responses 2.02-2.03; Response to Comment 2.9; SOB at 18. The deaths of fish, eggs, and larvae by impingement and entrainment at Kendall Station constitute adverse environmental impact; they need not be "justified" as adverse by reference to some other measuring stick or conceptual category.

Third, neither EPA nor any court has ever decided to read a de minimis exemption into CWA § 316(b). The statute does not expressly state that such an exemption is or is not allowed. Moreover, even if such an exception is allowed, it is certainly not the case, as Mirant appears to believe, that, before taking any action, the agency has the burden of demonstrating that an impact embraced by the relevant statute is not de minimis. As a general matter, even when an agency interprets a statute as allowing an implicit de minimis exception, it does not mean that environmental effects are *presumed* to be de minimis; rather, an agency choosing to interpret silence as permitting a de minimis exception must demonstrate that an impact *is* de minimis in order to exempt it from otherwise-applicable statutory requirements. *See* General Response 2.03.

Fourth, many of Mirant's comments rely on the Normandeau Report. MassDEP has reviewed the Normandeau Report and its estimates of fish populations in the Charles River. The MassDEP Report found that the Normandeau Report contains a number of deficiencies that either artificially diminish the impact of the facility's intake and/or suggest that the river herring stock in the lower Basin was likely overestimated. *See* AR 756 (MassDEP Report). EPA has reviewed the MassDEP report and concurs with its assessment of the Normandeau Report. Consequently, many of the analyses and conclusions upon which the specific comments rely are unsupported.

Fifth, it is important to focus on the specific factual context. While the conditions of the Final Permit Modification (as of the 2006 Final Permit) are designed to be protective of all species in the lower Basin, river herring have been of primary concern throughout this permit proceeding. The depleted condition of river herring anadromous fish runs is of such concern that in November 2005, MA DMF instituted a three year moratorium under which it is "unlawful for any person to harvest, possess or sell river herring in the Commonwealth or in the waters under the jurisdiction of the Commonwealth." 322 C.M.R. § 6.17; *see also* 2006 RTC Response to Comment C6, at C36. During the summer of 2008, MA DMF held hearings to obtain public feedback regarding the continuation of this moratorium for an additional three years. On October 2, 2008, MA DMF's Marine Fisheries Advisory Commission approved continuation of the moratorium on directed fishery for river herring for another three years, through 2011. In its statement, MA DMF explained:

> The proposal and subsequent action to continue the direct fishery moratorium was necessitated by a lack of recovery of river herring runs in the region. There have been some modest increases in annual river herring counts in certain runs. Most runs, however, remain at depressed levels. An additional three years of closure will protect another generation of river herring.

AR 766.[1] In other words, the state generally prohibits the take of even *one* river herring. Thus, the impact of mortality on what might be considered a small number of fish in other systems is of much greater concern in the Charles River.[2]

Comment 3.1
Mirant Kendall has collected and counted all impinged fish since 1999, and has reported the results to the Agencies through the end of September, 2007. The most recent compilation of that series of data was submitted with the Charles River Monitoring Report - 2006 and 2007 Data, Figure IMP-1 found at A.R. 692. The SOB relies upon and does not dispute the validity of those data. SOB at pp. 10 to 11.

For the following reasons, each of which the Agencies should consider in issuing the final Permit Modification, the numbers of impinged fish are too small to cause any meaningful environmental impacts.

Response to Comment 3.1
This comment is prefatory to comments 3.1.1-3.1.5. EPA has responded in detail to each of those specific comments.

---

[1] *Also available at* http://www.mass.gov/dfwele/dmf/marinefisheriesnotices/2008/october_mfc_regulation_102408.htm.

[2] In its announcement that it would continue the moratorium, MADMF stated that it is still "studying the status of river herring and the reasons for the past declines, [with a f]ocus . . . on predation, by-catch in open water fisheries, poaching, and spawning habitat degradation." AR 766. The fact that this announcement did not specifically list Kendall Station's CWISs among topics for MA DMF study is of little or no significance. The task before EPA is not to determine the full list and relative extents of adverse impacts to river herring—many of which are entirely outside EPA's regulatory authority—but rather to prescribe technological requirements that reflect the best technology available for minimizing adverse environmental impact. See also Response to Comment 3.4.4.

In addition, with respect to each of comments 3.1.1-3.1.5, see Responses to General Comments 2.02-2.03.

Comment 3.1.1
First, the numbers are strikingly small by any measure. Annual totals ranged from 2125 impinged fish in 2000 - which preceded repowering of the Station - down to 125 fish in 2006 (and only 38 fish in 2007 through September). It is apparent from these data that the intake in fact does not draw in large numbers of fish, who if healthy are perfectly capable of avoiding the intake. This was evident during gillnet sampling in 2000, which showed large numbers of river herring within the Broad Canal early in the spawning run, very few of which were impinged.

The numbers of impinged fish rose only later in the season when the herring were weakened in the aftermath of spawning and river volumes were high.

Numbers of River Herring Captured By Gillnet in Broad Canal and Impinged on Kendall Screens, Spring, 2000

Date	Gillnet alewives	Impinged Alewives	Gillnet Bluebacks	Impinged Bluebacks
April 10-11	1	0	0	0
May 2-3	2	0	0	0
May 10-11	4	0	25	0
May 15-16	7	2	80	0
May 22-23	0	1	5	9
June 1-2	0	1	84	28
June 6-7	0	0	37	60
June 12-13	0	0	92	519
June 20-21	0	0	0	68

These data, showing a shift to greater impingement as the spawning run progressed, are consistent with the descriptions in the scientific literature of the weakening and high natural mortality rate of spawning river herring. For example, Cooper, 1961 (A.R. 359) documented extensive weight loss, and incidence of disease associated with his estimate of about 50% mortality during spawning of alewives in a Rhode Island stream. It is entirely reasonable to expect that the incremental impact of impingement mortality in the Spring season at Kendall Station is far less than the documented "body count," because that count includes many fish already dead from the stress of spawning.

There is also strong evidence that healthy Young-of-the-Year (YOY) river herring detect the intake flow and avoid impingement. These fish are readily observed in large numbers in the Broad Canal on summer evenings, and have been sampled on several occasions, in each case without incidence of impingement. For example, YOY alewives were collected in Broad Canal gillnets on August 2, August 16-17, and September 13-14 in 1999, with no impingement losses in the entirety of either of those months. Similarly, YOY bluebacks were collected in a push net in the Broad Canal on August 20, 2003, with no corresponding incidence of impingement mortality. It is estimated that thousands of YOY herring have been in the Broad Canal regularly since re-powering, with fewer than ten impinged.

The SOB makes no effort to suggest that numbers that low have any appreciable impact on the overall populations of the species of concern in the Charles River, presumably because the Agencies know the data do not support that showing.

Response to Comment 3.1.1

1. Mirant states that "the numbers are strikingly small by any measure." Implicit in this comment is Mirant's view of what numbers are "large" and what numbers are "strikingly small." For example, in the year 2000, Mirant disposed of 2,125 fish that were impinged on its intake screens.[3] Mirant believes this to be a "strikingly small" number of fish for the company to be removing from the river. However, EPA does not agree with this conclusory characterization, and the comment does not explain why 2,125 must be considered "strikingly small by any measure." (Although the comment focuses on 2000 data, the same reasoning applies to the other years evaluated. See SOB at 11.)

Indeed, Mirant contradicts its characterization by stating that that "gillnet sampling in 2000 . . . showed *large* numbers of river herring within the Broad Canal early in the spawning run." (Emphasis added). The table in Comment 3.1.1 shows that, in 18 sampling days over a ten week period in the spring of 2000, 688 river herring were impinged—a number that is apparently "strikingly small" in Mirant's view. According to the same table, gillnet sampling showed 119 river herring in the Canal during the sampling days from April 10 through May 16, and 218 river herring in the Canal during the sampling days from May 22 to June 21 (a total of 337 river herring)—numbers that are apparently "large" in Mirant's view. This contradiction (that 337 is "large" but 688 is "strikingly small") simply illustrates the arbitrariness of Mirant's "strikingly small" characterization.

When discussing impingement mortality numbers in absolute terms, the status of fish in the Charles River must be considered. Currently, the depleted condition of river herring anadromous fish runs is of such concern that MA DMF has promulgated a moratorium under which it is "unlawful for any person to harvest, possess or sell river herring in the Commonwealth or in the waters under the jurisdiction of the Commonwealth." 322 C.M.R. § 6.17; General Response 3.0; *see also* 2006 Response to Comments, Response to Comment C6, at C36.

2. Mirant also suggests that impingement at its CWISs is limited to fish that are "weakened in the aftermath of spawning." While Mirant provides no evidence to support this theory (the record does not contain any evidence indicating that Mirant has ever attempted to assess the condition of fish immediately preceding their impingement), EPA

[3] The comment cites a figure of 2,125, but an examination of a data file submitted by Mirant in April of 2006 [Kendall Station Impingement Data.xls] shows a total of 2,145. Without deciding which number is more accurate, EPA has cited the lower number in this response, but the points in EPA's response apply *a fortiori* if the higher number that Mirant previously submitted to EPA is in fact correct.

acknowledges that the theory is at least plausible in theory. There is, however, a boundary between the realm of what is unsupported but plausible, and what is pure speculation. The statement that "the documented 'body count' . . . includes many fish already dead from the stress of spawning" falls into the latter category. Mirant has provided no evidence to support this conjecture—as noted above, Mirant has not even attempted to assess the health of fish before they become impinged—and EPA is aware of none.

Moreover, EPA does not agree that the existence of cumulative stressors (including natural stressors) would necessarily lead to the conclusion that the effects of the facility's CWIS can be ignored. Even assuming *arguendo* that the only fish that become impinged are those that are already weakened, in the absence of Mirant's CWIS those fish might be weakened and in the river, rather than dead and discarded. A fish in a stressed condition stands a better chance of survival if its chances of being impinged are greatly reduced or eliminated through the use of the Best Technology Available for minimizing adverse environmental impact.

3. Mirant states that "healthy Young-of-the-Year (YOY) river herring detect the intake flow and avoid impingement." The through-screen velocity at the CWIS is approximately 0.9 ft/sec, well above the 0.5 ft/sec recognized by EPA as protective of adult and juvenile fish. *See* Response to Comment 4.10.4; 66 Fed. Reg. at 65,274. EPA acknowledges that some river herring in the vicinity of the Broad Canal may be able to detect this elevated intake flow. Whether most or all healthy YOY fish are able to *avoid* the flow, once they detect it, is a matter upon which the record contains little or no direct evidence. At any rate, any fish that detect the elevated intake flow yet are unable to avoid it will stand a much greater risk of being impinged and subsequently killed than they would if the CWIS through screen velocity were 0.5 ft/sec or less.

4. Mirant states that the SOB fails to demonstrate that impingement losses at Kendall Station have any appreciable impact on the overall populations of the species of concern in the Charles River. EPA is not compelled to demonstrate that impingement losses at Kendall Station must have "appreciable impact on the overall populations of the species of concern in the Charles River." *See* General Responses 2.02, 3.0.

Comment 3.1.2
Also, the higher impingement years even within that data series are associated with particular events - not related to the Station - which led to an unusual number of weakened or already dead fish reaching the intake structures. For example, as Mirant Kendall has previously indicated to the Agencies, the 2005 numbers were inflated (more than 200 fish) due to a single event associated with a water line break in Cambridge in February 2005. The impingement numbers from 2000, upon which the SOB places great reliance, stem from June 11 and 12, 2000, when the Charles River experienced high pollutant loadings from high storm flows right at the time that blueback herring were in weakened, post-spawning condition. Dead or impaired fish that are collected in the intake structure but would not have survived anyway do not provide any basis for a finding of AEI due to impingement mortality.

Similarly, the highest incidence of impingement (about 300 river herring) in the post spawning period between June 10 and June 13, 2003, after repowering of the Station occurred. At this time the Charles River was receiving chlorinated run-off pollutant loads from a flow episode that remained between 600 and 800 cfs in the time leading up to and including those dates.

In issuing the final Permit Modification, the Agencies must explain why they would consider collection of already dead fish as indicative of impingement mortality.

Response to Comment 3.1.2
EPA understands that impingement events can be episodic and can be magnified by events not directly related to the operation of Kendall Station (e.g., storm events, cold fronts, or other anthropogenic activities in or surrounding the lower Basin). These events have happened in the past.

However, the nature of episodic events is that they can be expected to happen from time to time. Mirant cannot (and is not expected to) control when each of these events will take place in the future. The important point is that, although certain episodic conditions that increase the likelihood of impingement may be beyond Mirant's control, Kendall Station's current CWISs lack any protective features to minimize impingement events or even reduce impingement mortality under such conditions. In addition, efforts are under way to protect and enhance water quality and the health of fish populations in the Charles River. Increased fish spawning associated with the success of these efforts will likely result in greater numbers of river herring and other species that find themselves in the vicinity of the CWISs—including some in a post-spawning, weakened condition. Therefore, the absolute magnitude of impingement may change from its 1999–2007 levels. With no modification to the CWISs—which do not reflect the best technology available by any measure—future impingement events and the resulting impingement mortality have the potential to increase under these conditions.

EPA agrees that some environmental or anthropogenic conditions (such as pollutant loading from equipment malfunction, storm flows in the Charles River during and after spawning events, or abrupt changes in flow at the CWIS) likely played a central role in triggering large impingement events in the past. But such events may occur again in the future, triggering (under Kendall Station's current CWIS configuration) additional large impingement events at the facility intake. Other potential conditions, such as changes in ambient river temperatures over a short time period, predator/prey interactions, or the occurrence of a strong year class of fish in the lower Basin, could also increase the potential for impingement events at the CWIS.

These conditions are largely beyond the control of the permittee. But EPA is not required to imagine an alternative Charles River that never experiences "high pollutant loadings from high storm flows" or other "particular events." In the real world, an urban river is subject to an ever-changing set of conditions, any one of which might not be anticipated to recur each year, but which collectively mean that the unexpected is, in the aggregate, to be expected. In the absence of the best technology available for minimizing adverse environmental impact, such conditions may translate directly (and, historically, have translated directly) into fish mortality events. In EPA's judgment, the periodic recurrence of conditions that, absent protective measures, would favor increased impingement represents, in the long term, the norm, and EPA is entitled to consider those conditions as part of the whole. Under section 316(b), EPA is justified in requiring the best technology available for minimizing adverse environmental impacts in light of such expected conditions. *See also* 66 Fed. Reg. at 65,263 (noting that "cooling water intakes potentially contribute additional stress to waters already showing aquatic life impairment from other sources such as industrial discharges and urban stormwater"). Therefore, EPA rejects Mirant's suggestion to disregard these external events.

With respect to Mirant's assertion that fish impinged during such events were "already dead" and its counterfactual supposition that any fish not "already dead" at the time of impingement "would not have survived anyway" if they had not been impinged, see Response to Comment 3.1.1.

Comment 3.1.3

The numbers of impinged fish also are small by any relative measure. For example, the 2006 Final Permit requires Mirant Kendall to implement an annual gillnet sampling program based on the program that Mirant Kendall has implemented over several years (2002 to 2007). Part I.A.14(d)(2). Under that program, which has been conducted with all required regulatory approvals, Mirant Kendall's contractors have removed hundreds of river herring and white perch per year in numbers that range from 1.3 to 400 times higher by species than the number of that species impinged at the Station.

Comparison of Impingement and Gillnet Losses of River Herring and White Perch Year

Year	Impingement Losses River Herring	Gillnet Catch River Herring	Impingement Losses White Perch	Gillnet Catch White Perch
2003	285	446	252	230
2004	12	373	25	595
2005	6	520	279	196
2006	4	418	16	64
2007	5	328	10	128

It would be arbitrary and capricious for the Agencies to mandate expenditures of millions of dollars to eliminate impingement of fewer fish than the Agencies themselves require Mirant Kendall to remove annually through gillnet collections. In issuing the final Permit Modification, the Agencies must explain why it is sensible to take more fish for monitoring purposes than would be saved by modifications to the existing CWIS.

Further, the fact that the Agencies have imposed such permit requirements goes far to undercut any determination in the final Permit Modification that impingement of fewer fish is having any appreciable impact.

Response to Comment 3.1.3
Mirant's comment overlaps substantially with Comment 5.3. See Response to Comment 5.3.

EPA disagrees with the comment for two major reasons. First, the comment conflates Mirant's voluntary gillnet sampling program with the monitoring requirements of the still-not-in-effect 2006 Final Permit, and omits important details about those monitoring requirements. Second, the comment conflates biological monitoring, which can generate valuable environmental information, with impingement on the facility's traveling screens, which does not.

1. After submitting limited gillnet sampling data for the years 1999 and 2000 as part of its permit application, Mirant voluntarily initiated a gillnet sampling program in 2002. Gillnet sampling can yield useful biological data but unfortunately results in high mortality rates for fish captured. Neither gillnet sampling, nor any of the other specific sampling techniques that Mirant has employed to date, has been required by EPA or MassDEP. In fact, as explained herein, the fish mortality caused by Mirant's biological sampling during the extended time period of permit issuance and permit appeal is of concern to the resource agencies. Both before the issuance of the 2006 Final Permit, and during the two years since it issued but while it has remained stayed due to appeal, Mirant has been free to explore less-destructive sampling techniques designed to collect comparable data while greatly reducing or eliminating fish mortality.

In fact, the 2006 Final Permit *requires* Mirant to explore less-destructive sampling techniques and, if they generate comparable data with less fish mortality, to switch to such techniques instead. Mirant alludes to the gillnet sampling requirement of Part I.A.14.d.2 of the 2006 Final Permit, but omits a crucial point: the provision (entitled "Gill and/or Fyke Net Sampling") provides:

> Gill nets . . . will be used *unless successfully supplanted by fyke nets*. . . . In addition to gill net samples, fyke nets will be anchored on the bottom of the Charles River to provide additional information on deep-water habitation by Charles River fish. *Fyke nets will be substituted for gill nets if program results indicate that equivalent data can be obtained*.

2006 Final Permit, Part I.A.14.d.2, at 25 (emphasis added). Similarly, Part I.A.14.d.5, which concerns river herring spawning migration monitoring, provides:

> At Lock Number 3, fish will be collected with continually attended small mesh gill nets *or trammel nets* set for reasonable periods of time. The passage of fish at the New Charles River Lock and Dam and the Watertown Dam Stations *may also be monitored using hydroacoustics or other techniques agreed to by EPA and MassDEP* . . . . *A program including suggested refinements and quality assurance of the hydroacoustic sampling methods described by the permittee in Exhibit A*

(River Herring Run Size Estimation) of the July 23, 2003 letter submitted to EPA would be acceptable.

Id. Part I.A.14.d.5, at 27 (emphasis added). Thus, it is misleading to cite the 2006 Final Permit's gillnet sampling requirement and imply that EPA is simultaneously requiring expensive CWIS upgrades to eliminate impingement mortality and forcing Mirant to conduct high-mortality gillnetting. To the contrary, while it is true that the 2006 Final Permit requires gillnet sampling as an initial matter, it specifically *requires* Mirant to also conduct much less destructive fyke net sampling, and to replace the gillnet sampling program with a fyke net sampling program if the initial fyke net results indicate that they provide comparable data. Indeed, during the two years that the 2006 Final Permit has been under appeal, Mirant could have supplemented its voluntary gillnet sampling with fyke net sampling and begun comparing the data, such that, by the time the permit actually goes into effect, it might not be necessary to conduct any gillnet sampling at all. The same argument applies to the Lock Number 3 sampling requirements, where the 2006 Final Permit, upon taking effect, allows Mirant to use *either* gillnets *or* much less destructive trammel nets, and also provides a non-destructive third option (hydroacoustics). In short, it is inaccurate to claim that EPA is requiring destructive sampling with mortality greater than that of impingement. The biological monitoring requirements of the 2006 Final Permit, combined with the CWIS requirements of the Final Permit Modification, are entirely consistent: they seek reduction in fish mortality caused by biological sampling (through the use of comparable, less destructive fish sampling) and by impingement at the CWISs (through the BTA requirements in this permit modification)

2. Even acknowledging that biological sampling may result in unavoidable fish mortality, such mortality is not commensurable with impingement mortality, and there is no force to Mirant's argument that mortality incurred through biological sampling should somehow release Mirant from its obligation to operate CWISs that reflect the best technology available for minimizing adverse environmental impact. Biological sampling provides vital information when conducted under a sound sampling plan that follows basic scientific principles and is designed to addresses a particular question. Regrettably, fish mortality can be a by-product of this sampling. In certain cases, fish mortality can be avoided or minimized while still satisfying the objective of the sampling plan. For example, estimating the number, size and species of fish along a shoreline may be achieved using a beach seine net, as the permittee has done in the Charles River. This sampling technique provides valuable data with minimal fish mortality. In other cases, fish mortality is an unavoidable consequence of the sampling technique. Agencies use biological data to support permit limits that meet regulatory objectives.

In this context, an associated level of fish mortality, which EPA acknowledges is a concern, may be nevertheless justified by the overall environmental objective. The objective of biological data collection in the NPDES permit is to answer a question necessary for effective implementation of the Clean Water Act in this and future NPDES permits for Kendall Station. It is inappropriate to compare fish mortality resulting from biological sampling to fish mortality from impingement at a cooling water intake structure. The facility using a CWIS does not "need" to sacrifice fish in order to withdraw cooling water. Indeed, technology is available to greatly minimize impingement mortality while withdrawing the cooling water necessary for industrial operation.

Put simply, fish mortality from biological sampling, while regrettable, allows important environmental information to be collected. Fish mortality from impingement at a CWIS only provides information on the degree of unnecessary mortality caused by the water withdrawal process.

Comment 3.1.4
The numbers of impinged fish also are small relative to the stock of fish in the Charles River Basin. Updating prior estimates with new techniques based on the data and knowledge gained from the biological monitoring program since 1999, the Normandeau Report has prepared new estimates of the stock of age 3 river herring and age 2 white perch in the Charles River Basin for each year from 1999 to 2007. See Normandeau Report, Tables 6 and 10 and accompanying text. Comparing those estimates to the number of impinged herring in each year indicates that the number of fish impinged in the screens (without regard to whether they were dead or alive upon arrival) averages 0.9% of the available stock each year, approximately the same as the range for gillnet catch. And for white perch, the impingement average is only 0.03% of the available stock. Notably, the absolute numbers and the relative percentage of impinged fish are drastically less than the year-to-year variation in size of the stock, which varies enormously, often more than 100% according to multiple other factors. As a result, impingement at the Kendall Station is not a significant factor in the maintenance of the populations.

In issuing the final Permit Modification, the Agencies must explain why they would consider impingement averaging within those percentages of the local population to present more than a de minimis adverse environmental impact.

Response to Comment 3.1.4
This comment relies entirely on the Normandeau Report. MassDEP has reviewed the Normandeau Report and its estimates of fish populations in the Charles River. *See* AR 756 (MassDEP Report). The MassDEP Report found that the Normandeau Report contains a number of deficiencies that either artificially diminish the impact of the facility's intake and/or suggest that the river herring stock in the lower Basin was likely overestimated. EPA has reviewed the MassDEP report and concurs with its assessment of the Normandeau Report. EPA has incorporated this report by reference into this response and the responses to other comments that cite the Normandeau Report. Consequently, the analyses and conclusions upon which this comment relies are unsupported.

Even if a reliable stock assessment for the lower Basin for a given year were available, impingement mortality impacts need not register some pre-selected level of impact at the population level to demonstrate an adverse environmental impact. *See* General Response

2.02. EPA is satisfied that documented Kendall Station impingement mortality of thousands of fish, coupled with the potential for similar impingement events of similar or greater magnitude in the future, constitutes an adverse environmental impact that is not de minimis. Indeed, as noted above, MA DMF has gone to the effort of an absolute prohibition against the harvest, possession, and sale of even one river herring. *See* General Response 3.0; Response to Comment 3.1.1. This protective management action illustrates that the impact of mortality on what might be considered a small number of fish in other systems is of much greater concern in the Charles River. It also illustrates that MA DMF—the state agency entrusted with managing the state's fisheries—takes a very different view of the health of the Charles River river herring population, and the impacts of mortality thereto, than does Mirant.

Comment 3.1.5

Rather than evaluating the environmental impact to local populations from impingement mortality at the Kendall Station, the SOB instead makes several assertions that do not show that impingement is causing significant AEI. For example, twice the SOB notes that fish impinged at the CWIS suffer 100% mortality. SOB at pp. 10, 11. But, even putting aside the fact that many of those impinged fish were already dead or impaired before they were impinged, Mirant Kendall has never claimed that the reported number of impinged fish should be adjusted downwards because of fish returns. The numbers are the numbers; twice stressing that impingement means 100% mortality adds nothing to the analysis of whether impingement mortality is causing more than de minimis AEI. Similarly, the SOB dismisses the low numbers of impingement in recent years as irrelevant because they are not the result of "preventative" action by Mirant Kendall. SOB at p.11.

Nevertheless, the numbers of impinged fish still are low and should be evaluated to determine if they pose more than de minimis environmental impacts. Finally, the SOB notes at p. 10 that the estimated intake velocity at Kendall Station's CWIS is between 0.8 and 0.9 fps, which is higher than the 0.5 fps through-screen velocity that EPA identified as more than sufficiently protective to prevent impingement when it developed the Phase I and II rules. But the numbers of impinged fish are what they are, and whether they are causing more than de minimis environmental impacts is not logically connected to whether those numbers theoretically could be lowered. Moreover, the 0.5 fps standard that EPA promulgated in the Phase I and II rules was explicitly set at the lower end of the range that EPA found was adequate to protect healthy fish from impingement. The fact that the through-screen velocity is above 0.5 fps at Kendall Station, accordingly, does not show any, much less any significant AEI from impingement. In finalizing the Permit Modification, the Agencies must explain why there would be any likely benefit from a requirement to reduce the intake velocity from one protective level to another only slightly lower.

Response to Comment 3.1.5

Much of this comment consists of citing statements that the SOB made for one purpose, and criticizing those statements for failing to demonstrate an entirely different point which they were never intended to demonstrate.

1. The fact that fish impinged at the CWIS suffer 100% mortality is relevant in terms of the relationship between *impingement* and *impingement mortality* at Kendall Station. At many power generating facilities of comparable size to Kendall Station, the number of impinged fish may not automatically translate into an equivalent level of fish mortality. Some facilities have reported a high survival and successful return of impinged fish to the water body through the use of fish return systems or other technologies at the CWISs. This is not the case at Kendall Station because there is no mechanism to allow for survival of impinged fish at the facility. Put simply, at another facility, 2,125 fish impinged might mean 2,125 fish briefly trapped against a surface, but then freed and returned to the waterbody after undergoing a minimal amount of stress, by which many survive—upwards of 80 percent by some estimates. See EPRI 2007, A.R. 748. By contrast, at Kendall Station, 2,125 impinged fish almost invariably means 2,125 dead fish. Therefore, the SOB explained that, at Kendall Station, impingement numbers translate directly to impingement mortality numbers.

2. The fact that the lower impingement totals in 2006 and 2007 are not attributable to any action by Mirant is relevant to avoid any misperception that a past problem (higher impingement in the years 1999-2005) has since been resolved and will not recur. Rather, the SOB explained:

> Based on nearly nine years of data, impingement of more than 350 fish per year is common (occurring in 6 of 9 years), with the potential for impingement in excess of 2,000 fish based on the figures from the year 2000. Because recent low impingement years are not due to action taken by the Plant or any other readily apparent factor, *the potential for high impingement similar to that which occurred in the year 2000 still exists.*

SOB at 11 (emphasis added). In other words, low impingement numbers in 2006-07 are valid data points, but because they are not attributable to any fundamental and durable change in conditions (and certainly not to any change in Kendall Station's CWISs that would lead to lower impingement), they do not lead EPA to disregard the maximum from the dataset (from 2000) or to revise the central tendency (more than 350 fish per year for 6 of 9 years).

3. The fact that the through-screen velocity at Kendall Station exceeds 0.5 fps is relevant because, as the SOB stated, "[f]ish that encounter the Kendall Station CWISs would likely be unable to escape this higher intake velocity and become impinged." SOB at 10. (Regarding the selection of 0.5 fps as a protective velocity, see Response to Comment 4.29.1.) EPA agrees with Mirant's statement that "the numbers of impinged fish are what they are." The purpose of mentioning the above-0.5 fps through-screen velocity in the section pertaining to Adverse Impacts of Kendall Station's Intakes was to provide a conceptual explanation for why fish might become pressed against an intake screen, rather than escaping the influence of the CWISs' intake velocity.

EPA is not alone in attempting to provide conceptual explanations for this phenomenon. Despite the fact that "the numbers of impinged fish are what they are," Mirant provides its own explanations for those numbers: that the fish were "already dead," and moreover the numbers were "inflated" by various combinations of natural and human-made factors. See Mirant Comments 3.1.1-3.1.2. The point here is only that, in the context of examining impingement numbers, it is entirely reasonable to note that an expected consequence of a CWIS with an intake in excess of 0.5 fps is impingement, and the numbers bear that out. Mirant's statement that "[t]he fact that the through-screen velocity is above 0.5 fps at Kendall Station, accordingly, does not show any, much less any significant AEI from impingement" simply refutes Mirant's own straw-man. The fact that the through-screen velocity is above 0.5 fps at Kendall Station shows that impingement mortality is *to be expected*; the specific impingement data shows that impingement mortality is *actually occurring*.

Comment 3.2

The SOB acknowledges that impingement numbers have declined in recent years, but dismisses the relevance of that trend because the reasons are "not entirely clear" and are not due to any action taken by the Station "or any other readily apparent reason." SOB at p. 11. Yet there are at least three readily obvious possibilities that the Agencies should consider. First, as commented above, the single high year of impingement, 2000, reflected mortality due to river conditions - high stormwater flows at the post-spawning season - that will not be obviated by any improvements to the CWIS. That single year was twice as high as in 2001, the next closest annual total, and more than twice the total collected in the most recent years 2004 through September, 2007. Even the high year within those years, 2005, reflected a surge of chlorinated street drainage into the Broad Canal. The point is that the low numbers in recent years are more typical and representative of current and ongoing conditions.

Second, as the Agencies have noted, the Kendall Station has operated much more in recent years than in its history at the beginning of this decade. That more consistent operation is associated with more consistent intake flows, leading to a more regular "flow signal" to the surrounding fish population. By contrast, during 2002 and 2003 when the Station's flows were intermittent, some impingement episodes followed resumption of higher intake flows after downtimes. It is likely that with sustained, higher intake flows, the fish population has made the appropriate behavioral adjustments to avoid the intake. Certainly that is supported by the recent low impingement results, which coincide with higher intake flows and gillnet data showing fish in comparable or higher numbers to recent years. (Indeed, if the thermal limits in the 2006 Final Permit become effective and cause the Station to cycle on/off more frequently due to thermal curtailments, the resulting cycling of the flow signals may be detrimental.)

Finally, the low numbers of impinged fish certainly reflect the relatively isolated nature of the Broad Canal and the relatively low intake velocity of the CWIS. Yes, that intake velocity is somewhat higher than the protective intake velocity EPA selected in developing the Phase I and II rules under CWA § 316(b), but that in itself does not mean that this intake in this setting is causing more than de minimis environmental impacts due to impingement. Nor is there any evidence that reducing the intake velocity to lower than 0.5 fps in this setting would materially reduce the already low numbers of impinged fish.

Before imposing such a requirement, the Agencies must first explain whether it would make any material reduction in environmental impacts.

Response to Comment 3.2
In the SOB, EPA stated:

> EPA acknowledges that Kendall Station experienced low impingement during 2006 and 2007. However, while the reason for the lower impingement rates in 2006-07 is not entirely clear, it is certainly not due to any preventative action taken by Kendall Station. . . . Because recent low impingement years are not due to action taken by the Plant or any other readily apparent factor, the potential for high impingement similar to that which occurred in the year 2000 still exists. The risk of impingement causing adverse environmental impact at Kendall Station is great.

SOB at 11. That is, the lower impingement numbers in 2006-07 were clearly not caused by Kendall Station making improvements to its CWIS that would reduce impingement, and furthermore, EPA is not aware of any durable change in circumstances that would make fish less susceptible to impingement. Therefore, the potential for high impingement, similar to that which occurred in the year 2000, still exists.

In this comment, Mirant attempts to offer three reasons why the impingement was lower in 2006-07 than in past years: (1) the past high-impingement years reflected exceptional conditions, (2) the stabilization of Kendall Station's flow at higher levels since 2004 sends a "flow signal" that enables fish to adapt and avoid impingement, and (3) the "relatively isolated nature of the Broad Canal and the relatively low intake velocity of the CWIS" mean that fish are simply unlikely to be impinged there.

Before addressing these individual arguments, it is important to set the context. The first two arguments are essentially arguments to disregard a subset of the data as unrepresentative. Mirant appears to argues that only the data from 2006 and 2007 (or, perhaps, the data from 2004, 2006, and 2007) are relevant, and that the data from 1999-2003 and 2005 should, essentially, be ignored, on the basis that data from such years were contaminated by exceptional events and/or flow patterns that Kendall Station does not expect to repeat. EPA, on the other hand, deems *all* the data to be relevant. *See* SOB at 11 ("EPA must consider the entire body of impingement data in its BTA determination. Based on nearly nine years of data, impingement of more than 350 fish per year is common (occurring in 6 of 9 years) . . . .").

Which data to deem relevant, and which to deem no longer relevant, is a technical question. But this technical question potentially bears on at least two legal questions: (1) whether the impacts are de minimis, therefore arguably exempting Kendall Station from the requirement to install the best technology available for minimizing adverse environmental impact; and (2) assuming that the impacts are *not* de minimis, whether the facility's existing CWIS technology reflects BTA, because the impacts are *already minimized*. *See* General Response 2.03 (distinguishing these concepts).

It is helpful to understand how the resolution of the technical question (which data are relevant) might (or might not) affect these two legal questions. Suppose *arguendo* that EPA were to agree that *only* the impingement data from 2006-07 were relevant, and to discard all previous data. Thus, the known annual impingement totals would be 125 (for 2006) and somewhere upwards of 38 (the total for January-September 2007), and there would be no specific data confirming the potential for higher totals. Nevertheless, in such a scenario, EPA would not be legally *required* to find that impingement at Kendall Station was de minimis, and likely would *not* so find. To the contrary, EPA has declined to make such a finding (and has imposed section 316(b) requirements in NPDES permits) at facilities that recorded lower impingement numbers and were located in less important habitat. Similarly, even if EPA were to only consider the 2006-07 impingement data, EPA would not be *required* to find that the lower impingement totals in 2006-07 demonstrate that the impacts could not be further reduced and therefore the existing Kendall Station CWIS reflects BTA, and likely would *not* so find. To the contrary, all available evidence indicates that the principal permit requirements in the Final Permit Modification would minimize impingement mortality, and probably reduce it to zero.

Therefore, the technical question of which data should be considered—upon which EPA's biologists simply disagree with Mirant's—is relevant, but certainly not determinative, of the ultimate legal questions. EPA responds below to Mirant's specific arguments.

1. As discussed in Response to Comment 3.1.2, EPA does not find inherently unreasonable Mirant's hypothesis that past events, such as high stormwater flows during the post-spawning season, may have triggered or contributed to conditions that would render fish more likely to be impinged. However, it would be unrealistic to assume that these or comparable conditions will not recur in the future. In fact, spring storms are not considered unusual in Massachusetts. EPA disagrees that "the low numbers in recent years are more typical and representative of current and ongoing conditions"; the nature of the real-world urban river environment is that conditions change and unusual events occur. To set the supposedly exceptional years of 2000 and 2005 in context, they are two of the eight years for which there is impingement data. EPA does not lightly dismiss 25% of a relevant time period as unusual. Therefore, without a way to control or eliminate factors that may render fish more susceptible to impingement, it is not appropriate to dismiss 25% of the data sample, or to exempt Kendall Station from the requirements of section 316(b), on the basis that some of the years showed lower levels of impingement than others. Moreover, the fact of contributory cumulative stressors does not diminish the need for the best technology available for minimizing adverse environmental impact; if anything, it increases the need. For example, if high stormwater flows cause stress to fish in the River, it is arguably even more important for the facility to maintain protective CWIS technology (such as a coarse mesh barrier net with a maximum 0.5 ft/s through-medium velocity) to prevent impingement of fish that may already be in a weakened state.

2. The record does not provide sufficient evidence to support Mirant's speculation that a more regular "flow signal" of the intake may be contributing to the lower number of impingement events in more recent years. First, while Kendall Station has operated much more in recent years than in its history at the beginning of this decade, increased operation does not automatically translate into more consistent water withdrawal. Increased operation and a more consistent flow signal are two separate features of power plant operation and do not necessarily have to take place at the same time. A power plant that operates at a higher capacity can still have many swings in its water use profile (a less regular "flow signal"). For example, in 2005, changes in Kendall Station's water withdrawal of greater than 31% occurred on 13 occasions. Even if Mirant considers this a stable flow signal that may reduce the potential for impingement, the permittee cannot guarantee that operational conditions (outages, repairs, changes in power generation) will not cause the facility to reduce or increase its intake flow over brief time periods in the future. (EPA has not proposed, and does not understand Mirant to request, that the permit contain a requirement that Kendall Station must maintain a constant minimum intake flow so as to provide a more regular "flow signal." Moreover, such a requirement would be contrary to EPA's goal of reducing entrainment.). Therefore, notwithstanding any possible causal relationship between the "flow signal" of the intake and the lower impingement numbers in the most recent years, it is not appropriate to dismiss the data from the years before 2004, or to exempt Kendall Station from the requirements of section 316(b).

Furthermore, EPA declines to adopt Mirant's conjecture that "if the thermal limits in the 2006 Final Permit become effective and cause the Station to cycle on/off more frequently due to thermal curtailments, the resulting cycling of the flow signals may be detrimental." This statement extrapolates from a tenuous hypothesis about the past (that the lower impingement numbers since 2004 are due to more constant intake flow) to speculation about a hypothesized future in which the 2006 Final Permit's thermal requirements have taken effect, but the Final Permit Modification's CWIS requirements (which should virtually eliminate impingement regardless of changes in "flow signal") have not.[4]

3. Mirant's third argument appears to be directed not to the question of which data to examine, but rather whether the CWIS already reflects BTA. Specifically, Mirant questions whether a 0.5 fps intake velocity limit "would materially reduce the already low numbers of impinged fish."

EPA agrees that the relatively isolated nature of the Broad Canal does provide some measure of isolation of the CWISs from the main stem of the Charles River. With

[4] Indeed, it is not even clear that implementation of the 2006 Final Permit's thermal requirements would result in increased on/off flow cycling. If in fact Kendall Station needed to curtail the thermal component of its discharge, it would be entirely possible, and not unlikely, for the Station to do so by decreasing its thermal output (reduce power production, for example) while keeping the same volume of non-contact cooling water moving through the facility. This would reduce the facility's Delta T and reduce the discharge temperature within a short period of time. Thus, the scenario of a more frequent on/off cycle of cooling water in the future as a result of thermal curtailment is subject to question. The larger point, as noted above, is that the requirements of the Final Permit Modification would minimize adverse environmental impact from impingement even if such frequent cycling did occur.

respect to intake velocity, however, EPA disagrees with the standard Mirant purports to set—that EPA must demonstrate that such a velocity limit "would materially reduce the . . . numbers of impinged fish." In Mirant's view, "[b]efore imposing such a [velocity] requirement, the Agencies must first explain whether it would make any material reduction in environmental impacts." However, the applicable legal standard is whether "the location, design, construction, and capacity of cooling water intake structures reflect the best technology available for minimizing adverse environmental impact." CWA § 316(b). Elsewhere in this Response to Comments, EPA explains the basis of the 0.5 fps velocity limit as best technology available, both because it reflects the nationally best-performing technology and because of the specific swim speeds of fish in the Charles River. *See* Response to Comment 4.10.4. EPA expects that implementation of the requirements in this Final Permit Modification will minimize impingement mortality, and probably reduce it to zero. EPA is not required to isolate individual components of the Final Permit Modification (e.g., velocity), model the precise reductions in impingement mortality specifically attributable to such isolated provisions, and then explain why those reductions are "material."

Comment 3.3
Having concluded without serious analysis that impingement at Kendall Station presents an AEI mandating minimization under CWA § 316(b), the SOB and the Draft Permit Modification proceed to propose requirements that focus on reduction of impingement, in particular, deployment of a coarse mesh barrier net as a "secondary exclusion device" and reduction of the through net velocity to less than 0.5 fps. Those requirements would apply as a back-up to the primary exclusion device whenever it is not functioning during the entrainment season (defined in the SOB as March through August), and during the remainder of the year when not precluded by icing. SOB at pp. 46 to 47.

As demonstrated by other comments, deployment of a coarse-mesh barrier net as proposed will present its own distinct costs, operational difficulties, and interferences with other uses of the Broad Canal. Whether BTA under CWA § 316(b) mandates that deployment depends on whether impingement-caused AEI at Kendall Station is more than de minimis and needs to be minimized and by how much. As shown in the preceding comments, the SOB does not present any serious analysis of the effects or significance of Kendall Station impingement on the environment. Prior to issuing the final Permit Modification, the Agencies must undertake that analysis and determine what elements of BTA actually are warranted to minimize the actual AEI from impingement.

Response to Comment 3.3
EPA concluded that impingement at Kendall Station itself constitutes adverse environmental impact requiring minimization under CWA § 316(b). To reach this conclusion, EPA analyzed site specific information submitted by the permittee (MKS Application and subsequent data reports 2002-2007) to qualitatively and quantitatively analyze impingement mortality taking place at MKS. The discussion of adverse environmental impact caused by impingement mortality on Kendall Station's CWISs is found in the Draft Permit Determination Document at 201-207, SOB at pp. 10-11, and in this Response to Comments Section 3, particularly Responses to Comments 3.1-3.2.

No specific threshold of the effects or "significance" of Kendall Station impingement on the population level is required by law, and EPA exercised its discretion not to conduct a specific analysis of this issue. See General Response 2.02; Response to Comment 2.7.3.

Comment 3.4
As with impingement, the SOB's analysis of entrainment relies on data that Mirant Kendall's consultants have collected and reported, and takes a similar approach. That is: the SOB cites to the numbers, labels them "large" and "significant," but did not provide any actual analysis of their significance within the larger context of the Charles River. SOB at pp. 11-13. The SOB, for instance, does not provide any analysis of what the numbers of entrained eggs and larvae mean in terms of adult equivalents, even though as demonstrated in an earlier comment, that is the standard approach under CWA § 316(b).

In anticipation of these proceedings to re-examine the CWIS-related provisions in the 2006 Final Permit, however, Mirant Kendall commissioned Normandeau Associates to evaluate the data collected since 1999 and to assess the significance of entrainment at Kendall Station to the overall populations of river herring and white perch in the Charles River. Those species were selected because they are the dominant and most representative species about which the most data are available. The resulting Normandeau Report, provided with these comments as MK Modification Comments, Exhibit No. 5, represents the culmination of Normandeau's years of data collection and increased understanding. It updates and supplants all prior assessments that Mirant Kendall has submitted during this lengthy permitting process.

To summarize, the conclusions of the Normandeau Report are that the impacts of entrainment at Kendall Station's CWIS are small and are much less than Mirant Kendall and the Agencies had previously estimated. The principal reason for the reduced estimates is that Normandeau now can quantify the effects of spring-time advection of eggs and larvae out of the system, which means that many of the eggs and larvae entrained at the Station would not have reached adulthood anyway. Another important reason is that Normandeau now can quantify the effects of recirculation within the Lower Basin under various flow conditions, which means that the calculation of adult equivalents can account for double-counting of entrained, recirculated organisms. Finally, there now are sufficient data to compare estimated entrainment losses to estimated fish stocks.

For the following reasons, each of which the Agencies should consider in issuing the final Permit Modification, it is essential for the Agencies to consider Normandeau's conclusions and the reasons for them, and to calibrate their determination of BTA accordingly. Determining BTA is not a mere question of reducing IM/E; instead the Agencies should seek to understand the system and determine what technology and permit conditions will best minimize AEI from entrainment.

Response to Comment 3.4

EPA does not agree that adult equivalent analysis must be performed by EPA in every CWA § 316(b) permit proceeding. While such an analysis may provide interesting information, it is not required in every instance, and was not required here. *See* General Response 2.02; Response to Comment 2.7.9. Moreover, there is no particular threshold of significance (as measured in adult equivalents, number of individuals, pounds of biomass, or any other measure), beyond (perhaps) de minimis, which must be met before the adverse impacts must be minimized by the application of BTA. *See* General Responses 2.02-2.03.

Moreover, as explained above, the MassDEP review of the Normandeau Report found a number of deficiencies that either artificially diminish the impact of the facility's intake and/or artificially overestimate river herring stock in the lower Basin. *See* Response to Comment 3.1.4. EPA concurs with the findings of the MassDEP review. Consequently, the data and analyses upon which this and subsequent comments rely are unsupported. Based on this assessment, Mirant's comment that "the impacts of entrainment at Kendall Station's CWIS are small and are much less than Mirant Kendall and the Agencies had previously estimated." is not supported by the Normandeau Report.

In addition to the points set forth in the MassDEP Report, which EPA incorporates into this response by reference, EPA specifically notes the following:

1. Mirant's efforts to better quantify the effects of spring-time advection of eggs and larvae out of the system, even if largely accurate, do not advance its position. EPA has already fully considered Mirant's advection hypothesis and how it related to entrainment mortality at Kendall Station in the 2006 Response to Comments. See 2006 Response to Comments, Response to Comment H18, at H44-H45 (explaining that natural processes that may move plankton out of the lower Charles River are not ecologically equivalent to entrainment of those same organisms by the station); *see also* Response to Comment H10, at H34-H35; *cf.* Response to Comment C23, at C75-C77 (in the context of thermal discharge); Response to Comment C25, at C85-C86 (similar). Mirant has presented no new facts to challenge EPA's full assessment of advection in the 2006 Response to Comments. In particular, EPA reiterates the following points:

> 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.
>
> (2006 Response to Comments, Response to Comment H10, at H35)

> This [Mirant advection] 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.
>
> (2006 Response to Comments, Response to Comment H18, at H44-H45)

In this case, projections of expected natural mortality of early life stages of fish and estimates of mortality caused by other anthropogenic activities do not justify dismissing or diminishing entrainment mortality from the facility. The argument that many of the eggs and larvae entrained at a facility "would not have reached adulthood anyway" does not put losses from impingement and entrainment at MKS in a more favorable light. On the contrary, early life stage mortality from other sources beyond the control of the permittee and the regulators only reinforces the need to minimize entrainment impacts at a facility using site-specific BTA.

2. Mirant's contention that the effects of recirculation within the lower Basin under various flow conditions can account for double-counting of entrained, recirculated organisms is plausible, but at this point not quantifiable. MKS intake temperature data suggests that re-entrainment of the thermal plume likely occurs under certain river flow conditions. The number or percentage of "post-entrainment" ichthyoplankton that are able to remain in the upper water column and be carried back to the intake has not been determined through field work in the lower Basin. Without some basis to quantify any double counting of entrainment that may be taking place, EPA has taken the conservative approach that estimated entrainment levels at MKS cannot be reduced by some factor to account for double counting at this time.

3. EPA disagrees with Mirant's statement that "there now are sufficient data to compare estimated entrainment losses to estimated fish stocks." While EPA does not dispute the *raw field data* collected or measured by Mirant's consultants, MassDEP and EPA lack confidence in the data analysis and calculations presented in the Normandeau Report that underlie both "estimated entrainment losses" and "estimated fish stocks." *See* Response to Comment 3.4.2.

Comment 3.4.1
Assessments of the biological significance of entrainment losses of fish eggs and larvae must account for the biological fact that each female fish can produce vast numbers of eggs and larvae that are subject to extraordinarily high natural mortality rates due to predators and other natural conditions. Recognizing that the raw numbers of entrained organisms at a power plant are often huge but are meaningless because only a very small number of those eggs and larvae would have survived anyway, biologists have developed standardized methods, cited in the Normandeau Report, for estimating the numbers of adult fish that are the equivalent (the "equivalent adults" or "EA") to the entrained organisms. These methods provide a much more sensible basis for evaluating the relative significance of entrainment at a power plant as compared to the local fish population, and they are commonly used by the Agencies in making BTA determinations under CWA § 316(b).

Indeed, the Agencies included such EA assessments in issuing the draft NPDES permit here in 2004. DD at 213 (reviewing Mirant Kendall's estimates as available at that time). The EPA also relied on equivalent adult estimates in developing the Phase II rule, see 69 Fed. Reg. at 41586, and the Agencies even require such analyses as part of the proposed monitoring requirements for Kendall Station. Yet in the SOB, EPA New England simply cited that Mirant Kendall had estimated that millions of eggs and larvae were entrained in 1999 and 2000 and concluded the magnitude of resulting AEI is substantial, with no analysis of entrainment impacts in terms of EA. SOB at 11.

Prior to issuing the final Permit Modification, the Agencies should review the Normandeau Report's updated and more thorough estimates of EA losses attributable to entrainment, and use those revised estimates to reconsider both (a) whether those losses are more than de minimis and (b) how the advection and other flow characteristics of the Charles River affect the selection of BTA to minimize any AEI from entrainment.

Response to Comment 3.4.1
Adult equivalent analysis (EA) is one of the tools available to regulators when evaluating entrainment losses, but EPA is not legally required to conduct such analyses here. *See* Response to Comment 3.4; *see also* Responses to Comments 2.7.3, 2.7.9. Mirant cites three instances where EPA referred to EA analyses, but none of them demonstrate that section 316(b) requires such analyses:

- EPA cited Mirant's EA analysis in the 2004 Draft Permit Determinations Document, see Response to Comment 2.7.9, but nothing in the DPDD suggests that Mirant's EA analysis was essential to EPA's decision-making in developing either the 2004 Draft Permit or the 2006 Final Permit. Thus, the DPDD does not support the proposition that there is a minimum threshold of adult equivalent loss that must be sustained before BTA is required.

- The preamble to the final Phase II Rule did cite adult equivalent figures, but never suggested that such analysis was *necessary* for development of a national rule, let alone for each BPJ permit determination. Moreover, that preamble further emphasized:

> Although the number of age 1 equivalent fish killed by impingement and entrainment is very large, precise quantification of the nature and extent of impacts to populations and ecosystems is difficult. Population dynamics and the physical, chemical, and biological processes of ecosystems are extremely complex. While generally accepted as a simple and transparent method for modeling losses, the proportional methodology that EPA uses to estimate impingement and entrainment nationwide has uncertainties that may result in under or over estimating actual impingement and entrainment rates.

69 Fed. Reg. at 41,586. On that same page, EPA also pointed out that equivalent adult loss was only one consequence of entrainment mortality; another consequence is that "[d]ecreased numbers of aquatic organisms can disrupt aquatic food webs and alter species composition and overall levels of biodiversity. . . . [F]orage species, which comprise a majority of entrainment losses at many facilities, are often a primary food source for predator species." *Id.* at 41,586-87. Thus, the preamble to the Phase II Rule does not support the proposition that there is a minimum threshold of adult equivalent loss that must be sustained before BTA is required.

- Mirant included an EA assessment in its initial NPDES application submission, and the 2006 Final Permit does require Mirant to conduct further EA analysis in continuation of this assessment. As noted above, notwithstanding their potential difficulties, EA analyses can sometimes provide interesting or useful information. However, there is a stark difference between a permit requirement to conduct an analysis that might provide useful information, and the argument that EPA is not legally authorized to issue a NPDES permit with section 316(b) requirements unless it has already performed such an analysis.

In general, EPA sometimes finds a properly-conducted EA analysis to be helpful. EPA did include the adult equivalent analysis submitted in the permittee's NPDES application as part of the entrainment mortality analysis in the Draft Permit Determination Document. See Determination Document Section 8.1.2i, pp. 212-215. In the development of the SOB, however, EPA decided it was not necessary to perform a second adult equivalent analysis. When Mirant voluntarily submitted additional ichthyoplankton data collected in 2006 and 2007 (AR 760) there was no data set identified as entrainment loss information. EPA was not aware that an updated entrainment study had been conducted similar to the one submitted with the permit application in February of 2002. If a study had been conducted and Mirant felt that an EA was vital to the understanding of entrainment at the facility, it was free to submit that calculation as well. At any rate, now that Mirant has submitted an EA analysis as part of its public comments, MassDEP and EPA have reviewed that analysis and provided their evaluation and response. *See* MassDEP Report.

Finally, while useful in some instances, EA estimates are not the exclusive tool available for entrainment analysis. When there is a focus on the percentages of loss through entrainment mortality of fish eggs and larvae, for example, the loss of a certain percentage of ichthyoplankton translates into the same percentage of adult fish lost to the system. For example, if there were a loss of approximately 23% of the larval population due to the facility in year 2000, and all other forms of mortality to that population were to remain unchanged, the number of adults projected to have resulted from the year 2000 larval population is expected to be about 23% lower than it would have had entrainment not occurred. *See* 2006 Response to Comments, Response to Comment C23, at C76.

Comment 3.4.2
The Normandeau Report presents a detailed analysis of the data collected over almost ten years to determine the actual effects of IM/E at Kendall Station in comparison to estimated stocks of river herring and white perch in the Charles River. Mirant Kendall provides that report as a comment on the Draft Permit Modification, and expects the Agencies to respond to its analyses in detail when they issue the final Permit Modification. Here in Mirant Kendall's direct comments, it is sufficient to set out the main conclusions of the Normandeau Report as they pertain to entrainment. Those conclusions are:

The analyses indicate that numbers of equivalent adult river herring resulting from entrainment average 406 fish per year once entrainment estimates are adjusted for advection and recirculation. These fish represent an average of 1.2% of the estimated Charles River stock. For white perch numbers of equivalent adults resulting from entrainment average 266 fish per year once entrainment estimates are adjusted for advection and recirculation. These fish represent an average of 0.05% of the estimated Charles River stock.

In issuing the final Permit Modification, the Agencies must explain why they would consider entrainment within those small percentage ranges of the local population to present more than a de minimis adverse environmental impact, particularly given year-to-year variances in population that can be greater than 100% due to other factors.

Response to Comment 3.4.2
The comment argues that "the Agencies must explain why they would consider entrainment within those small percentage ranges of the local population to present more than a de minimis adverse environmental impact." This statement assumes that (1) adverse environmental impact must be defined in terms of population-level effects, and (2) EPA is under an affirmative obligation to demonstrate that the adverse environmental impact caused by Kendall Station's CWIS exceeds some "significance" level. Neither assumption is correct. *See* General Responses 2.02, 2.03. Consequently, the premise of the comment is incorrect—EPA does *not* need to "explain why [it] would consider entrainment within [claimed] percentage ranges of the local population to present more than a de minimis adverse environmental impact"—and any such explanation that EPA might provide would be supererogatory. Consequently, no further response is necessary. Nevertheless, EPA provides the following additional response:

EPA lacks confidence in the numbers presented in the comment, for the following reasons.

This comment relies entirely on the Normandeau Report. As explained above, the MassDEP review found that the Normandeau Report contains a number of deficiencies that either artificially diminish the impact of the facility's intake and/or artificially overestimate river herring stock in the lower Basin. *See* AR 756 (MassDEP Report). Consequently, the data and analyses upon which this comment relies are left unsupported.

Moreover, EPA is not convinced that the adverse environmental impacts from fish eggs and larvae entrained at MKS, in terms of adult equivalents, can legitimately be adjusted by including an estimate of advection and recirculation of ichthyoplankton in the lower Basin. *See* Response 3.4. An evaluation submitted by MA DMF, included as an attachment to the MassDEP Report, dated September 28, 2008, also calls into question this adjustment to the facility's entrainment impact. The MA DMF attachment states "However, accounting for advection may not be appropriate as mortality from all sources (including advection) should already be implicitly accounted for in the mortality rates used to estimate equivalent adults from various early life stages." Mirant's advection adjustment is likely double counting mortality for fish in the river, but the uncertainty associated with attempting this type of estimate makes it difficult to determine to what extent. In order to evaluate the degree to which Mirant's inclusion of advection and recirculation changed EA entrainment losses, EPA recalculated EA loses for river herring based on permitted flow without advection and recirculation (Table 3.4.2-1). In conducting this exercise, EPA did not modify any other calculations submitted by Mirant regarding the population of river herring in the lower Basin.[5]

Table 3.4.2-1. Adult Equivalent Entrainment Mortality as Percent of River Herring Stock Estimate (Permitted Flow)

Year	Charles River Age 3 Stock Estimate	Mortality With Advection and Recirculation	Percent Mortality	Mortality Without Advection or Recirculation	Percent Mortality	Mortality Without Advection, but With Recirculation	Percent Mortality
1999	34100	2096	6.1%	3310	9.7%	2643	7.8%
2000	33500	359	1.1%	2299	6.9%	2185	6.5%
2002	65000	81	0.1%	313	0.5%	255	0.4%
2003	33500	628	1.9%	1652	4.9%	1553	4.6%
2004	14600	304	2.1%	980	6.7%	861	5.9%
2006	8400	7	0.1%	478	5.7%	478	5.7%
2007	60100	393	0.7%	1353	2.3%	1236	2.1%
MEAN	**35600**	**553**	**1.7%**	**1484**	**5.2%**	**1316**	**4.7%**

Notes:

[5] This assumption—that the calculations other than those pertaining to advection and recirculation did not need to be changed—was made purely *arguendo* and does not imply that EPA finds those other calculations to be acceptable.

1. Column 2 (“Charles River Age 3 Stock Estimate”) is taken from the Normandeau Report and, for the sake of this exercise, is assumed *arguendo* to be correct.
2. Columns 3 (“Mortality With Advection and Recirculation”) and 4 (“Percent Mortality”) are taken directly from the Normandeau Report and reproduced here for the sake of comparison.
3. Columns 4-7 were calculated by EPA from the Normandeau Report’s data, assuming *arguendo* that all of Normandeau’s calculations other than those pertaining to advection and recirculation were correct.

When Mirant’s assumptions regarding advection and recirculation are removed, the impact of entrainment mortality from the facility as a percentage of age 3 river herring stock estimate changes from a low of 0.1% in 2002 and 2006 and a high of 6.1% in 1999 to a low of 0.5% in 2002 and a high of 9.7% in 1999. The mean also changes from a percent mortality loss of 1.7% from 1999 through 2007 to a loss of 5.2%.

MassDEP’s analysis of the Normandeau Report also suggests that the population of river herring in the Charles River has been overestimated based on several of the assumptions used to calculate the Age 3 stock presented in Table 3.4.2-1. MassDEP’s adjustments to these assumptions for two years for which all necessary data was available (2004 and 2007) resulted in substantially lower estimates of age 3 river herring stock for those years. Mirant provided an estimate of 14,600 age 3 river herring in 2004 (Normandeau 2008 and Table 3.4.1-1). Re-calculating with adjusted assumptions for average juvenile age, useable push net volume, and geometric means, and assuming a collection efficiency of 90 percent for sampling gear, MassDEP estimated approximately 1,605 age 3 river herring for 2004. If a 50 percent collection efficiency for sampling gear is assumed (as used in Mirant’s calculation), this estimate increases to 2,890 age 3 river herring. Similarly, in 2007, Mirant estimated 60,100 age 3 river herring while MassDEP (re-calculating the same assumptions as in 2004) estimated 2,890 age 3 river herring in the Charles River. The single assumption that had the greatest effect on the estimate of age 3 river herring stock was decreasing the useable push net volume from 80% to 20%. The combined variation resulting from re-calculating age 3 river herring stock based on MassDEP’s assumptions, and recalculating adult equivalent mortality from entrainment excluding the assumptions of advection/recirculation, markedly affects the proportional impact of the facility’s annual entrainment on river herring stock (Table 3.4.2-2). In 2004, for instance, the estimated impact of the facility on the Charles River age 3 stock population due to entrainment ranges from 2.1% based on Mirant’s estimate of stock size and entrainment mortality (permitted flow and advection and recirculation accounted for) to 61.1% based on MassDEP’s stock estimate and EPA’s estimate of entrainment mortality (permitted flow and advection and recirculation excluded from the adult equivalent analysis for entrained eggs and larvae). EPA does not consider any of these values de minimis.

Table 3.4.2-2. Comparison of 2004 and 2007 Adult Equivalent Entrainment Mortality as Percent of River Herring Stock Estimate according to Mirant and MassDEP (based on Permitted Flow).

Year	Parameter	Mirant's 50% collection efficiency with advection and with recirculation	MassDEP 90% collection efficiency with advection and recirculation	MassDEP 90% collection efficiency without advection or recirculation	MassDEP 50% collection efficiency with advection and recirculation	MassDEP 50% collection efficiency without advection or recirculation
2004	Age 3 Stock Estimate	14600	1605	1605	2890	2890
	Adult Equivalent Entrainment Mortality	304	304	980	304	980
	Percent Mortality	2.1%	18.9%	61.1%	10.5%	33.9%
2007	Age 3 Stock Estimate	60100	6050	6050	10890	10890
	Adult Equivalent Entrainment Mortality	393	393	1353	393	1353
	Percent Mortality	0.7%	22.4%	6.5%	12.4%	3.6%

Notes:

1. Mirant's Age 3 Stock Estimate in 2004 (Row 2, Column 3) and 2007 (Row 5, Column 3) are taken from the Normandeau Report and 2004 Adult Equivalent Entrainment Mortality (Row 3, Column 3) and 2007 Adult Equivalent Entrainment Mortality (Row 6, Column 3) are taken from the Normandeau Report's data based on permitted flow and, purely for the sake of this exercise, are assumed *arguendo* to be correct.
2. MassDEP 2004 Age 3 Stock Estimates (Row 2) in Columns 3-6 are taken directly from MassDEP 2004 Re-calculated Charles River Age 3 Stock Estimates (AR 777).
3. Adult Equivalent Entrainment Mortality (2004, Row 3 and 2007, Row 6) in Columns 5 ("MassDEP 90% collection efficiency without advection or recirculation") and 7 ("MassDEP 50% collection efficiency without advection or recirculation") were calculated by EPA from the Normandeau Report's data, and assuming *arguendo* that all of Normandeau's calculations other than those pertaining to advection and recirculation were correct.
4. MassDEP 2007 Age 3 Stock Estimates (Row 5) in Columns 3-6 are taken directly from MassDEP 2007 Re-calculated Charles River Age 3 Stock Estimates (AR 778).

EPA agrees with the methodical approach used by MassDEP in its review and shares MassDEP's lack of confidence in the reasoning behind assumptions made in the Normandeau Report. However, because of the number of assumptions and the complexity of the calculations involved in the generation of the estimates above, EPA is not prepared to unequivocally state that Mirant's estimates are "incorrect" in all cases and that the recalculated estimated included here are "correct." Rather, EPA included the above exercise to illustrate the dramatic impact various assumptions underlying the calculation of Charles River age 3 stock population have on the outcome of the facility's impact. In other words, the very fact that such dramatic changes to both the numerator (adult equivalent entrainment mortality) and the denominator (age 3 stock estimate)—and consequently the percent mortality—result from differing assumptions illustrates why

EPA might, in its scientific expertise and exercise of discretion, choose not to rely heavily on adult equivalent analysis in a particular setting.

Based on the above analysis, EPA believes the impact of MKS's entrainment mortality on fish in the Charles River is likely greater than Mirant depicts in the Normandeau Report. This leads EPA to (1) reaffirm its conclusion that the impact of entrainment from Kendall Station's intakes *is not* de minimis, (2) in the alternative, note that EPA's and MassDEP's biological judgment differs from that of Mirant's consultants in this disputed technical question, but that in any event Mirant has failed to demonstrate that the impact *is* de minimis, and (3) reiterate that EPA has discretion not to rely on adult equivalent analyses here.

Comment 3.4.3
The SOB at pp. 11 to 12 makes various statements about the seasonality of entrainment and the size of Kendall Station's intake flow as a percentage of river flow, concluding that there is a "high potential for entrainment." Of course, there is more than high potential, the CWIS at Mirant Kendall does entrain eggs and very small larvae. Those statements in the SOB may sound significant and scientific, but they do not address the real issue, which is whether that entrainment matters to the environment or, as a practical matter, is de minimis.

Also, the SOB asserts that the more recent, increased intake flows at the Station, while still within permit limits, mean that there is increased potential for entrainment now as compared to when Mirant Kendall first evaluated entrainment impacts at a time when the intake flows were somewhat lower. SOB at p. 13. But that, too, begs the real issue of whether that entrainment causes significant AEI even at the somewhat higher levels.

More important, in providing its more accurate estimates of entrainment-related losses over the past years, the Normandeau Report accounts for the variations in intake and river flows over those years. Accordingly the Agencies' assessment of AEI from entrainment at Kendall Station should not be affected by the fact that the actual intake flows at the plant over time show some variation within the overall permitted levels.

Response to Comment 3.4.3
Mirant does not dispute EPA's conclusion that there is a "high potential for entrainment" at Kendall Station, particularly in the years since Mirant's initial evaluation of entrainment impacts in 2002, when the intake flows were measurably lower. Rather, Mirant argues, "the real issue" is whether that entrainment "matters to the environment" by causing "significant" AEI, or "as a practical matter, is de minimis." *See* General Responses 2.02-2.03; Response to Comment Section 3, *passim*. As discussed throughout EPA's Section 3 responses, the undisputed high potential for entrainment at MKS is key to EPA's determinations regarding the requirements of CWA § 316(b).

Mirant also refers to the "more accurate estimates of entrainment-related losses" in the Normandeau Report. Based on the MassDEP Report and the entrainment mortality estimates included in Response to Comment 3.4.2, there is little confidence in the MKS mortality estimates and population estimates submitted by Mirant. Also as stated in Response 3.4.2, MassDEP's more defensible approach to estimating MKS's entrainment mortality reveals an adverse environmental impact that is much greater than Mirant's estimate.

Mirant also maintains that the Agencies' assessment of AEI from entrainment at Kendall Station should not be affected by the fact that the actual intake flows at the plant over time show some variation within the overall permitted levels. However, in developing a permit that may last five years or even longer, EPA must take into consideration all variations in facility operation that may result in a change of impact on the environment, up to the permitted limit of the variation in question. In order to address variation in facility operation and resulting environmental impact, EPA often employs a conservative, or "worst case" approach, where the variation in facility operation (in this case the intake flows at MKS) is always calculated to be the permitted value that is judged to have the greatest adverse impact. In this case, a conservative approach would be to estimate water withdrawal impacts based on the maximum limit (80MGD) of water withdrawal.

Comment 3.4.4
[Mirant makes five distinct points in this comment. For purpose of clarity, EPA has subdivided the comment into comments 3.4.4.1-3.4.4.5, and organized its responses accordingly. Cross-references to "Response to Comment 3.4.4" elsewhere in the document refer to the responses 3.4.4.1-3.4.4.5 collectively.]

Mirant Kendall's 2006-2007 Charles River Monitoring Report demonstrated that the 2007 YOY river herring abundance was the highest seen since comparable sampling began in 2002, and occurred despite relatively high operating levels at Kendall Station. The SOB at p. 13 acknowledges that those results occurred while the plant was operating with "near maximum permitted water withdrawals," but dismisses them as "one strong herring year" that likely is the result of "inherent variability" in fish recruitment. As evidence, the SOB points to the lower YOY abundance during 2006, which had comparable water withdrawals. The SOB concludes that no inferences may be based largely on one strong year.

For several reasons, however, the Agencies should look harder at the full set of data over several years that Mirant Kendall presented in that report. The Agencies should conclude that the variability in YOY results is more than just "inherent" and instead is clearly associated with factors other than the plant's intake flow levels.

Response to Comment 3.4.4
EPA does not dispute that factors other than the plant's intake flow levels can have effects, even large effects, on YOY herring abundance. In fact, EPA has never asserted that the plant's intake flow levels are the *only*, or even always the *largest*, influence on the total YOY river herring population in the Charles River. To the extent Mirant implies that EPA has argued such a position, Mirant is wrestling with its own strawman.

Mirant further argues that variability in YOY herring abundance is “clearly associated with factors other than the plant’s intake flow levels.” At a very general level, it is undeniable that YOY herring abundance in a dynamic ecosystem is associated with multiple factors, including factors in addition to the plant’s intake flow levels (although the *extent* of its association with each such factor can be a complex question to answer). EPA’s SOB was not predicated on a direct relationship between increased MKS flows and the reduced YOY river herring abundance. YOY river herring abundance is influenced by many factors, and it is not surprising that increases and decreases in water withdrawal at MKS do not always dominate these other contributors to YOY production and result in a persistent, direct relationship with juvenile abundance.

That said, the conclusion that the comment urges EPA to draw is largely irrelevant. EPA is required to ensure that Mirant’s NPDES permit contains conditions that reflect the best technology available for minimizing adverse environmental impact. Mirant seems to assume that a conclusion that “variability in YOY results is . . . clearly associated with factors other than the plant’s intake flow levels” would lead to the result that, therefore, Kendall Station’s CWISs either cause only de minimis impacts (and therefore need not be upgraded), or already reflect the best technology available for minimizing adverse environmental impact (and therefore need not be upgraded). But that does not follow. There is no rule of law saying that, before requiring the best technology available, EPA must first demonstrate that there are no other factors harming the fish in the waterbody, or even that there are no other factors harming the fish in the waterbody more than the facility’s CWISs do. EPA’s mandate is to take the ecosystem as it is and require the facility to install and operate CWISs that reflect the best technology available for minimizing adverse environmental impact, notwithstanding the fact that other factors beyond EPA’s or the permittee’s control may also cause fish mortality. *See also* Response to Comment 2.9.

EPA responds to the specific comments below.

Comment 3.4.4.1
First, as shown in the Normandeau Report, the absolute and relative impacts of IM/E losses due to the Kendall Station’s CWIS in any year are small, on the order of 1%, much smaller than the variation in the order of 100% from year to year in YOY results. By contrast, while the Station’s intake flow levels vary from year to year, they actually are bounded within a much smaller range. It is apparent that other factors than the plant’s intake are much more significant.

Response to Comment 3.4.4.1
EPA’s discussion of impingement mortality at MKS is included in Response to Comments 3.1.1 – 3.1.5. Also, revised river herring stock estimates in the lower Basin included in the MassDEP Report indicate that the absolute and relative impacts of impingement mortality from MKS were likely underestimated by Mirant. In addition, Mirant’s position that absolute and relative impacts of entrainment losses due to the Kendall Station’s CWIS in any year are very low is not supported by MassDEP’s

assessment of the raw data. Impacts from entrainment are likely much greater as well. See Response to Comment 3.4.2 and the MassDEP Report.

Moreover, EPA does not dispute that while MKS causes among the most significant anthropogenic impacts to the lower Basin, there are certainly other factors, in addition to the facility's CWIS, that likely play a large role in the lower Basin at a given time. This reality makes it all the more important to minimize Kendall Station's mortality from impingement and entrainment, rather than ignore these losses simply because they may not constitute the single largest influence on YOY production at a particular time.

Comment 3.4.4.2
Second, the reason for a poor year class in 2006 is readily apparent. As shown in the Normandeau Report, that year had extraordinarily high river flows during the spring, three times normal, which adverted an estimated 99% of the herring eggs and larvae potentially subject to entrainment out of the system. As a result, 2006 even with high intake flows actually had a very low EA loss of river herring due to the Kendall Station CWIS, estimated at only seven fish and 0.08% of the stock, because the eggs and larvae were subject to advection.

Response to Comment 3.4.4.2
Mirant states that increased advection of herring eggs and larvae in 2006 was responsible for the poor year class. EPA is not convinced that using estimates of advection is a straightforward way to determine the impact of MKS on a given year class of fish. MA DMF also questions this approach. As discussed earlier, MA DMF stated that "… accounting for advection may not be appropriate as mortality from all sources (including advection) should already be implicitly accounted for in the mortality rates used to estimate equivalent adults from various early life stages." See Response to Comment 3.4.2. If advection is not considered when evaluating the impact of MKS on river herring in 2006, then Mirant's estimate of an EA loss of 0.08% climbs to an EA loss of 5.7% (see Table 3.4.2-1).

Even assuming *arguendo* that Mirant's advection estimate is appropriate, its argument in this comment is unpersuasive. In this case, it is assumed that 99% of the herring eggs and larvae potentially subject to entrainment in 2006 have been advected out of the system. Under these circumstances, it seems reasonable to judge that any additional mortality on the one percent of the eggs and larvae remaining in the lower Basin would be a critical reduction to a stock that has been severely depleted. An adverse environmental impact caused by a plant's CWISs to the fragile remnant of a year class may be of great concern.

In either case, AEI from MKS cannot be discounted because a year class of river herring has already suffered high mortality from another source. Indeed, it seems that in a case like this, employing BTA to minimize AEI is appropriate.

Comment 3.4.4.3
Third, looking at all of the years with appropriate data, which are 2003 through 2007, and excluding 2006 as anomalous due to its extraordinary river flows and advection, it is apparent that the higher YOY abundance occurred in the years (2005 and 2007) of higher plant intake flows and the lower YOY abundance occurred in the years (2003 and 2004) of lower plant intake flows. These results indicate that the plant's intake flows have no evident relationship to the abundance of YOY river herring, and undercut the SOB's simplistic assumption that any entrainment has more than de minimis environmental impacts.

Response to Comment 3.4.4.3
The comment begins by limiting its analysis to only the five years with "appropriate" data, then completely excluding one-fifth of that data (2006) because it had atypical river flows. *Cf.* Response to Comment 3.2 (exclusion of data). The comment then concludes, based on four years of data, that "the plant's intake flows have no evident relationship to the abundance of YOY river herring."

The comment seems to assume that the applicable legal standard is that section 316(b) requirements do not apply if a relatively small recent data set (excluding any years in which the weather was atypical) does not conclusively demonstrate a statistical correlation between plant intake flow and YOY abundance. EPA is unaware of any such requirement.

Also, Mirant's argument is only plausible when it is coupled with the underlying assumption that the abundance of YOY river herring would be a fairly stable value from year to year, absent the removal of ichthyoplankton by MKS. This stable abundance through time would be the only circumstance to allow for a statistical correlation between YOY abundance and plant intake flows. Even a rudimentary knowledge of year class strength in a river from one year to the next disproves this assumption. YOY river herring abundance can vary greatly from year to year in systems that are not subject to impingement mortality and entrainment (IM/E) removals from a CWIS. This natural variability would confound any attempt to determine a statistical correlation between YOY abundance and plant intake flow.

Comment 3.4.4.4
Perhaps recognizing that it should not have dismissed the higher abundance of YOY river herring in years of high plant intake, the SOB goes on to make two closing arguments. First, the SOB indicates that the entrainment of large numbers of eggs and fish cannot be "discounted," i.e., has an important AEI, "particularly as Kendall Station has not implemented protective measures to reduce entrainment." But the absence of such measures says nothing about whether the current levels of entrainment cause more than de minimis environmental impacts.

Response to Comment 3.4.4.4
This comment cites a statement that the SOB made for one purpose, and criticizes that statement for failing to demonstrate an entirely different point which it was never intended to demonstrate.

Mirant has, in various comments, suggested that entrainment mortality is not itself adverse environmental impact, but rather entrainment mortality may contribute to adverse environmental impact if it exceeds some threshold. (In this comment, the threshold appears to be that the adverse environmental impact be "important.") EPA has, as a matter of policy and interpretation of CWA § 316(b), reached a different interpretation, which has been upheld by the United States Court of Appeals for the Second Circuit. *See* General Response 2.02.

The statement that the comment cites reads in full:

> A number of physical, biological, and anthropogenic factors influence the abundance of river herring YOY, and any inference based in large part on one strong year class does not discount the fact that Kendall Station entrains large numbers of river herring eggs and larvae, particularly as Kendall Station has not implemented protective measures to reduce entrainment.

SOB at 13. Mirant states that "the absence of such measures says nothing about whether the current levels of entrainment cause more than de minimis environmental impacts." This appears to miss the point of the cited statement. The point of the statement is: Kendall Station entrains large numbers of river herring eggs and larvae. Notwithstanding Mirant's suggestion that EPA adopt a different interpretation of CWA § 316(b), that statement summarizes the adverse environmental impact of Kendall Station's intakes. The final clause ("particularly as Kendall Station has not implemented protective measures to reduce entrainment") refutes any suggestion that adverse environmental impact at Kendall Station is *already minimized*. *See* Response to Comment 3.2; General Response 2.03.

With respect to whether those impacts are "de minimis" (as opposed to "already minimized"), see General Response 2.03, and Response to Comments Section 3 *passim.* In particular, a careful examination of the Normandeau Report by MassDEP supports the position that the impact of MKS's entrainment mortality on fish in the Charles River is greater than Mirant depicts in the Normandeau Report and is not de minimis. *See* Response to Comment 3.4.2.

Comment 3.4.4.5
Second, the SOB falls back to the notion that Mirant Kendall cannot rewrite history and prove a negative, i.e., that Mirant Kendall cannot demonstrate that the 2007 YOY class "would not have been better" had entrainment not occurred during 2007. That, too, avoids the real issue, which is whether any impacts from entrainment are truly adverse to the environment. As shown in the Normandeau Report, the losses of EA herring and

white perch due to IM/E at Kendall are not significant, particularly relative to other factors such as advection of eggs and larvae. As part of the evidence for that conclusion, it is important for the Agencies to recognize that the plant's intake flows have no apparent relationship to the numbers of fish present in the River.

Response to Comment 3.4.4.5
See Responses to Comments 3.4.4.3-3.4.4.4. Regarding whether losses are "significant," see General Response 2.02. Regarding whether mortality caused by entrainment through Kendall Station is higher, lower, or the same as mortality caused by other factors (e.g., advection), see Responses to Comments 2.9 and 3.4.4.

Comment 3.5
Having concluded without serious analysis that entrainment at Kendall Station presents an AEI mandating minimization under CWA § 316(b), the SOB and the Draft Permit Modification proceed to propose requirements that focus on reduction of entrainment. In particular, the purpose of the proposed "technological design measures" for the "aquatic organism exclusion device" is solely to minimize entrainment of eggs and larvae (and impingement of entrainable organisms), because such a device would not otherwise be needed to minimize impingement of larger organisms. As demonstrated by the comments in Section 4, locating, designing, piloting, permitting, construction and deployment of an aquatic organism exclusion device as proposed would present extraordinary, distinct costs, operational difficulties, and interferences with other uses of the Broad Canal. The SOB acknowledges that the proposed technological design measures have not been met elsewhere, and will require "innovative" solutions to meet "challenging" issues. But whether BTA under CWA § 316(b) mandates that deployment depends first on whether entrainment-caused AEI at Kendall Station is more than de minimis and needs to be minimized and by how much. As shown in the preceding comments, the SOB does not present any serious analysis of the effects or significance of Kendall Station entrainment on the environment. Prior to issuing the final Permit Modification, the Agencies must undertake that analysis and determine whether any modifications to the Station's CWIS actually are warranted to minimize the actual AEI from entrainment.

Response to Comment 3.5
After introductory material, the comment states that EPA must ascertain "whether entrainment-caused AEI at Kendall Station is more than de minimis and needs to be minimized and by how much," and provide a "serious analysis of the effects or significance of Kendall Station entrainment on the environment" so as to "determine whether any modifications to the Station's CWIS actually are warranted to minimize the actual AEI from entrainment." Consequently, this comment simply reiterates the preceding comments in Section 3. See Responses to Comments 3.1-3.4.4.

Comment 3.6
As shown in the Normandeau Report and elsewhere in the record, the EA losses due to impingement and entrainment at the Station are in the ranges of 1.2 % for river herring and 0.5% for white perch relative to populations in the Charles River, and amount to an

average of hundreds of fish per year, not thousands. Those losses are lower than the losses the 2006 Final Permit requires Mirant Kendall to cause just by biological monitoring, and are well within the natural variability in fish stocks that any fish population regularly experiences. The Agencies have not provided any evidence suggesting that herring or perch stock in the Charles River are at risk of collapse in any way comparable, for example, to the concerns about winter flounder in Mount Hope Bay, and the SOB acknowledges that the YOY herring stock has been strong in some recent years, such as 2007, when the Station was at high operating levels.

Considering those facts and the other factors affecting fish stocks in the Charles River, it is clear that the adverse environmental effects of IM/E at Kendall Station are in fact de minimis. Mirant Kendall is not arguing those effects are zero - that is not what the Normandeau Report indicates. And it is not arguing that those effects "are not a concern." Rather, Mirant Kendall's point is that those effects are small, in fact are de minimis, such that were the Station to close down, no meaningful improvements in fish populations in the Charles River would result. The Agencies should determine that the AEI from IM/E at Kendall Station are de minimis such that CWA § 316(b) does not require any improvements to the CWIS.

Response to Comment 3.6
The essence of the comment is an argument that the adverse environmental impacts of Kendall Station's cooling water intake structures are de minimis. *See* General Responses 2.02-2.03; General Response 3.0; Responses to Comments Section 3, *passim*, especially Response to Comment 3.4.2. *See also* General Response 3.0 (regarding Normandeau Report's EA estimates); Response to Comment 3.1.3 (regarding losses due to biological monitoring); Response to Comment 3.4.4 and its subcomments (strong YOY class in 2007).

Mirant states that "the EA losses due to impingement and entrainment . . . are well within the natural variability in fish stocks that any fish population regularly experiences." Even assuming *arguendo* that this observation is true, it does not affect the outcome of this section 316(b) determination. If, for example, EA losses due to impingement and entrainment at MKS are within the range of a large depletion of the year class due to weather conditions, the loss from MKS operation is another factor contributing to the lower abundance seen that year. The fact that the IM/E loss is within some natural variability bracket does not diminish the adverse environmental impact or obviate the requirement to minimize this documented adverse impact.

Mirant also states that "[t]he Agencies have not provided any evidence suggesting that herring or perch stock in the Charles River are at risk of collapse in any way comparable, for example, to the concerns about winter flounder in Mount Hope Bay" (a reference to the Brayton Point permit proceeding). EPA agrees that herring and perch in the Charles River are not at immediate risk of collapse. But nothing in section 316(b) requires that a population be at risk of total collapse before CWIS requirements may be imposed; rather, EPA's obligation is to ensure that the location, design, construction and capacity of cooling water intake structures reflect the best technology available for minimizing adverse environmental impact. *See* General Response 2.02. Here, the record contains evidence that the river herring stock in particular is depleted, resulting in interventions by the Atlantic States Marine Fisheries Commission and MA DMF. *See* Draft Permit Determination Document § 5.7.3a, at 78 ("Once an important commercial species, observed declines in commercial landings of alewife and degradation of historic spawning habitat have made it necessary to formulate a management plan for the restoration of this species. This plan is administered by the Atlantic States Marine Fisheries Commission (NOAA 1998)."); General Response 3.0 (MA DMF moratorium); Response to Comment 3.1.1.

Comment 3.7
If the Agencies do determine that modifications to the CWIS at Kendall Station are needed because AEI is more than de minimis, there still are several specific ways that the Agencies must use a more refined understanding of the actual, small AEI from IM/E at the Station in selecting what constitutes the necessary BTA under CWA § 316(b), as follows.

Response to Comment 3.7
This comment is entirely prefatory to Comments 3.7.1-3.7.3. EPA has responded to those specific comments.

Comment 3.7.1
Under the "wholly disproportionate" standard as set forth in Seacoast, as discussed in earlier comments, the Agencies must determine whether the costs of a proposed technology are wholly disproportionate to the benefits. Thus, even if the Agencies determine that AEI from IM/E at the Station are more than de minimis and must be minimized through some modifications to the existing CWIS, the Agencies must go on to evaluate whether the benefits of proposed modifications are out of proportion to the costs. Necessarily, as the impacts of existing IM/E are small, only smaller costs can meet the wholly disproportionate test. Thus in applying that test, the Agencies must first take account of the actual size of AEI to be minimized, and the extent to which it can be minimized.

Response to Comment 3.7.1
EPA is neither obligated nor authorized to conduct a "wholly disproportionate" cost-benefit comparison. *See* Responses to Comments 2.1, 2.3.

EPA is not obligated to, and has explained why it has chosen not to, attempt to determine precisely "the actual size of AEI to be minimized" or "the extent to which [AEI] can be minimized" in the specific manner that the comment suggests. *See* General Response 2.02, Responses to Comments 2.7, 2.7.5. EPA lacks (and Mirant has not submitted) an analysis sufficiently reliable to project the level of reductions in adverse environmental impact so as to enable the agency to calibrate technology requirements to the adverse environmental impact with the level of precision that the comment seems to demand. The MassDEP Report reveals the uncertainty and assumptions, and year to year variability, intrinsic in an analysis of this nature. Variability in fish spawning success, water quality and meteorological variations from year to year, and changes in facility operation all contribute to this uncertainty. This is perhaps illustrative of why EPA has not interpreted CWA § 316(b) to require that EPA conduct, in every permit proceeding, the type of analyses that Mirant proposes.

Comment 3.7.2
As the SOB acknowledges, the Agencies are required to consider other non-water environmental impacts of potential technologies to reduce AEI from intakes. Indeed, the SOB rejected some technologies (cooling towers, fine-mesh traveling screens) on such bases. In considering such non-water environmental impacts, it is more likely that they will outweigh the benefits of IM/E reduction if those benefits are small. For example, to save the existence of a herring population in the Charles River, it might be worthwhile to install a technology to reduce IM/E at the Station even if it would foreclose or substantially infringe recreational uses of the Broad Canal or nearby areas of the Charles River. But that impact on recreational uses would not be sensible to save 10 herring per year.

Similarly, a reduction in the small impacts of the existing CWIS also are likely outweighed by some water-related environmental risks of modification. In particular, installation of any of the proposed technologies outside of the Broad Canal or at the mouth of the Broad Canal certainly will alter the hydrodynamics of the Lower Basin to some extent. Whether those changes are beneficial, harmful or inconsequential has not been assessed by the Agencies, but if harmful, they easily could outweigh the small benefits of reducing IM/E from the existing CWIS. The Agencies must consider those trade-offs before determining BTA here under CWA § 316(b).

Thus in considering the full set of impacts of proposed technologies, the Agencies must first take account of the actual size of AEI to be minimized, and the extent to which it can be minimized, to determine whether the overall impacts of the technology actually are positive.

Response to Comment 3.7.2
1. EPA disagrees with the analytical framework implied by the comment, under which incommensurable impacts are compared to determine which "outweighs" the other. *See generally* Response to Comment 2.13. The policy decisions to which the comment adverts—concerning what is "worthwhile," "sensible," and/or "likely . . . to outweigh the benefits of IM/E reduction"—have already been made by Congress in enacting CWA § 316(b) as a technology-based standard. Here, EPA has evaluated the non-water quality impacts of possible technologies and eliminated from consideration options that present unacceptable non-water quality impacts. For example, EPA has in the Final Permit Modification determined that installation of CWIS technology across the mouth of the Broad Canal does not reflect BTA because it would substantially impact recreational use, particularly passage of boats, and has prohibited a CWIS location at the mouth of the Canal that would interfere with the passage of recreational boats into or out of the Canal. *See* Response to Comment 4.12. With respect to other comments regarding non-water quality environmental impacts, EPA judged that these impacts could be mitigated, or, to

the extent unavoidable, were not so severe as to render the technology unavailable. *See, e.g.,* Responses to Comments 4.22, 4.23, 4.24, 4.25, 4.28, and 4.29. In short, EPA determined the best technology available by eliminating technologies that for one reason or another (lack of space; unacceptable recreational/navigational impact; etc.) are not "available," and, of those that are in fact "available," determining which are "best" for minimizing adverse environmental impact, consistent with the other elements of the BTA standard.

2. Mirant suggests that "to save the existence of a herring population in the Charles River, it might be worthwhile to install a technology to reduce IM/E at the Station even if it would foreclose or substantially infringe recreational uses of the Broad Canal or nearby areas of the Charles River. But that impact on recreational uses would not be sensible to save 10 herring per year." This argument is unpersuasive for several reasons (besides the misunderstanding of the analytical framework described above). First, as noted above, EPA has excluded from further consideration, as unavailable, technologies that would "substantially infringe recreational uses of the Broad Canal or nearby areas of the Charles River." Second, the use of hypothetical extremes (comparing "to save the existence of a herring population" vs. "to save 10 herring per year") is unilluminating in this case, which concerns a fishery that is seriously depleted (to the extent that a complete harvest moratorium has been imposed) but not yet at imminent risk of total collapse.

3. As a point of clarification, the SOB did not reject cooling towers or fine-mesh traveling screens on that basis of non-water quality environmental impacts. The SOB determined that closed-cycle cooling was unavailable due to lack of available space. See SOB at 29-30. Regarding the reasons EPA has determined that fine-mesh traveling screens do not reflect the best technology available at Kendall Station, see Response to Comment 4.7.

4. EPA has considered the potential adverse impacts that changing the current hydrodynamics of the lower Basin could have to both organisms and water quality, and has determined that the impacts would be minimal. *See* Response to Comment 4.35.

Comment 3.7.3
In its comments on technology selection in Part 4, Mirant Kendall urges that if the final Permit Modification determines that modifications to Kendall Station's CWIS are needed, piloting and monitoring of the results are necessary to establish detailed final designs. Such piloting will require many months and could require years because there is just one, relatively short peak entrainment season per year and because the design, engineering and permitting issues for these undemonstrated technologies are "challenging."

While time for piloting might be considered unacceptable were the impacts from Kendall Station's CWIS causing substantial adverse impacts, its impacts are de minimis and Kendall Station's overall environmental impacts as a CHP plant are beneficial. Even if the environmental impacts from Kendall Station's CWIS are considered to be more than de minimis, they do not present any sort of emergency that suggests that implementation of improvements must rush ahead without an appropriate time and sequence of activities to meet the engineering and design challenges that the Agencies recognize.

Response to Comment 3.7.3
Regarding "de minimis" impacts, see General Response 2.03, and Responses to Comments Section 3 *passim*, especially Responses to Comments 3.4.2 (MKS entrainment mortality), 3.6 (depleted state of anadromous fish populations in the Charles River), and the MassDEP Report.

Regarding pilot studies and implementation schedules, see Responses to Comments 2.27 and 4.46.

Comment 3.8
The objective under CWA § 316(b) is to minimize AEI from cooling water intakes as part of the larger objective under the CWA to restore and maintain the chemical, physical and biological integrity of the nation's waters. CWA § 101(a). Accordingly, in developing the final Permit Modification, the Agencies should use their understanding of the relationships between Kendall Station's operations, its CWIS and the fish populations in the Charles River to issue a final NPDES permit that enhances those populations.

Here is a specific way for the Agencies to modify the 2006 Final Permit to enhance fish populations in the Charles River. The Normandeau Report shows that the river herring populations in the Charles River vary enormously from year-to-year depending on whether there are high springtime flows at times when the larvae are too small to resist advection out of the system. That effect is unrelated to the operations of Kendall Station's cooling water intake, but as shown in Appendix II to the Normandeau Report, the ability of the larvae to resist advection is favorably affected by Kendall Station's cooling water discharge. Specifically, by increasing water temperatures by a few degrees, the thermal discharge accelerates larval growth rates and shortens the time during which the larvae are too small to resist advection. Without that effect, a higher percentage of larvae would be advected and would not contribute to the YOY abundance in that year and to the eventual numbers of returning adults.

The same acceleration in larval growth rates also would shorten the time during which larvae are too small to resist entrainment through such devices as fine-mesh barrier nets. The 2006 Final Permit, however, would force Kendall Station to curtail its discharge during the peak entrainment season before it would cause in-stream temperatures to reach the levels that are reported to be optimal for larval growth rates. As a result, that benefit of the discharge also would be lost, with consequential losses in equivalent adult river herring. If the Agencies wish to enhance and maintain the biological integrity of the Charles River, they should also reconsider the in-stream temperature limits in the 2006 Final Permit and adjust them upwards, particularly as applicable during the peak entrainment season.

Specifically, Mirant Kendall recommends that the thermal limits in the 2006 Final Permit should be changed for the periods between April 15 and June 12. Currently, the thermal limits in the 2006 Final Permit follow a "stair-step" approach with resulting four-hour-averaged in-stream limits beginning at 65° F on April 15 and stepping up to 75° F for June 8 - 11. As discussed in detail in the Normandeau Report, these limits are all below the optimum temperatures for river herring larval growth of 79° F. Further, from mid-May onward, these limits are frequently less than two standard deviations above the historic mean temperatures recorded in the river, including in superior herring production years like 2005 and 2007. Therefore the following alternative limits are suggested for consideration, consistent with scientifically defensible targets for enhanced productivity and historic ambient conditions in the river:

April 15 - May 15: 24-hour average of 72° F
May 15 - June 11: 24-hour average of 79° F

Response to Comment 3.8
In the Statement of Basis, EPA stated: "EPA is requesting, and plans only to respond to, comments regarding the portions of the Final Permit that have been replaced and/or modified by this permit modification." Statement of Basis, at 6; *see also* Public Notice, at 2; *see generally* 40 C.F.R. § 124.19(d) (noting that "Any portions of the permit which are not withdrawn and which are not stayed under §124.16(a) continue to apply," i.e., that exercise of § 124.19(d) withdrawal option does not reopen entire permit to renewed comment). This comment pertains solely to thermal discharge limits, which EPA did not withdraw under 40 C.F.R. § 124.19(d), did not propose to modify in the Draft Permit Modification, and did not subject to a renewed opportunity for public comment. The thermal discharge limits to which the comment requests changes were not developed under the authority of CWA § 316(b), do not constitute part of the "best technology available for minimizing adverse environmental impact," and are certainly not inextricably intertwined with the permit's section 316(b) requirements such that EPA would be required to consider them as within the scope of this permit modification proceeding.

Consequently, no further response is necessary. That said, EPA provides the following supererogatory response: EPA disagrees with the substance of the comment, for several reasons.

First, as a matter of science, the evidence indicates that, while warmer temperatures may result in increases in larval growth rates, warmer temperatures also result in decreased survival rates. *See* 2006 Response to Comments, Response to Comment C44, at C125-C128; *see also id.* Response to Comment C7 (Part II), at C41; Response to Comment C23, part 4, at C79-C80. In other words, increasing the 2006 Final Permit's thermal limits might result in larger larvae, but it would also result in fewer of them.

Second, as a matter of policy, EPA disagrees with the comment's fundamental assumption that the NPDES permit should use Kendall Station's heat discharge to orchestrate a man-made temperature regime to "improve" the Charles River's natural temperature regime. *See* 2006 Response to Comments, Response to Comment C47, at C138-C139 ("Mirant's comment seems to suggest that it is necessary to heat the lower

Basin . . . with warmer temperatures than the river would reach without anthropogenic influence. EPA and MassDEP support actions which allow natural ambient conditions to influence the aquatic habitat as much as possible, rather than attempt to artificially warm or cool the lower Basin.”).

One example of the implications of EPA’s reluctance to engage in artificial temperature management is illustrated by the differing implications of warmer temperatures for alewife and blueback, the two different species of river herring. In a natural temperature regime, the relative populations of alewife and blueback would fluctuate according to a variety of factors, both natural (e.g., predation, competition, different growth cycles, habitat preferences, etc.) and human-induced (e.g., fishing, different tolerance for various anthropogenic influences). Among other differences, blueback herring are more tolerant to temperature than alewife. The temperature limits specified in the 2006 Final Permit are designed to be protective of alewife, which was selected as the anadromous species most sensitive to temperature in the lower Basin. Thus, any attempt to artificially manage the temperature of the lower Basin by heating it above natural conditions would favor blueback over alewife and likely contribute to a population that, though perhaps indigenous, would not be “balanced” because the relative success of two different species is being partially determined by anthropogenic heat discharges.

Of course, it may be that the ecosystem of the lower Basin has been, and continues to be, altered from its natural state due to anthropogenic influences, some of which may be beyond the scope of this permit (or the NPDES program in general). However, EPA is not inclined, and is certainly not legally obligated by the Clean Water Act, to deliberately use a NPDES permit to create an unnatural temperature regime in a waterbody and thereby actively contribute to such imbalances.

4. COMMENTS ON BTA AT KENDALL STATION

Comment 4.1
[Mirant makes numerous distinct points in this comment. For purpose of clarity, EPA has subdivided the comment into comments 4.1.1-4.1.10, and organized its responses accordingly. Cross-references to "Response to Comment 4.1" elsewhere in the document refer to the responses 4.1.1-4.1.10 collectively.]

Comment 4.1.1
EPA's method of determining BTA for the Draft Permit Modification does not constitute a proper BTA determination, which requires a much more thorough and consistent application of all (and not some) of the factors relevant to a proper BTA analysis. For example, the SOB fails to thoroughly and independently evaluate the "availability" of the various technologies or design standards (including a proper analysis of their costs).

Comment related to 4.1.1 from Yan Au of CLF
We feel that EPA and MassDEP have done a good job of evaluating and ensuring the chosen technologies minimize impacts to adult and juvenile fish as well as fish eggs and larvae. The three tiered approach to the BTA at the site described in Part 1.A.11 of the Final Permit Modification make sense. We feel it should work to minimize adverse impacts to the aquatic organisms.

Response to Comment 4.1.1 and related comment
EPA acknowledges the comment supporting EPA's BTA determination and disagrees with the comment criticizing EPA's BTA determination. Regarding availability, see Responses to Comments 4.16 generally, and specifically 4.16.3; 4.19 generally, and specifically 4.19.3; 4.20, 4.24, and 4.25 generally, and specifically 4.25.6. Regarding cost, see General Response 2.04.

Comment 4.1.2
The SOB is also internally inconsistent in that it sometimes evaluates a technology using a site-specific analysis, but at other times evaluates a technology generally and in the abstract, without any reference to or consideration of the determinative site-specific factors affecting availability or the ability of that technology to reduce impingement and entrainment at Kendall Station.

Response to Comment 4.1.2
In this BPJ permitting decision, EPA has used a site-specific analysis to the extent possible. Where reliable site-specific information is available, EPA has used such information. Where site-specific information is unreliable or unavailable, EPA has relied on more general information.

Comment 4.1.3
Moreover, EPA New England often determines that certain technologies do not reflect BTA on the basis of analyses that would apply equally to other technologies that EPA New England concludes could reflect BTA.

Response to Comment 4.1.3
This comment is generic and largely prefatory to more specific comments pertaining to specific technologies. EPA has responded to the more specific comments. See, e.g., Response to Comment 4.7.

Comment 4.1.4
Finally, under the rubric of providing "flexibility," EPA New England did not make determinations on several issues it has the burden of deciding. For example, the SOB did not thoroughly assess the implications of its decision not to specify a location for the CWIS technologies. Location, in general, is a critical factor in the BTA determination, and, as discussed in more detail below, location has even greater significance in the Lower Basin because it has an important bearing on which CWIS technologies may be available and which may tend to increase rather than decrease environmental impacts.

Response to Comment 4.1.4
While section 316(b) requires EPA to "require that the location . . . of cooling water intake structures reflect the best technology available for minimizing adverse environmental impact," the granularity of that "location" is not specified in the statute. In some cases it may be necessary to specify the "location" to the nearest inch; in others it may suffice to observe that a certain general area constitutes one "location"; in others it may be appropriate to note that two areas constitute distinct "locations" but that both "locations" reflect BTA. The SOB location analysis considered, and rejected, alternate locations for the CWIS. See SOB at 28-29 (concluding that relocating CWIS to the inner Harbor would not reflect BTA; noting EPA's earlier conclusion that "BTA would entail retaining the CWIS in its approximate current location in the lower Charles River basin"; and concluding that "EPA is not aware of any new information that would alter this conclusion and, as a result, does not currently intend to give further consideration to relocating the CWIS to an alternative site as an element of the BTA for Kendall Station.").

In response to public comments regarding location of BTA at Kendall Station, the Final Permit Modification has been altered to prohibit the CWIS from a location outside of, or blocking, the Broad Canal. See Responses to Comments 4.12-4.22.

Comment 4.1.5
The absence of a thorough BTA analysis is most apparent with respect to the Draft Permit Modification's various design standards. Some of these design standards are technologically infeasible, have never been deployed or tested, and will do little to promote EPA New England's goals while at the same time being unlikely to result in the best performing technology to minimize the already small effects resulting from Kendall Station's intake. Although recognizing that the technologies and design standards that would satisfy its BTA requirements are unproven and untested, EPA New England provides little more than conclusory statements to support its determinations, and does not fulfill its obligations to use its BPJ to determine BTA.

Response to Comment 4.1.5
See Responses to Comments 4.22- 4.25.

Comment 4.1.6
Moreover, EPA New England recognizes that there is no existing CWIS technology that -- standing alone -- could satisfy all of the design standards that it proposes to impose on Kendall Station. Mirant Kendall therefore would have to create a completely new and innovative suite of technologies in order to satisfy the proposed design standards. In this sense, EPA New England's BTA determination would force Mirant Kendall to develop a completely new and untested technology, rather than install a currently available technology.

Response to Comment 4.1.6
EPA has determined that several available technologies would satisfy all of the design standards in the Final Permit Modification. See Responses to Comments 4.25.3, 4.39, 4.40, 4.42, 4.43, and 4.47.

Comment 4.1.7
EPA New England states that it has relied upon "reasonably available data" in making its BTA determination. But of the four technologies that EPA New England identifies as having the potential to serve as the "primary BTA," at Kendall Station, two have never been deployed or tested in the § 316(b) context (0.5 mm fine-mesh barrier net and Filtrex), and the other two have never been deployed or tested in any situation that would provide any idea of whether they would be available or effective at Kendall Station. Moreover, the SOB does not identify an exclusion technology, nor is Mirant Kendall aware of any, that has been designed, tested or deployed to achieve the design standards requiring a "gentle release" of impinged eggs and larvae and "induced sweeping flows."

Response to Comment 4.1.7
See Responses to Comments 4.24 (gentle release), 4.25 (induced sweeping flow), 4.40 (fine mesh barrier net), 4.42.1 (aquatic filter barrier), 4.43.2-3 (wedgewire screens), 4.44 (Filtrex).

Comment 4.1.8
Furthermore, the "reasonably available" site-specific data from the Charles River, on which EPA New England should have based its analyses, do not support a conclusion that the design standards, even if achievable, are necessary or appropriate to minimize AEI. EPA New England's conclusory justifications are oftentimes contradicted by information and data in the administrative record, including some of EPA's own scientific and technological materials. For example, the SOB relies on the Phase II Rule for its determination that 0.5 fps is a necessary through-medium velocity to prevent impingement, but overlooks the Phase II Rule's analysis on this topic that demonstrate how there is little basis for imposing that standard at Kendall Station.

Response to Comment 4.1.8

This comment contains both a general criticism (“oftentimes”) and a specific example (selection of 0.5 fps as through-medium velocity). To the extent that the general criticism is also manifested in specific comments that EPA can reasonably connect to particular permit provisions, EPA has responded to those specific comments in detail. Regarding the specific example presented in this comment, see Responses to Comments 4.10.4, 4.23.1, and 4.29.1.

Comment 4.1.9
The SOB’s statement that none of the evaluated technologies are “perfect, proven and fully protective of the environment,” and that they are all “innovative,” underscores just how far from the requisite BTA determination EPA New England has strayed. Not only has EPA New England proposed to require untested, unproven and innovative design standards and technology without a thorough and searching review of their availability, but it has also failed to closely evaluate, on a site-specific basis, whether these unproven and experimental technologies would actually minimize environmental impacts in the Lower Basin.

Response to Comment 4.1.9
With respect to whether a technology is “proven,” in other words the technology has been used successfully at facilities with the same or similar characteristics, is one important factor for EPA to consider. Of course, a technology is not “unavailable” simply because it has not been used with complete success at an identical facility. In this BPJ permitting decision, EPA has used a site-specific analysis to the extent possible. However, site-specific analysis of technologies is limited in this case, and EPA has relied on more general information where site-specific information is unreliable or unavailable. See Response to Comment 2.1 Part 4. Finally, EPA believes that any technology that successfully fulfills the design standards included in Part I.A.11 of the Final Permit Modification will effectively minimize environmental impacts in the Lower Basin based on site-specific analysis (see, for example, Response to Comment 4.10.4), research studies (see, for example, Response to Comment 4.28), other deployments (see, for example, Responses to Comments 4.42.1 and 4.43.2), and technical evaluations (SAIC Report, AR 738).

Comment 4.1.10
As a result, EPA New England has created a level of uncertainty by not fully evaluating the potentially adverse consequences for the Lower Basin that some technologies may create. For example, and as described more fully below, one of the few theoretically feasible ways for inducing an artificial sweeping flow would more than double the amount of water that its withdrawn from and then discharged back to the Lower Basin. The SOB does not evaluate the risks that such a significant change in the flow patterns in the Lower Basin may have on both organisms and water quality itself. EPA New England must thoroughly evaluate all of the consequences of “design standards,” such as this, rather than adhere to the SOB’s narrow focus on theoretical ways to reduce already de minimis numbers of IM/E.

Response to Comment 4.1.10

Regarding induced flow, see Response to Comment 4.25 and the SAIC technical report (AR 738). Regarding purportedly "de minimis" impacts, see Response to Comments Section 3.

Comment 4.2
In this comment, Mirant summarizes the BTA determination in the SOB and the conditions of the Draft Permit Modification.

Response to Comment 4.2
No response is required because the SOB speaks for itself and the comment is not a "significant comment" under 40 C.F.R. § 124.17(a)(2).

Comment 4.3
[Comment 4.3 has three subcomments, 4.3.1-4.3.3. Comment 4.3 itself is prefatory; comments 4.3.1 and 4.3.2 simply provide background. For convenience, EPA has merged and summarized these comments into a single comment numbered 4.3.]

The Agencies should consider the public walkway requirement. MK and property owners to the west of Kendall Station are under separate obligations to design, permit and maintain a public walkway along the Broad Canal pursuant to regulatory approvals from MassDEP, the Cambridge Conservation Commission (CCC), and others. The CCC has approved plans that Mirant submitted for this walkway.

The infrastructure of the planned walkway limits the feasibility of some of the technologies identified in the SOB and increases the costs or engineering difficulties of others. Development of the walkway and a small craft marina (consisting of a public boat dock and an area for canoe and kayak rentals) will lead to increased recreational use of the Broad Canal and Lower Basin, which in turn requires the Agencies to examine not only the adverse aesthetic impacts of some technologies that it proposes, but also the significant safety and navigational concerns that some technologies present, even with reasonable mitigation.

Response to Comment 4.3
The proposed public walkway for the Broad Canal was required as a provision of a MassDEP waterways license (#8772) which also included the construction of the new generator at MKS among other items. The MassDEP is in the process of issuing an amendment to this license which will extend the previous deadline by which Mirant was required to construct this walkway, in order to account for recent developments. As the comment notes, the revised plans for this walkway have been approved by the CCC.

In making its BTA determination for the Final Permit Modification, EPA considered the current and future recreational uses of the Broad Canal and Lower Basin and the comments submitted on the Draft Permit Modification. The Lower Basin has designated primary and secondary contact uses, but these are not always attained, especially after wet weather. In light of the fact that there is ongoing recreational use in the Broad Canal, as well as a planned small craft marina at the end of the Broad Canal, which will likely increase such use, the Final Permit Modification has been revised to prevent the installation of an exclusion technology that would effectively block access to the Charles River from the Broad Canal. See Part I.A.11.a of the Final Permit Modification. The Final Permit Modification also precludes the installation of a technology in the Broad Canal that would not allow for adequate room for passage of small watercraft in and out of the Broad Canal, except during times of construction of such BTA components.

In its comments on the Draft Permit Modification, the permittee put forth a BTA proposal that would include the installation of a barrier net system which would be attached to the support piles of the planned walkway. See Response to Comment 4.45. If, in selecting and installing a particular technology to comply with the conditions of the Final Permit Modification, Mirant decides upon a design that will be attached to or have any effect on the walkway, Mirant may be required to revise and obtain approval for any changes in the walkway design plans and also make all necessary and reasonable efforts to obtain any other local, State or Federal permits and approvals required for installation of such a system.

Regarding any aesthetic impacts associated with CWIS technologies, EPA and MassDEP are satisfied that the technologies that would fulfill Part I.A.11 of the Final Permit Modification need not pose aesthetic impacts so severe as to render them "unavailable" under CWA § 316(b). Most, if not all, of the available technologies are primarily located beneath the surface of the water and will not impact the visual aesthetic. Associated structures (e.g., return system) could be integrated into the public walkway in order to achieve minimal impact to aesthetics. Thus, there are ways that the permittee can design a CWIS technology (including elements required for induced flow) that would be effective in reducing impingement and entrainment (I&E) while at the same time not creating unacceptable aesthetic impacts in the water or the vicinity of the water.

With proper design of technology as well as appropriate public notification prior to and during construction as well as signage in the area, the permittee can mitigate any navigational and safety issues. There are also provisions in the MassDEP waterways license that address these issues. See also Response to Comment 2.23.

It is important to emphasize that EPA has carefully considered the public walkway in reaching its final decision, and has designed the Final Permit Modification to be *consistent with* the public walkway and associated requirements, but no part of this NPDES permit modification requires Mirant to build or maintain a public walkway. Of course, Mirant might be well advised to take the requirements of this Final Permit Modification into consideration as it builds the walkway; it is possible that cost savings could be achieved by doing so, as opposed to building it as if the Final Permit Modification did not exist, and then later realizing that it has created an unnecessary problem for itself when it comes time to install the CWIS technology required by the Final Permit Modification. However, from the perspective of the NPDES permit, the relevance of the public walkway is that the Final Permit Modification is designed to be consistent with such a walkway, and EPA has determined that the Final Permit Modification will not likely result in a violation of any applicable legal requirements. If

Mirant determines that the requirements of the Final Permit Modification require the walkway to be built in a fashion differently than previously envisioned (possibly involving subsequent state and local process), it is Mirant's responsibility to make necessary changes and seek any further required state or local authorizations.

Comment 4.4
Mirant concurs with EPA New England's conclusion that closed-cycle cooling does not reflect BTA for Kendall Station, as well as some of its analyses, but provides additional reasons why cooling towers do not reflect BTA at Kendall Station.

Comment related to Comment 4.4 from Yan Au of CLF
We prefer closed cycle cooling at MKS, but we won't contest EPA's conclusion that closed cycle cooling isn't feasible due to space limitations.

Response to Comment 4.4 and related comment
In the SOB, EPA stated:

> Based on the scarcity of available space, and the easements and underground utility lines present, as well as the otherwise densely developed area around the power plant, EPA reaffirms its conclusion that cooling towers are not an available technology for Kendall Station at this time. Consequently, no detailed analysis regarding any of the other related issues (energy penalty, noise, fogging, icing, etc.) is necessary.

SOB at 29-30. Mirant's comment concurs with EPA's conclusion that cooling towers are not an available technology for Kendall Station at this time, and merely offers additional reasons why Mirant agrees with EPA's conclusion. Similarly, CLF's comment declines to contest EPA's conclusion. Consequently, no further response is necessary.

Once a technology has been eliminated from consideration, further analysis of that technology is unnecessary. *Cf. Cont'l Air Lines, Inc. v. Civil Aeronautics Board,* 551 F.2d 1293, 1309 (D.C. Cir. 1977) ("While the Board has an obligation to consider proposals by the parties, the Rule of Administrative Law requiring a statement of the reasons for adoption of standards and approaches does not require comparable detail for the reasons for discarding alternative approaches preferred by the parties."). Conducting detailed analyses of concededly unavailable technologies and counterfactual hypothetical scenarios is not legally required and would serve no useful purpose here. However, it should not be inferred from this response that EPA agrees with any or all of the additional reasons that Mirant proffers for rejecting closed-cycle cooling as BTA at Kendall Station.

Comment 4.4.1
Mirant agrees with EPA's analysis that existing easements, below-grade utility lines, constraints imposed by local and state historical commissions, and lack of adjacent property all represent factors that preclude a determination that cooling tower structures can be feasibly constructed at or around Kendall Station.

Response to Comment 4.4.1
See Response to Comment 4.4.

Comment 4.4.2
Mirant adds that in addition to easements and below-grade utility lines, Kendall Station's lot already is filled with structures necessary for its operations. These existing structures also limit the space available for the construction of cooling towers.

Response to Comment 4.4.2
See Response to Comment 4.4.

Comment 4.4.3
Mirant agrees with EPA New England that there is no available space on adjacent properties on which to locate closed-cycle cooling towers. Mirant also asserts that the potential availability of adjacent space is not a proper inquiry for EPA as part of its BTA determination, which must confine itself to an examination of the land under Kendall Station's reasonable control.

Response to Comment 4.4.3
See Response to Comment 4.4.

Comment 4.4.4
Construction of cooling towers would require numerous other permits and approvals that are just as uncertain to issue as the approvals of local and state historical commissions that EPA New England recognized as a factor in finding construction of cooling towers to be infeasible. EPA New England should recognize this factor as a reason for determining that cooling towers are not BTA.

Response to Comment 4.4.4
See Response to Comment 4.4.

Comment 4.4.5
Mirant Kendall agrees that, if EPA had determined space constraints that did *not* preclude construction of cooling towers, it would have also had to examine the other environmental impacts of cooling towers, including those that could directly impact human health and safety.

An additional factor to be considered as part of the BTA analysis is whether the costs of constructing and operating a CWIS technology are wholly disproportionate to the benefits. EPA must first compare the relatively small magnitude of the environmental impacts due to impingement and entrainment at Kendall Station when compared against the significant costs of converting Kendall Station to a closed-cycle cooling system with cooling towers.

Moreover, under the current circumstances, a cost-effectiveness analysis with respect to the construction and installation of cooling towers is also appropriate because there are several other potential technologies discussed in the SOB with comparable potential to reduce impingement and entrainment, but with very different capital and annualized costs.

Finally, the SOB should have also considered the benefits of Kendall Station's thermal discharge on growth rates of river herring larvae. Newly conducted analyses demonstrate that eliminating the thermal discharge by requiring closed-cycle cooling could result in adverse impacts to the river herring population. In this sense, closed-cycle cooling has the potential to increase, rather than minimize, some adverse environmental impacts.

Response to Comment 4.4.5
See Response to Comment 4.4. While no further response is necessary, see also Responses to Comments 2.12, 2.20, and 3.8.

Comment 4.5
In the SOB, EPA concludes that installation of variable speed pumps (VSPs) would be unlikely to substantially minimize I&E. While MK believes that deployment of other CWIS technology would render VSPs unnecessary, EPA's analysis regarding the benefits of VSPs is in some places incorrect and in other places incomplete.

Mirant agrees with EPA that VSPs can potentially decrease intake volumes that would result in corresponding reductions in I&E and that VSPs can potentially reduce flow only when MKS is operating at less than full capacity. But, as EPA recognized, Mirant Kendall's mean monthly withdrawal during the peak entrainment season is only 76% of the permitted maximum and therefore, flow reductions are possible during this season.

Despite recognizing these reductions during peak season, the SOB, without any calculations or analysis, states that those reductions would be unlikely to substantially reduce I&E. In order to justify this conclusion, EPA must calculate the amount of flow reduction that operation of the VSPs could accomplish and then determine the amount of I&E that these reduced flows would prevent.

The comment also states that there appears to be an error in the SOB's identification of the peak entrainment season in its discussion of VSPs, contrasting references to the "peak entrainment period" at pp. 12, 30, and 46 of the SOB.

Response to Comment 4.5
EPA agrees that installation of VSPs could reduce flows (and corresponding levels of I&E) to some degree, except during periods when electricity production is at or approaching levels commensurate with the maximum intake pumping rate of approximately 79.2 MGD. However, due to the past variability of flows throughout the year and the uncertainty of future flows, EPA cannot reliably estimate what such corresponding decreases in I&E would be. That said, in its 2001 permit application, Mirant briefly evaluated the I&E reduction associated with VSPs, and concluded: "Little, if any reduction in fisheries impact would occur compared to the current proposal." Mirant NPDES Permit Application, at 6-25. In that document, "the current proposal,"

with respect to I&E, apparently referred to a combination of a 1/32 (approximately 0.8mm) mesh barrier net and a flow limit of 70 MGD as an annual average. See id. at 6-8 to 6-9, 6-25. As explained elsewhere in this Response to Comments, EPA has concluded that a barrier net with a mesh size larger than 0.5mm, even with flow restricted to 70 MGD as a monthly average, would not sufficiently reduce I&E of the smallest eggs and larvae. Mirant has not supplied an updated analysis of its view of the I&E reductions achievable by VSPs.

EPA also agrees with the permittee that the deployment of other CWIS technology would result in much higher levels of I&E reduction than could be achieved by VSPs, and would render VSPs unnecessary at this time. Therefore, EPA is not obligated to specifically estimate the I&E reduction associated with VSPs and cannot reliably do so based on the plant's variability in electricity production.

However, EPA cannot preclude the possibility that VSPs could be required as a component of a future BTA determination (e.g., if other components prove to be ineffective, cannot be permitted, or other reasons). Therefore, an estimate of potential I&E reductions is provided below.

Assuming a monthly average permit limit of 70 MGD for April through June, the estimated I&E reductions achievable by VSPs would be based on reductions from 70 MGD and not 79.2 MGD, which is the approximate maximum flow. EPA further assumes mean monthly withdrawal during the peak entrainment season at 76% of the permitted maximum (i.e., about 53.3 MGD), and also that I&E reductions at the facility are roughly commensurate with decreased flows. If one intake pump per CWIS is replaced with a VSP, this would allow each of the three VSPs to operate at roughly half their pumping capability (or from approximately 16% of total intake flow each to 8% each), resulting in an approximately 24% reduction in overall intake flow and a roughly 24% reduction in I&E. These reductions are substantially less than what is expected to be achieved by the aquatic organism exclusion technology required by the Final Permit Modification. In short, EPA agrees that VSPs would result in non-trivial reductions in adverse environmental impact, and encourages their use at Kendall Station. The Final Permit Modification in no way prohibits Mirant from installing VSPs. However, VSPs alone do not reflect BTA.

As a result of this examination of the capacity reductions achievable by VSPs, EPA has examined whether other capacity reductions could be achieved. In its February 2001 permit application, Mirant examined operational shutdowns or prescribed outages as a means of curtailing flow when aquatic organisms are most likely to be entrained. *See* Mirant NPDES Permit Application (Feb. 2001), at 6-22. In that application, Mirant stated that the nature of the facility's steam demand did not support the feasibility of this option. In the Draft Permit Determinations Document, EPA considered "Generation Curtailment & Timed Maintenance Outages" as an option, and noted:

> EPA believes that the permittee should employ options to make reductions in electrical generation in a way that would not disrupt its obligations to its steam

> customers. In order to maintain sufficient steam generation capacity, the plant could discharge at a heat load of up to 10% of the maximum heat load discharge represented by a discharge of 80 MGD. In the case of MKS, EPA finds that flow reduction and generation curtailment are appropriate and available methods of meeting some short-term or seasonal heat reduction target.

Draft Permit Determinations Document, at 222. However, neither the 2004 Draft Permit nor the 2006 Final Permit required flow reduction or generation curtailment—other than the seasonal limit of monthly average flow during the months of April, May and June to 70 MGD—under section 316(b).

Upon present consideration, EPA agrees with its prior determinations that extensive curtailment or outages during the spawning season do not reflect BTA at Kendall Station. However, Kendall Station regularly conducts scheduled *maintenance* outages approximately one week long. When practicable, scheduling such outages (which must occur anyway) during times of high entrainment is a component of the best technology available for minimizing AEI. The timing of these outages is dependent on the facility's maintenance needs, and the record does not support an absolute requirement that such outages always occur during peak entrainment season. However, EPA has added a requirement in the Final Permit Modification (Part I.A.11.d) that requires Mirant to schedule such outages between May 15 and June 30 to the extent practicable, and if it is not practicable to do so in a given year, to explain why not. The practicability exception is designed to accommodate the realities of plant operational and maintenance needs, which are within Mirant's unique expertise; the requirement to submit a written explanation is designed to encourage transparency and accountability. In other words, while the Final Permit Modification allows Mirant to schedule a maintenance outage outside of this period, it must provide a reason for this timing. *See also* Response to Comment 1.13.

With respect to the "peak entrainment period," Mirant assumes an error where there is none. Most of the eggs and larvae in the Basin are found between April and July; within this four-month period, most of the eggs and larvae have been collected in May and June. *See* SOB at 11-12 ("[E]ntrainment is highly seasonal with eggs and larvae primarily present in the basin between April and July . . Overall, 94 percent of eggs and 95 percent of larvae were collected in May and June. Thus, ichthyoplankton sampling, combined with life history data, suggest that entrainment at Kendall Station would be expected primarily between early spring and late summer, with peaks in May and June."), 30 (referring to "the peak entrainment period from April through July"), 46 ("[E]ntrainment is highly seasonal, with peaks in May and June."). April through July represents the peak entrainment period as a whole, while the actual peaks (i.e., daily, weekly, or monthly maximum values for eggs and larvae collected) occur in May and June. See also Responses to Comments 4.26 and 4.36.

Comment 4.6
With respect to capacity, the SOB concludes that BTA for Kendall Station is already reflected by the 2006 Final Permit's previous limitations on monthly average flows for

April, May and June. SOB at p. 43. While Mirant Kendall agrees that any limitations on capacity beyond the Final Permit's limits do not represent BTA, Mirant Kendall believes that even these limitations are not necessary as part of BTA.

If the Final Permit Modification includes the additional design standards proposed by the Draft Permit Modification (or those set forth in Mirant Kendall's BTA Proposal) to reduce entrainment and impingement, capacity restrictions are no longer needed. In other words, because EPA New England has included design standards that it believes are sufficient to minimize environmental impacts of entrainment and impingement, capacity restrictions are no longer necessary, and cannot be justified absent an analysis that without those restrictions, impingement and entrainment will not be minimized.

The design standards proposed by the Draft Permit Modification (and Mirant Kendall's BTA Proposal) incorporate a mesh-size sufficient to reduce entrainment, and a limit on through-screen velocity that will reduce or eliminate the already de minimis levels of impingement. Any restrictions on capacity, therefore, will not provide any meaningful benefits to minimize impacts of entrainment or impingement because the mesh-size and the maximum approach and through-medium velocities will not change and thus will be sufficiently protective no matter whether Kendall Station's rate of intake is 70 MGD or 80 MGD. For this reason, the Final Permit Modification should eliminate this unnecessary restriction on intake.

Response to Comment 4.6
The 1988 permit required Mirant to meet a monthly average flow of 70 MGD. In the 2004 Draft Permit Determination Document, EPA explained:

> Mirant Kendall proposes to increase the permitted flow of the once-through cooling water by changing the monthly average of 70 MGD to an annual average of 70 MGD. The daily average maximum flow will remain the same at 80 MGD. However, the actual flow of the non-contact cooling water will increase above the historical flow (approximately 50 MGD) to a level approaching the permit limit, as a result of the increased thermal load arising from the upgrades to power plant and from a change to continuous plant operation. This change to an annual average flow of 70 MGD will likely result in higher non-contact cooling flows through most of the year, an associated increase in heat load to the river and likely increases in the potential impacts due to impingement and entrainment (I&E) of aquatic life. The permittee will also be limited to a monthly average of 70 MGD for the months of April, May and June, to protect fish, eggs and larvae during their spawning periods.

DPDD at 23; *see also id.* at 228 ("[T]he permittee is required to limit its discharge flow during the months of April, May and June to 70 MGD, as a monthly average. Spawning activity takes place primarily during this three month period and limiting the discharge flow during this time will lead to lower rates of I&E of aquatic organisms as compared to the plant's permitted daily maximum discharge of 80 MGD. Yet, the permittee should be able to comply with this limit as 70 MGD is the yearly average design flow proposed by the permittee and April through June are not typically the highest demand months of the year."). These limits were retained in the 2006 Final Permit. See 2006 Final Permit Response to

Comments, Response to Comments Related to B9 (3) from CLF and MA CZM, at B13. The Draft Permit Modification did not modify this limitation. *See* SOB at 43.

The exclusion technology will substantially reduce entrainment of ichthyoplankton by excluding organisms using a small mesh size and low through-screen velocity. Nonetheless, some organisms may still be entrained. The proportion of a given type of organism that is successfully excluded by an exclusion technology is known as "retention" or "collection efficiency." ESEERCO (AR 750) examined the retention of 0.5 mm mesh at 0.5 fps, and found that: (1) retention of later postlarvae (alewife greater than 9.5 mm and yellow perch greater than 6.3 mm) ranged from 89 to 100 percent; (2) retention of early yellow perch prolarvae (mean length 5.8 mm) was somewhat lower, but still greater than 50 percent; but (3) retention of early alewife prolarvae (mean length 5.2 mm) was poor. EPRI (AR 749) observed 0.5 mm screens retaining as much as 80 percent of common carp (average length 7.6 mm) at one screen type, but other screens and trials retained between 40 to 65 percent of common carp. The study also observed collection efficiency as low as 20 percent for white sucker (average length 16.8 mm). Based on these results, the exclusion technology will likely prevent entrainment of a substantial number of eggs and larvae. However, limited entrainment may occur even with small mesh size and low intake velocity. For this reason, requiring an average monthly limit of 70 MGD is still necessary to protect the maximum number of ichthyoplankton during the peak entrainment season.

Furthermore, based on available operational data, reducing the average monthly intake limit to 70 MGD is not likely to impair Mirant Kendall's operations so severely as to render the requirement unavailable. EPA examined Mirant's average monthly intake from 1998 to 2005. Over this seven-year period, the average monthly intake during April, May, and June did not exceed 70 MGD, and averaged only 51.6 MGD. In fact, the proposed average monthly permit limit of 70 MGD was only exceeded once in this seven-year period. A monthly average of 70 MGD during the peak entrainment period matches the facility's past average intake flow, even in years with higher intake flows (such as 2006 and 2007), and Mirant Kendall has not provided any information suggesting that meeting these limits would pose operational problems. *Cf.* 2006 Response to Comments, Response to Comment H1, at H9 ("[T]he 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.").

Limiting flow is among the surest methods, and perhaps the surest method, for limiting entrainment. Because the 70 MGD monthly limit during the peak entrainment season would ensure entrainment reductions beyond reductions provided by the exclusion technology, particularly for organisms that may still become entrained, and because of the minimal (if any) operational impact of the limit, EPA has concluded that an average monthly limit of 70 MGD from April through June is warranted, and has been retained.

Comment 4.7
The SOB begins its analysis of traveling screens by first examining Kendall Station's current traveling screens and stating that current intake velocities are not low enough to

be protective. SOB at p. 31. The SOB's most substantive discussion of fine-mesh traveling screens occurs as part of its review of the six BAT criteria. SOB at p. 39. At that point, the SOB finds that fine-mesh traveling screens are not BTA based on several different factors. First, the SOB finds that installation of the screens would require significant infrastructure changes to the current CWIS. SOB at p. 39. Second, the SOB finds that in order to minimize AEI, a fish return system would be needed and that the efficacy of such a return system was uncertain, especially considering that such a system would subject organisms to additional stress. SOB at p. 39. Third, the SOB finds that installation of a fish return system would require substantial construction, and could possibly alter the historic seawall. SOB at p. 39. Summarizing its findings, the SOB concludes by stating that fine-mesh traveling screens are not BTA because screens and a fish return system would be "technologically difficult [to install] and their ability to maximize the ultimate survival of otherwise entrainable organisms is uncertain." SOB at p. 39. The SOB then reaches the same conclusion, based on the same rationale, for Geiger screens. SOB at p. 40.

While Mirant Kendall agrees with several aspects of the SOB's analysis regarding fine mesh traveling screens, it does not believe that fine-mesh traveling screens should be eliminated as BTA, as discussed in the comments that follow.

Response to Comment 4.7
In the SOB (p. 39-40), EPA evaluated the feasibility of fine mesh traveling screens and noted the following:

1. A fine-mesh traveling screen could result in the impingement of river herring eggs and larvae, which are particularly fragile and susceptible to mortality from CWISs.
2. Retrofitting Kendall Station's existing traveling screens with fine-mesh traveling screens, which generally include mesh sizes of 5 mm or less (EPA Technical Development Document for New Facilities, p. 5-7), would require making the surface area of the screens much larger than the current configuration in order to maintain a through-screen velocity of not more than 0.5 fps.
3. Transporting eggs and larvae to the Charles River through a fish return system would cause additional stress, which may jeopardize their survival. The success of a fish return system for the smallest life stages of river herring, which is the most frequently entrained species, has not, to EPA's knowledge, been evaluated.
4. Engineering a fish return system to deposit fish, eggs, and larvae outside the Broad Canal back into the Charles River would require substantial construction and potentially the alteration of a historic seawall.

EPA therefore reached two conclusions: "operation of fine-mesh traveling screens at Kendall Station would be technologically difficult," and "their ability to maximize the ultimate survival of otherwise entrainable organisms is uncertain." *Id.* at 39. EPA therefore concluded that "fine-mesh traveling screens do not constitute BTA at Kendall Station." *Id.* at 40.

In response to Mirant Kendall's comments, EPA carefully re-evaluated all four elements of its analysis. EPA has refined and elaborated that analysis, but reached the same ultimate conclusion: that fine-mesh traveling screens are not BTA at Kendall Station. The reason for this conclusion is an elaboration of point #1 above: a fine-mesh traveling screen at Kendall Station would be likely to cause significant mortality to eggs and larvae of the Charles River species (river herring and perch) that would become impinged upon it. The most commonly entrained organisms at Kendall Station are river herring (alewife and blueback) and, to a lesser extent, white perch, sunfish, and yellow perch (AR 760). Studies by ESEERCO (AR 750) and EPRI (AR 749) suggest that even if robust species such as striped bass and channel catfish larvae might be protected by fine-mesh traveling screens, more sensitive species, including alewife and yellow perch, suffer high impingement mortality when exposed to 0.5 mm screens at 0.5 fps. The ESEERCO study also suggests that the spraywash mechanism associated with fine mesh traveling screens may harm fragile life stages and may not be effective at removing smaller larvae and eggs, such as alewife, from the screen to the fish return.

Based on the available evidence, the ability of eggs and larvae of the Charles River organisms most commonly entrained at Kendall Station (i.e., river herring and perch) to survive impingement, air exposure, and spraywash removal is unknown and, in the professional judgment of EPA's and MassDEP's biologists, very doubtful. Consequently, at this specific facility, fine-mesh traveling screens would not be expected to minimize entrainment-related mortality because the evidence suggests that they would not protect the particular ichthyoplankton common in the Charles River.

Consequently, EPA now clarifies the rationale for its conclusion that fine-mesh traveling screens do not reflect BTA at Kendall Station as resting on a determination that fine-mesh traveling screens do not reflect the "best" technology for minimizing adverse environmental impact, rather than on a determination regarding availability.[1]

However, because points #3 (performance of fish return system), and #4 (construction impacts of fish return system) may also relate to technologies other than fine-mesh traveling screens, EPA has elsewhere re-examined these points, and concluded on further reflection that these issues would not render unavailable a technology relying on a fish return system. *See* Responses to Comments 4.9, 4.10.5, 4.11, 4.16.2. With respect to fine-mesh traveling screens, these revised conclusions are principally academic, as the record indicates that fine-mesh traveling screens are not the Best Technology Available at Kendall Station for other reasons as explained earlier in this response.

---

[1] Although it is not necessary to EPA's conclusion that fine-mesh traveling screens are not BTA at Kendall Station, EPA does note that the existing traveling screens cannot be retrofitted with fine mesh screens because, at the current surface area, the velocity would be much higher than the design standard of 0.5 fps, which is necessary to protect the most species and life stages at Kendall Station. Replacing the existing screens with fine mesh screens to meet the design standards of 0.5 mm mesh and 0.5 fps through-screen velocity would require twelve, 14-foot wide baskets (well opening of 15 feet 2 inches) (August 4, 2008 Memo from Siemens Water Technologies). Accommodating this number of screens in the Broad Canal would require at least a 10-fold expansion of the current intake and would damage approximately 200 linear feet of the historic seawall.

Comment 4.8
Mirant Kendall agrees that the challenges or difficulties associated with engineering and constructing a CWIS technology are factors that can preclude that technology from reflecting BTA. And as EPA New England's analysis with respect to fine-mesh traveling screens demonstrates, it is not necessary for the infrastructure changes or construction and engineering difficulties to be insurmountable; it is merely enough that they present a sufficient level of "difficulty."

Mirant Kendall also agrees that the engineering and construction difficulties identified by the SOB would preclude the type of fine-mesh traveling screens as contemplated by the SOB --or any other technology posing similar challenges -- from being BTA. Specifically, Mirant Kendall agrees that the difficulties associated with "a major retrofit or complete renovation of the existing screens," SOB at p. 39, would be impractical and could not be considered BTA. Mirant Kendall also agrees that creating a new infrastructure for a fish return system that would "require substantial construction and potentially the alteration of a historic seawall," SOB at p. 39, also supports the conclusion that fine-mesh traveling screens should not be considered BTA.

Response to Comment 4.8
This comment consists of a general statement regarding the role of engineering aspects of applying various control technologies in a BTA determination, and a specific statement concurring the SOB's determination that fine-mesh traveling screens are not BTA.

With respect to the general statement, the role of engineering aspects of applying various control techniques in a BTA determination is set forth in the SOB at pp. 21 and 36. EPA does not agree that mere "difficulty" renders a technology unavailable. *See* Response to Comment 2.17 part 1.

With respect to the specific statement, the SOB concluded that fine-mesh traveling screens are not BTA. See Response to Comment 4.7. As noted above, EPA has reaffirmed this conclusion, but has narrowed and clarified its rationale. See Response to Comment 4.7. Mirant's comment agrees with EPA's conclusion that fine-mesh traveling screens are not BTA. Since the comment agrees with EPA's conclusion, no further response is required.

Comment 4.9
While Mirant Kendall agrees that a fine-mesh traveling screen that would require major renovation of the current intakes and a fish return system that would require the construction of additional infrastructure in or around the Broad Canal and on the historic seawall would not be available because of engineering and construction difficulties, there is a conceptual design that may overcome these difficulties (subject, of course, to proper pilot testing).

The first aspect of this design would be to replace the three existing traveling screens with fine-mesh traveling screens that would have a sufficiently small mesh-size to prevent entrainment of fish eggs and larvae. Replacing the current traveling screens in this manner would not require substantial alteration to the existing civil structures or the historic seawall, especially when compared with the replacement contemplated by the SOB.

With respect to a fish return system, Mirant Kendall may be able to take advantage of the soon-to-be-constructed public walkway, and suspend a fish return pipe or channel beneath the walkway. This design feature may eliminate the need for the creation of a new support infrastructure, and would not compromise the historic seawall.

Response to Comment 4.9
As explained above, EPA has re-evaluated fine-mesh traveling screens, and concluded that fine-mesh traveling screens cannot be considered to reflect the best technology available for minimizing adverse environmental impact at this facility. See Response to Comment 4.7. The proposal in this comment addresses construction impacts to some extent, but would not reduce the lethality of fine-mesh traveling screens to the eggs and larvae of the species at issue here, and would therefore not make fine-mesh traveling screens BTA.

Furthermore, the proposal is ambiguous with respect to intake velocity. As noted above, if the fine-mesh traveling screens were simply sized at the surface area of the existing traveling screens, then they would have a through-screen velocity well above the existing velocities (0.8 to 0.9 fps), which already exceed protective levels. This would compromise their ability to protect adult and juvenile fish, and would also be expected to increase mortality of eggs and larvae impinged against the screens. This provides an additional reason why fine-mesh traveling screens sized at the surface area of the existing traveling screens are not the "best" technology for minimizing AEI at Kendall Station.

As a final note, EPA agrees that, in theory, a fish return system may be constructed to be compatible with the proposed public walkway. At the time of issuance of the Draft Permit Modification, the design of the public walkway was not finalized, but as proposed it offers an opportunity to incorporate a fish return system or some other component of BTA into the infrastructure. See Response to Comment 4.3. However, for the reasons stated above and in Response to Comment 4.7, fine-mesh traveling screens do not constitute BTA for other reasons. The fact that a fish return system could be built with minimal or no impacts to the historic seawall does not change this conclusion.

Comment 4.10
The SOB suggests that retrofitting Kendall Station's current traveling screens with fine mesh barriers would be insufficient to reduce impingement because the approach velocities at Kendall Station's intakes would remain above the protective (as found by the SOB) through-medium velocity of 0.5 fps. SOB at p. 31. But, for several reasons, such a low through-medium velocity at fine-mesh traveling screens in the Broad Canal would not be needed to minimize any impingement mortality of juvenile or adult fish.

Response to Comment 4.10

This comment serves primarily as an introduction to Comments 4.10.1 to 4.10.5. Consequently, detailed responses are provided in responses to those comments.

The comment does evince some confusion regarding page 31 of the SOB. The statement to which the comment refers is: "Retrofitting existing screens *with fish buckets and a return system alone* would still not qualify as BTA, however, because intake velocities are approximately 0.8 and 0.9 fps at the three intake structures, a range substantially greater than the 0.5 fps through-screen velocity considered to be adequately protective." SOB at 31 (emphasis added). Retrofitting the existing technology with fish buckets and a return system would not reflect BTA because (1) through-medium velocities would be above protective levels, and (2) the existing 9.5 mm screens would not minimize entrainment.

That said, it is correct that retrofitting the existing traveling screens with fine mesh screens would increase the through-medium velocity to far greater than the existing velocities (0.8 to 0.9 fps), which already exceed protective levels. See Response to Comment 4.9. More detailed responses follow.

Comment 4.10.1
For the reasons described in the comments above, the number of fish impinged at Kendall Station at its current approach velocities, which EPA New England has recognized have been measured from 0.57 fps, Determination Document at p. 202, to 0.9 fps, SOB at p. 31, is so low since re-powering that the numbers likely fall below any reasonable de minimis threshold. But even if the SOB had thoroughly analyzed the numbers of fish impinged at Kendall Station and concluded they are not de minimis, the SOB also would have had to make findings that the mortality actually occurred due to impingement on the screens. As discussed in the comments above, such a finding would have little, if any, support in the current record, which does not contain any information indicating whether the fish mortality at Kendall Station occurred due to impingement, or if the fish were dead or dying in the aftermath of spawning and/or storm-water pollution and were drawn into the screens.

Response to Comment 4.10.1
With respect to the argument that impingement is "de minimis," see Responses to Comments 2.03, 2.7.4, and 3.1-3.2.

Mirant also states that EPA must "make findings that the [documented impingement] mortality actually occurred due to impingement on the screens." Mirant provides no authority for this proposition, and EPA is unaware of any. In fact, the proposition is untenable. Under Mirant's hypothesized rule of law, before EPA could impose permit conditions to minimize adverse environmental impact from impingement, EPA would be required either to intercept fish and assess their condition prior to contact with Kendall Station, then track which were impinged and which were not; or, alternatively, to inspect each fish impinged on Mirant's traveling screens and determine its cause of death. This has never been EPA's interpretation of section 316(b). For example, the 1977 Draft 316(b) Guidance states that "[a]s a first order approximation, 100 percent loss of individuals impinged, entrapped, or entrained could be assumed unless valid field or laboratory data are available to support a lower loss estimate." 1977 Draft 316(b) Guidance, at 34. But if section 316(b) required EPA to "make findings that the mortality actually occurred due to impingement on the screens," then the guidance should have said that EPA must assume that all of the fish that might be impinged were already dead or dying before they encountered the CWIS, i.e., *zero* percent loss until demonstrated otherwise.

EPA acknowledges that, in general, weakened adult or juvenile fish are more likely to become impinged than healthy individuals. Still, Mirant Kendall has submitted no evidence to support the claim that impinged fish at Kendall Station are all (or even mostly) weakened or dead prior to impingement. See Response to Comment 3.1.1. The record in general is replete with evidence that impingement frequently results in mortality to live fish. *See, e.g.,* 66 Fed. Reg. 65,262-65. Moreover, the record in this proceeding demonstrates the significant numbers of fish found dead after being impinged upon Kendall Station's CWIS. *See, e.g.,* SOB at 10-11. What the record does *not* contain – and what Mirant Kendall has not provided – is any specific evidence to identify the cause of mortality of the fish found dead after impingement on the Kendall Station CWIS. Based on the present record, EPA reasonably judges that the dead fish collected after impingement on the traveling screens suffered impingement mortality.

Comment 4.10.2
In fact, the low levels of impingement occurring simultaneously with the numerous fish collected in the Broad Canal during Mirant Kendall's sampling program indicate that healthy fish and large larvae can and do avoid the current intake velocities. Moreover, the most recent data from the Lower Basin indicate that river herring develop sufficient swimming ability to resist entrainment from the existing intake by the time they reach about 13 mm. MK Modification Comment Exhibit No. 5 (AR 736). Only eight juvenile river herring have been impinged on the intake screens since 2003, providing further evidence that juvenile river herring (and by necessary implication healthy adults) are sufficiently strong swimmers to resist impingement on the traveling screens despite current approach velocities. Furthermore, studies in other locations (Radle, 1998) confirm that late-season juvenile and any adult river herring can swim at speeds sufficient to resist impingement at Kendall Station's current approach velocities. At a very conservative, sustainable swim speed of two body lengths per second, a typical adult river herring measuring 250 mm can swim at over 1.5 fps, and a typical 140 mm white and yellow perch can swim at 0.9 fps.

Response to Comment 4.10.2
EPA acknowledges that some fish, particularly adults, may be capable of avoiding the current intake velocities. Mirant contends that "[a]t a very conservative, sustainable swim speed of two body lengths per second, a typical adult river herring measuring 250 mm can swim at over 1.5 fps, and a typical 140 mm white or yellow perch can swim at 0.9 fps." An evaluation of fish swimming speeds confirms that the average critical velocity for white perch over 100 mm in length typically exceeds 1.0 fps, and limited

data on river herring indicate that individuals over 90 mm typically exceed a critical velocity of 1.0 fps (EPRI 2000).

While adult fish may swim at speeds capable of avoiding impingement, juveniles, which range from 7 to 30 mm for white perch (AR 573) and 20 to 45 mm for river herring (Jones et al., AR 736), may be unable to escape. Based on Radle's conservative sustained swim speed of 2.5 body lengths per second (L/s) (Exhibit 14, AR 736), a juvenile white perch could sustain a swimming speed between 0.06 fps and 0.25 fps, while a juvenile river herring could sustain a swimming speed between 0.16 fps and 0.4 fps. This analysis, based on Mirant Kendall's own submission, suggests that a juvenile white perch or river herring, and similarly a larger larva, would be unable to avoid impingement at velocities greater than 0.5 fps.

Mirant suggests that river herring larvae are able to resist entrainment at around 13 mm because the maximum size larva captured in the discharge (i.e., entrained) was 13 mm, while the maximum size larva captured in the intake was 22 mm. However, this conclusion is based on limited data (sample size (N) = 45; 3.5% of larvae captured), as very few larger larvae (larger than 13 mm) were captured at either location (N = 43 at intake, N = 2 at discharge). Furthermore, even if 13 mm larvae were able to escape a velocity of 0.9 fps, the permittee would still need to implement an exclusion technology to protect larvae smaller than 13 mm, which includes the most frequently captured size range at Kendall Station (approximately 3 to 8 mm, AR 761, p. 4).

Based on Radle's sustained swimming speed for larvae (2.5L/s), 13 mm larvae would be capable of sustaining a swimming speed of 0.01 fps, while 22 mm larvae could potentially swim 0.07 fps, both far less than the estimated existing through-screen velocity of 0.9 fps. Radle's sustained swimming speed of 2.5 L/s (Exhibit 14, AR 736) does not account for the development of fins capable of sustained swimming, which Mirant suggests begin to develop when a river herring larva reaches 9 mm (See AR 761, p. 41). Still, even if capable of swimming at speeds greater than 2.5 L/s due to fin development, it is unlikely that even 22 mm larvae could avoid entrainment at an average approach velocity of 0.8 to 0.9 fps. Thus, although adults would likely avoid impingement at velocities as high as 1.0 fps, juveniles, young-of-year, and larger larvae would be unlikely to avoid impingement at velocities greater than 0.5 fps. In order to provide protection for these life stages, the Final Permit Modification requires that the through-media velocity of the implemented exclusion technology be no greater than 0.5 fps.

Comment 4.10.3

The SOB does not consider the fact that as fish approach the intake there is a gradient of increasing velocities, rather than a distinct line between no velocity and 0.9 fps. This phenomenon, along with the above-referenced data showing very low incidence of impingement, strongly suggest that there is a behavioral component to resisting impingement in that as fish sense the increasing intake velocities, they swim away before the velocities reach a critical velocity that they would not be able to overcome. This means that even if 0.9 fps were a sufficiently strong intake velocity to impinge fish, fish are still able to avoid impingement because of their behavioral response of swimming away from the intake when the velocities are still relatively low.

Response to Comment 4.10.3

EPA agrees that a velocity gradient may exist, and moreover, that adult fish may sense the gradient and escape impingement. Of course, the "slope" of the gradient is based on its peak (the through-screen velocity) and the total intake flow. Holding other factors (e.g., total flow) constant, and examining the approach velocity at any given distance, a higher through-screen velocity means a higher approach velocity, and a lower through-screen velocity means a lower approach velocity. To be specific, a through-screen velocity of 0.5 fps will result in a gentler gradient, with a lower peak and with lower approach velocities measured at most or all points, than a 0.9 fps through-screen velocity. These factors – in particular, the relation between through-screen velocity and approach velocity -- were taken into consideration in EPA's initial establishment of 0.5 fps as a generally protective through-screen velocity. *See* 66 Fed. Reg. at 65,274.

At a through-screen velocity of 0.5 fps, a gradient would still exist and likely be protective of more species and life stages. EPA has determined that a through-media velocity of 0.5 fps represents BTA for MKS because it is available for a number of technologies, is protective of more life stages and weaker swimmers, and allows a greater number of adult and juvenile fish to escape impingement.

Comment 4.10.4

The SOB seems to assume -- without any specific analysis -- that there will be unacceptable AEI due to impingement unless through-medium velocities are at the level of 0.5 fps. SOB at p. 31. As discussed above, the site-specific data and species-specific swim speed data undercut this general assumption. But even if this were not the case, the SOB does not fully apply EPA's own finding on this issue of velocities. The SOB relies on the Phase II Rule for stating that 0.5 fps is a sufficiently low through-medium velocity to reduce any AEI due to impingement. But the SOB does not consider how Kendall Station's current approach velocities do fall within the range that EPA determined would likely be protective. In the Phase II Rule, EPA found that fish swim speed data:

> showed that the species and life stages evaluated could endure a velocity of 1.0 ft/s. To develop a threshold that could be applied nationally and is effective at preventing impingement of most species of fish at their different life stages, EPA applied a safety factor of two to the 1.0 ft/s threshold to derive a threshold of 0.5 ft/s. This safety factor, in part, is meant to ensure protection when screens become partly occluded by debris during operation and velocity increases through portions of the screen that remain open.

66 Fed. Reg. at 65,274; see also 65 Fed. Reg. at 49,088. This finding is significant and applicable to the current BTA determination at Kendall Station. First, it demonstrates that the high end of Kendall Station's intake velocities (0.9 fps) still falls below the approach velocities that EPA found most of the studied species could handle. Second, EPA's articulated reason for requiring a safety factor of two (i.e., provision for possible debris

loading on the screen) is not applicable to traveling screens that are rotated and washed in a frequent manner in order to prevent any significant debris loading. Third, EPA New England has not explained why, despite EPA's finding that most fish could handle 1.0 fps velocities, it has proposed a design standard for Kendall Station that will require it to reduce its approach velocities all the way down to 0.25 fps in order to maintain a through-screen velocity of 0.5 fps. Fourth, all of these findings on swim speeds -- from Radle to the EPA -- are applicable to healthy fish, which further underscores the fact that any of the adult fish that are drawn into Kendall Station's intake are most likely dead or moribund due to other causes.

Response to Comment 4.10.4
At the outset, it is important to correct several errors in the comment. First, EPA derived the 0.5 fps protective through-medium velocity from the studies cited, and analysis provided, in the preamble to the Phase I Rule, not the Phase II Rule. *See* SOB at 10 (citing 65 Fed. Reg. at 49,087-88), 31 (same), 45 (citing 66 Fed. Reg. at 65,274).[2]

Second, EPA concluded that impingement at Kendall Station results in an adverse environmental impact based on the absolute numbers of impinged organisms. See Response to Comment 2.7.2.

EPA disagrees with Mirant's claim that "Kendall Station's current approach velocities do fall within the range that EPA determined would likely be protective." As explained in the preamble to the proposed Phase I Rule:

> To develop an appropriate, nationally protective minimum velocity requirement at cooling water intake structures, EPA reviewed available literature, State and Federal guidance, and regulatory requirements and found that a velocity of 0.5 ft/s has been used as guidance in at least three Federal documents. The 0.5 ft/s threshold recommended in the Federal documents is based on a study of fish swimming speeds and endurance performed by Sonnichsen et al. (1973). This study concluded that appropriate velocity thresholds should be based on the fishes' swimming speeds (which are related to the length of the fish) and endurance (which varies seasonally and is related to water quality). The data presented showed that the species and life stages evaluated could endure a velocity of 1.0 ft/s. To develop a threshold that could be applied nationally and would be protective of most species of fish and their different life stages, EPA applied a safety factor of two to the 1.0 ft/s threshold to derive a threshold of 0.5 ft/s. EPA recognizes that there are specific circumstances and species for which the 0.5 ft/s requirement might not be sufficiently protective and is aware that alternative requirements have been developed for these situations. For example, the National Marine Fisheries Service and the California Department of Fish and Game have developed fish screening criteria (velocity requirements) for

[2] Pages 45 of the SOB erroneously cited "66 Fed. Reg. [at] 65,724." The cited page does not pertain to CWIS regulations. The citation should have read 66 Fed. Reg. [at] 65,274, which is part of the preamble to the final Phase I Rule. *Cf.* SOB at 8 (providing initial citation to that document) & n.1 (explaining its relevance).

anadromous salmonids that range from 0.33 ft/s to 0.40 ft/s. There are also species for which a velocity of greater than 0.5 fps would still be protective.

65 Fed. Reg. at 49,087-88.

While it is true that many of the species and life stages evaluated could endure a velocity of 1.0 fps, evaluating additional data revealed a number of species that would not be protected at a velocity of 1.0 fps, and that a more conservative through screen velocity limit of 0.5 fps would protect 96 percent of the tested fish. Moreover, a requirement that protects almost all fish and life stages is particularly appropriate because it also provides a margin of safety for circumstances in which, as is common, screens become occluded by debris during the operation of a facility and velocity increases through the portions of a screen that remain open.

Mirant makes four distinct points to argue that a velocity of 1.0 fps would be protective at Kendall Station:

"[T]he high end of Kendall Station's intake velocities (0.9 fps) still falls below the approach velocities that EPA found most of the studied species could handle." EPA has determined that some of the species and life stages present at Kendall Station's intake would not be able to escape the existing intake velocities (0.9 fps). See Response to Comment 4.10.2.

"EPA's articulated reason for requiring a safety factor of two (i.e., provision for possible debris loading on the screen) [is] not applicable to traveling screens that are rotated and washed in a frequent manner in order to prevent any significant debris loading." The 0.5 fps protective velocity threshold was developed primarily in order to be protective of almost all (96%) species and life stages. The additional margin of safety provided against the likely occlusion of screens by debris during operation of a facility would increase velocity through portions of the screen is important, but secondary. Additionally, Kendall Station's screens are not continuously rotated, and may be occluded by debris which would lead to points where the velocity may be greater, albeit short term.

"EPA New England has not explained why, despite EPA's finding that most fish could handle 1.0 fps velocities, it has proposed a design standard for Kendall Station that will require it to reduce its approach velocities all the way down to 0.25 fps in order to maintain a through-screen velocity of 0.5 fps." As explained in the SOB, studies of 30 species of fish suggest that a through-medium velocity of 0.5 fps or less creates a force weak enough to prevent impingement of 96 percent of tested fish species by allowing them to swim away from the CWIS. *See* SOB at 45 (referring to studies cited in preamble to Phase I Rule). Consequently, EPA determined in the SOB that "maintaining a maximum through-media velocity limit of no more than 0.5 fps will effectively minimize impingement of adult and juvenile fish." *Id.* In theory, a site-specific evaluation of swimming speeds would the best method to determine the most appropriate velocity indicator for a facility. However, data available to make an accurate, site-

specific determination for intake velocity based on swimming speeds of the species and life stages impinged or entrained at Kendall Station is unavailable. In the absence of site-specific data, EPA relied on available data from field and laboratory studies—the same data that was used to develop a national standard through-screen velocity of 0.5 fps.

"[A]ll of these findings on swim speeds -- from Radle to the EPA -- are applicable to healthy fish, which further underscores the fact that any of the adult fish that are drawn into Kendall Station's intake are most likely dead or moribund due to other causes." Impingement has consistently resulted in mortality in laboratory and other case studies and Mirant has submitted no evidence to convince EPA otherwise. See Response to Comment 4.10.1.

Comment 4.10.5
Finally, even assuming more than a de minimis number of healthy juvenile or adult fish would be impinged by fine-mesh traveling screens, these fish would likely be returned to the water body in a manner that increases their chances of survival through operation of the fish return system. The SOB does not recognize the difference between potential survivability of the more fragile eggs and very small larvae, and the potential survivability of juvenile or adult fish.

In fact, EPA New England previously found in the Determination Document that it was feasible to construct a fish return system that could maximize the survival of juvenile and adult fish. Determination Document at pp. 77-79. So even if juvenile and adult fish would be impinged in any appreciable numbers on fine-mesh traveling screens, they would be returned to the waterbody in a manner designed to maximize their survival, especially when considering that studies demonstrate that river herring survival is expected to be comparable at 0.5 fps to 1.0 fps. See, e.g., Black, J.L. 2007. Laboratory Evaluation of Modified Traveling Screens for Protecting Fish at Cooling Water Intakes. Master's Thesis. Department of Wildlife and Fisheries Conservation, University of Massachusetts, Amherst, available at http://scholarworks.umass.edu/theses/5/, copy included within Appendix B to these comments.

Response to Comment 4.10.5
To be clear, the SOB stated that "the success of a fish return system for *the smallest life stages* of river herring, which is the most frequently entrained species, has not, to EPA's knowledge, been evaluated." SOB at 39 (emphasis added). EPA did not suggest that survival of *juvenile or adult* fish through a fish return system was in doubt. To the contrary, substantial evidence suggests that a fish return system can safely deliver juvenile and adult fish to aquatic habitat with minimal harm. For instance, a study of 10 species of freshwater fish found low injury and scale loss rates, and mortality did not exceed 5 percent for any studied species (Black, Master's Thesis cited in Comment 4.10.5; see also AR 748).

With respect to the smallest life stages (i.e., eggs and larvae), EPA has re-evaluated the issue and has determined that there is little evidence to suggest that eggs and larvae would not survive a fish return system. Ichthyoplankton regularly survive turbulence and swift currents in their natural habitat. Upon further consideration of all available information, EPA has concluded that a fish return system is a viable option for safely returning adult and juvenile fish as well as eggs and larvae to a natural habitat. As such, a fish return system could be a component of BTA at MKS.

Comment 4.11
[Mirant makes numerous distinct points in this comment. For purpose of clarity, EPA has subdivided the comment into comments 4.11.1-4.11.8, and organized its responses accordingly. Cross-references to "Response to Comment 4.11" elsewhere in the document refer to the responses 4.11.1-4.11.8 collectively.]

Comment 4.11.1
Mirant Kendall agrees with EPA New England's determination that technologies whose performance or effectiveness are uncertain may not be appropriate candidates for BTA.

Response to Comment 4.11.1
EPA does not adopt the formulation stated by the comment, since the SOB speaks for itself on this question. *See also* Response to Comment 2.1, part 4. That said, since the comment purports to agree with the SOB, no response is necessary.

Comment 4.11.2
As stated above, the SOB states that the ability of eggs and larvae to survive a return to the water body through a fish return system was too uncertain. Mirant Kendall does recognize that there are some uncertainties as to whether a fish return system at Kendall Station would be successful in returning impinged eggs and very small larvae to the water body in a manner that maximizes their survival.

Response to Comment 4.11.2
See Response to Comment 4.10.5.

Comment 4.11.3
Yet, as the SOB recognizes, fine-mesh traveling screens with fish return systems reflect an available technology that has been deployed for entrainment reduction at power plants more frequently than any of the other technologies that the SOB identifies. Moreover, traveling screens with a fish return system are designed to try and remove impinged eggs and larvae and return them to the water body in a manner that enables survival. By contrast, Mirant Kendall is not aware that any exclusion technologies that have been designed, deployed, or tested to try and remove excluded eggs and larvae and then return them to the water body in a manner the enables survival.

Response to Comment 4.11.3
With respect to fine-mesh traveling screens, see Response to Comment 4.7.

With respect to Mirant's statement that it is "not aware that any exclusion technologies . . . have been designed, deployed, or tested to try and remove excluded eggs and larvae and then return them to the water body in a manner [that] enables survival," it is best for any CWIS technology not merely to exclude eggs and larvae and leave them to their fate, but rather to release them in a manner that is consistent with survival. This is not an untested question. Alden (2007), for instance, estimated impingement and survival rates of eggs and larvae released upstream of an aquatic filtration system after the filter flow ceased and when the system was backflushed, both techniques designed to release impinged organisms to the water body (AR 774).

EPA acknowledges that, even with the best technology available, some organisms (particularly larvae, which are fragile) will not survive their experience with the aquatic organism exclusion technology. Thus, the Final Permit Modification does not include a permit requirement to attain a specific survival minimum for eggs and larvae. However, the objective of section 316(b) is to minimize adverse environmental impacts of CWISs; and merely excluding eggs and larvae from being entrained without regard to mortality associated with the exclusion technology itself would not minimize adverse environmental impact. To this end, the Final Permit Modification requires that eggs and larvae be returned to the water body at a location that enables survival by minimizing the potential for re-impingement. See also Response to Comment 4.24.1.

Comment 4.11.4
Moreover, numerous studies and data examine survivability of various organisms that experience a fish return system, but Mirant Kendall is not aware of any studies that examine survivability of organisms that are impinged on and then removed by an exclusion technology.

Response to Comment 4.11.4
As stated in Response to Comment 4.11.3, Alden completed a rigorous test of an aquatic filtration system to estimate the survival of blueback herring and American shad eggs that had been impinged on and then removed by an exclusion technology. EPA acknowledges that studies of exclusion technologies are just beginning to be explored, but studies such as this one demonstrate that it is possible to estimate release and survival of excluded organisms.

Comment 4.11.5
Accordingly, while there are some uncertainties with respect to the effectiveness of a fish return system, there are even greater uncertainties surrounding the design standards that the Draft Permit Modification imposes in order to reduce impingement of eggs and larvae. Specifically, no technology has -- to Mirant Kendall's knowledge -- ever been designed, employed or tested to "gently release" eggs and larvae from an exclusion technology in a manner that would maximize survivability, or to provide an induced sweeping flow past that technology to prevent reimpingement.

Response to Comment 4.11.5
EPA has removed the requirement of a "gentle release" mechanism from the Final Permit Modification because EPA has determined that this mechanism is unavailable at this time. See generally Response to Comment 4.24. EPA has determined that an induced

sweeping flow is feasible in the Broad Canal. See generally Response to Comment 4.25 and AR 738.

Comment 4.11.6
But despite this fact, the SOB eliminates fine-mesh traveling screens with a fish return system as a potential BTA on the basis of uncertainty, while at the same time imposing design standards that have significantly greater uncertainty with respect to their performance.

Response to Comment 4.11.6
EPA has eliminated fine-mesh traveling screens as a potential BTA not based on uncertainty, but rather based on poor performance at minimizing AEI at this facility. See Response to Comment 4.7. The Final Permit Modification's permit conditions designed to reflect the BTA do not have "significantly greater uncertainty with respect to their performance" than fine-mesh traveling screens. The technologies evaluated as reflecting BTA in the SOB are available at this facility and expected to result in significantly higher survival rates for larvae.

Comment 4.11.7
Fine-mesh traveling screens with a fish return system may represent the "best" technology available if only because it presents the least amount of uncertainty when compared with all of the other highly experimental technologies the SOB currently proposes.

Response to Comment 4.11.7
See Response to Comment 4.7 regarding the availability of fine-mesh traveling screens.

Moreover, while it is generally beneficial to minimize uncertainty, section 316(b) requires EPA to set permit limits that reflect BTA for minimizing adverse environmental impact. Mirant's comment implicitly elevates "uncertainty" to a status above "adverse environmental impact" as the key factor to be minimized. Taking this argument to its logical conclusion, the existing technology at any facility could be argued to represent BTA since it, by virtue of already being in place, presents the least amount of uncertainty of all. In the Final Permit Modification, EPA has exercised its scientific judgment and permitting expertise to select technologies that offer greater expected reductions in impingement and entrainment mortality at this facility, rather than simply the technologies whose performance is best studied regardless of their efficacy.

Comment 4.11.8
While Mirant Kendall's BTA Proposal contains a design and pilot testing for a fine-mesh barrier net, it is entirely possible that after pilot testing, successful performance of a fine-mesh barrier net in the Broad Canal will prove to be unlikely or uncertain, leaving fine-mesh traveling screens with a fish return system as the "best" available option.

Response to Comment 4.11.8

See generally Responses to Comments 4.7 (fine-mesh traveling screens), 4.45 (Mirant's barrier net proposal), and 4.46 (pilot testing). As a general matter, the theoretical prospect that a high-performing technology might be installed but then for some reason not perform as well as expected is not usually a sound basis for picking a lower-performing technology instead. It is important to reiterate that Mirant's obligations are defined completely by the design and operational standards specified in the Final Permit Modification, and that if site-specific or other operational considerations render the technology less effective than expected, that reduced effectiveness will not be held against Mirant. *See* Response to Comment 2.17.

Comment 4.12
The SOB is imprecise with respect to its evaluation of what location for the CWIS represents BTA. The SOB first determines that "BTA would entail retaining the CWIS in its approximate current location in the lower Charles River basin…." SOB at p. 29. But then the SOB states that there is "no reason to prohibit Mirant from moving the CWIS either within the Broad Canal or into the main body of the Charles River, if it so chooses and can obtain necessary permits." SOB at p. 29. By not requiring that the CWIS be located in the Broad Canal, the SOB has made an implicit conclusion that locating a CWIS at the mouth or outside of the Broad Canal could constitute BTA. Such a determination is not only unsupported by any analysis, but it also contradicts EPA New England's own analyses that identify several major problems with locating CWIS structures at the mouth or outside of the Broad Canal.

Moreover, the SOB's ambivalence on location of the CWIS is inconsistent with the fact that EPA New England has recognized earlier in this proceeding that location is sometimes considered "the most important factor in minimizing adverse impacts from a CWIS." Determination Document at p. 197. Given this importance of location, and given the significant site-specific differences between locating the CWIS structures inside rather than at the mouth or outside of the Broad Canal, EPA New England's decision with respect to location of the CWIS structures -- insofar as it allows such structures to be built at the mouth or outside of the Broad Canal -- was not reached as a result of a proper BTA analysis. The following comments urge that any additional CWIS structures must be located within the Broad Canal in order to constitute BTA.

Comment related to Comment 4.12 from Mark Jaquith
The abutters to the Broad Canal are required to construct certain improvements in the canal as part of their state and local permit requirements. These include a boardwalk and public park along the north bank and a canoe and kayak launch and dock at the terminus.

There is one aspect of the proposed permit that will diminish the usability of the above improvements and, I believe, degrade the wildlife habitat within the Broad Canal. I refer to the possibility of blocking the canal entrance with a netting or mesh device to prevent the impingement and entrainment of fish eggs and larvae due to cooling water intake and its flow through the plant, resulting in the death of those organisms. Any barrier will significantly interfere with the use of the planned public canoe and kayak launch, docking facility, and boat rental concession. Even if the barrier is constructed so that it is possible for small craft to skim over it, it is not credible to assume that there will not be snags, collisions and displacements which will damage and diminish the effectiveness of the barrier and interfere with access to the boating facility. Nor is it conceivable that the barrier will not be damaged by power boats.

The barrier will prevent the passage of fish in and out of the canal. This will result in the depletion of food stocks for fish-eating birds which frequent the canal. To deprive these waterfowl of feeding grounds and fish of habitat is not consistent with your mission and may well conflict with wetlands protection regulations. It is unknown what other effects this sudden change in the local biota may have.

The proposed installation of this barrier appears to have significant adverse effects that should be subject to review in a formal environmental impact statement, but I am unaware of any such review.

Additional comment related to Comment 4.12 from Mark Jaquith
There must be some serious consideration of acceptable alternatives. The first would be to have Mirant relocate its cooling water intake to that area of the Charles River outside of the canal where Memorial Drive swings out over the water several hundred feet south of its current location. Use of this area would isolate a much smaller piece of habitat, and would not interfere with other uses of the canal. It also has the advantage that the highway structure could be used for support and would offer a longer cross section than the entrance to the canal, further slowing the speed at which intake water would pass through and further reducing any impingement of marine life. Mirant has previously expressed a desire to build a heat diffuser pipe for its cooling effluent that would extend 700 feet into the river, so this would be within their capability. That plan was blocked for other environmental reasons.

Comment related to Comment 4.12 from Rae Stiening
The draft PM appears to allow the permittee to install a fish net across the entrance of the Broad Canal although the EPA's intention probably was to allow the permittee to install a net at any place near where water could be drawn into the power plant. This section should be modified to include language that requires the fish nets not interfere with the recreational uses of the BC which include fishing and boating and that the nets be protected from accidental damage by recreational users.

Comment related to Comment 4.12 from East Cambridge Planning Team
The ECPT approves of the requirement for barrier nets to minimize the AEI of I&E of fish, fish eggs and larvae. We are, however, opposed to the options in this draft PM that allow Mirant to install barrier nets that will prevent fish, fish eggs, larvae and boats from entering the BC from the Charles River. The recent growth in the number of residential and commercial buildings near the end of the canal has greatly increased the number of people seeking to use the public amenities there. It is essential that the BC be preserved in a natural state for the enjoyment of the public.

Response to Comment 4.12 and related comments

The statute requires that "the location, design, construction, and capacity of cooling water intake structures reflect the best technology available for minimizing adverse environmental impact." 33 U.S.C. § 1326(b). The statute does not, however, specify a particular method by which those requirements must be expressed, so long as they "reflect the best technology available." See Response to Comment 2.26. Depending on the particular circumstances, it may be appropriate to specify a location with high precision (e.g., GIS coordinates) and in other cases with less precision (e.g., as Mirant suggests, "within the Broad Canal," an area approximately 100 feet wide and 15 feet deep, with 700 feet of frontage at Kendall Station). *See* Response to Comment 4.1.4; *see generally* Draft Permit Determination Document at 197-98. Under the latter approach, the "location" determination is that, in EPA's judgment, the "location" includes any point within the specified region, and any point within that region reflects BTA.

In the Draft Permit Modification, EPA took the latter approach: the SOB evaluated whether locations at the mouth or outside of the Broad Canal are available, and determined that a location within, at the mouth, or outside of the Broad Canal would be acceptable. This describes a general region including the Broad Canal and that portion of the Lower Basin in its vicinity. In the SOB, EPA did not specify the location more precisely than the above, because all points within this region have benefits and drawbacks. (The principal advantages of locating the CWIS technology *outside* the Broad Canal are that a system in the Lower Basin could take advantage of the low, but non-zero, ambient sweeping flow to reduce the likelihood that eggs and larvae freed from the system would be re-impinged. The principal advantages of locating the CWIS technology *inside* the Broad Canal are that it is much more feasible to generate an induced sweeping flow within the Canal, and that locating the CWIS technology in the Canal reduces or avoids entirely many of the issues identified in the various comments.) *See generally* SOB at 28-29; *see also* Draft Permit Determinations Document at 227; 2006 Response to Comments on 2006 Final Permit, Comment related to H24 from MA DMF, at H58 (advocating a location beyond the Broad Canal because the a location within the Canal would not prevent re-impingement without a return system for impinged organisms).

EPA agrees with commenters who state that the mouth of the Broad Canal does not reflect BTA because it would substantially impair recreational use, particularly passage of boats. The Final Permit Modification has been revised to prohibit a location at the mouth of the Canal that would prevent the passage of recreational boats into or out of the Broad Canal.

The SOB, at p. 29, acknowledged that installation of an exclusion technology outside of the Broad Canal may result in some adverse environmental impacts, particularly associated with water quality. To clarify, the SOB primarily highlighted the potential adverse environmental impacts and non-water quality impacts of relocating the CWIS outside the Charlestown Dam locks, which EPA determined would not be BTA (SOB at p. 29). Still, EPA agrees that installing an exclusion technology in the Lower Basin may result in short-term high turbidity during construction and that withdrawing water at certain depths, generally lower than 15 feet, may cause Kendall Station's discharge to negatively impact water quality. Although effects from construction would be short-term and could be mitigated with best management practices, and other impacts could be minimized if critical depths were avoided in the design of the technology, EPA recognizes that these issues complicate any CWIS technology installation in the Lower Basin.

Mirant's comments 4.12-4.21 raise a host of issues concerning locating a CWIS technology outside the Broad Canal, including permitting, water quality impacts, engineering and construction difficulties, habitat loss, impairment of recreational use, risks to human safety, decrease in potential performance for reducing impingement and entrainment, and cost-effectiveness. As a result of Mirant's comments on the CWIS location and on induced sweeping flow, EPA examined the location issue further, and has accepted Mirant's suggestion that it reconsider its location determination. This re-evaluation has included construction, design, availability, and the other elements of the BTA standard. EPA found some of the issues raised by Mirant to be persuasive, and others less so, but in the end, EPA agrees that locating the technology within the Broad Canal represents BTA for this facility at this time.

The Final Permit Modification has been revised to ensure that the aquatic organism exclusion technology is located within the Broad Canal and does not preclude unobstructed entrance or egress of recreational boats to the Broad Canal or navigation within the Broad Canal, except during temporary construction periods. *See* Final Permit Modification Part I.A.11.a. Because EPA has accepted Mirant's suggestion in Comment 4.12 that the Final Permit Modification specify that the exclusion technology must be located within the Broad Canal, a detailed response to each of Comments 4.13-4.21 is not necessary and has not been provided.

Comment 4.13

The SOB recognizes that the location for the CWIS technology depends on whether Mirant Kendall can obtain all necessary permits. SOB at p. 29. This recognition is consistent with Mirant Kendall's previous submissions and comments that whether a particular CWIS technology is "available" depends, in part, on whether all necessary permits to construct and operate that technology can be obtained. It is anticipated that in order to construct and operate any additions to its CWIS, Mirant Kendall will have to obtain at least the following permits or approvals: MEPA Certificate, Massachusetts Historical Commission approval, Massachusetts Energy Facility Siting Board approval, a Chapter 91 Waterways License, Army Corps 404 Permit, 401 Water Quality Certification, MCZM Certification, Cambridge Conservation Commission Amended Order of Conditions, and DCR Permit. AR 687. But the SOB currently provides no assessment of whether Kendall Station could obtain all of these permits for a structure located in the Lower Basin, as opposed to one located in the Broad Canal. The permittability of any additions to the CWIS should be known to the Agencies because the Draft Permit Modification was co-issued by MassDEP, which will be a key decision-maker with respect to many of the permits Kendall Station will need to acquire.

Response to Comment 4.13
See Responses to Comments 2.23 and 4.12.

Comment 4.14
Mirant Kendall concurs with EPA New England in-so-far as it decides not to alter its conclusion, first reached in issuing the 2006 Final Permit, that locating the CWIS outside of the Lower Basin would not reflect BTA. SOB at p. 28. In making this determination, the SOB primarily relies on prior submissions by Mirant Kendall and on EPA New England's prior analysis in the Determination Document. SOB at p. 28. Among the reasons listed by the SOB that weigh against relocating the CWIS outside of the Lower Basin are:

- The necessity of extensive waterfront construction in congested areas outside of Mirant Kendall's control;
- Environmental impacts due to the construction;
- Potential impingement and entrainment impacts to other species, and potential impacts on EFH species, and triggering of the Magnuson-Stevens Fishery Conservation and Management Act; and
- Introduction of additional saltwater to the Lower Basin, which would increase the salt water wedge and further degrade the habitat for fresh water species in the Lower Basin.

SOB at p. 28. Mirant Kendall agrees with EPA New England's finding that these are proper factors to consider when determining BTA, and that each of these considerations remains valid.

Response to Comment 4.14
EPA's determinations on this issue are stated at pp. 28-29 of the SOB. Since the comment agrees with EPA's conclusion, no further response is required.

Comment 4.15
Mirant Kendall concurs with EPA New England's determination that locating the CWIS structures within the Broad Canal constitutes BTA. In reaching this determination, EPA New England considered that locating the CWIS in the Lower Basin "might even increase certain [adverse environmental] impacts," through discharge of anoxic waters to the surface as well as water quality impacts associated with construction, such as turbidity in the water column, erosion of the shoreline, and the need to dispose of dredged materials. SOB at p. 28.

Mirant Kendall agrees that impaired water quality and the feasibility and impacts of construction are factors to consider when determining BTA. Mirant Kendall also agrees with EPA New England's conclusions with respect to these factors; namely, that withdrawing water from the Lower Basin (at least at certain depths) would cause Kendall Station's discharge to contain anoxic, saline water during the times of year when those conditions pervade the lower water. Such a discharge would lead to a temporary or permanent decrease in water quality. Moreover, withdrawing water from the Lower

Basin will also have the effect of substantially altering the current hydrodynamics in the Lower Basin. The SOB did not consider the potential adverse consequences for such a substantial alteration of flows, which is discussed in more detail in the comments that follow.

Response to Comment 4.15
See Response to Comment 4.12.

Comment 4.15.1
Consistent with what EPA New England has already determined in connection with the 2006 Final Permit, the bottom waters in the Lower Basin have relatively high concentrations of metals and organic pollutants and contain relatively high levels of phosphorus. EPA New England has already determined that mixing this nutrient rich water with the surface waters could lead to decreased water quality at the surface, including an increased risk of algal blooms. But the SOB does not consider the impact that locating various technologies in the Lower Basin would have with respect to disturbing these bottom waters, which will likely occur through construction and operation of many of the potential technologies the SOB identifies as potentially reflecting BTA.

Mirant Kendall has shown earlier in these proceedings that the destratification effects accomplished through the use of its proposed diffuser would not degrade water quality or lead to algae blooms. But it notes that the effects in the Lower Basin from construction and operation of many of the CWIS technologies pose a real potential for adverse impacts to water quality in ways that the diffuser does not. For example, it is not likely that the "gentle release" mechanism for any exclusion device in the Lower Basin will operate in a manner that will destratify the water column in the manner that the diffuser would do. If this were to be the case, then operation of the "gentle release" mechanism could result in the periodic introduction of increased nutrients and toxic sediments into the upper water column. In any event, it is inconsistent for the Agencies to refuse to allow use of the diffuser because of speculative impacts to water quality, and yet require the construction and operation of CWIS technologies that have a very real potential to adversely impact water quality.

Response to Comment 4.15.1
EPA has prohibited installation of an exclusion technology outside of the Broad Canal. See Response to Comment 4.12.

Any comments regarding the diffuser are outside the scope of this permit modification. Therefore, to the extent this comment addresses Mirant's diffuser proposal, no response is necessary.

Comment 4.15.2
Mirant Kendall is aware that past commenters have suggested that any exclusion infrastructure should be located at the mouth or outside of the Broad Canal in order to best minimize environmental impacts from impingement and entrainment. While the

SOB does not provide any direct response to these speculative arguments, the SOB and the record do contain ample bases for rejecting such claims.

First, both the SOB and Mirant Kendall's BTA Proposal require installation of an exclusion technology with a mesh size small enough to eliminate entrainment. Therefore, the location of this exclusion technology is immaterial to its performance with respect to entrainment; but, if anything, a location inside the Broad Canal is better because the risks of decreasing performance due to debris loading are smaller there than in the Lower Basin. A structure in the Lower Basin would be exposed to the greater range of debris that floats down the Charles River as opposed to the debris that finds its way into the Broad Canal. There are also three storm drains that discharge into the Broad Canal, and so there is a possibility that an exclusion technology at the mouth or outside of the Broad Canal could be subject to debris loading on both sides.

Second, both the SOB and Mirant Kendall's BTA Proposal require maintenance of through-screen velocities at a level low-enough so as to minimize environmental impacts due to impingement. So minimization of impingement is not dependent on location (although, again, barrier integrity can be compromised and through-screen velocities can increase by virtue of debris loading, making location in the Broad Canal superior from a performance standpoint).

Response to Comment 4.15.2
See Response to Comment 4.12.

Comment 4.16
The SOB did not perform a thorough analysis as to whether locations at the mouth or outside of the Broad Canal are "available." Specifically, the SOB did not assess several critical issues affecting availability, discussed below.

Response to Comment 4.16
See Response to Comment 4.12.

Comment 4.16.1
The first determinative factor affecting the availability of any exclusion infrastructure at the mouth or outside of the Broad Canal is the difficulty of constructing such a structure. Construction of a free-standing (and in the case of an aquatic filter barrier, 700 foot long) structure, resting on pilings driven into the bottom of the water body, and with a total top to bottom height ranging from 10 to 15 feet using completely new infrastructure in the middle of the Lower Basin, seems likely to present greater construction difficulties and uncertainties when compared with the construction of the type of fish return system contemplated by the SOB. Moreover, the exclusion device, unlike the fish return system, would have to be equipped with numerous electrically powered pumps or jets needed for inducing a sufficient sweeping flow.

Construction issues that the SOB did not contemplate include whether sufficient, sturdy pilings could be installed on the bottom in this section of the Lower Basin; the difficulties associated with dredging the substantial (and toxic) sediments that have built up in the Lower Basin; and the ability to secure sufficient anchorage points for the exclusion panels on the bottom of the Lower Basin. In addition, the SOB has not assessed the feasibility of installing the dozens of fish pumps or jets adjacent to and across the exclusion technology, and calibrating all of these individual devices to assure proper "sweeping" flows. Moreover, this complex network of pumps or jets also would require significant electrical engineering to ensure a sufficient electrical power is provided to all of them so that they can operate continuously.

Response to Comment 4.16.1
In the Final Permit Modification, EPA requires the exclusion technology to be located within the Broad Canal. See Responses to Comments 4.12 and 4.17.2. To the extent, if any, that the last two sentences of this comment (regarding an induced sweeping flow) are also intended to apply to an induced sweeping flow *within* the Broad Canal, EPA responds as follows: An induced flow system in the Broad Canal would not require "numerous" or "dozens" of fish pumps or jets. Moreover, according to the SAIC technical report, the energy needed to power fish pumps to create the flow needed under the design standards of the Final Permit Modification would be approximately 11 KW (AR 738). See Response to Comment 4.25.4.

Comment 4.16.2
As discussed above, whether all of the permits necessary to install and operate a technology can be obtained is a critical factor affecting that technology's availability. The SOB makes no assessment of whether Mirant Kendall would be able to obtain all of the permits necessary for construction of a large exclusion technology that would -- in the case of an aquatic filter barrier located outside of the Broad Canal -- eliminate approximately 3.8 acres of recreational area and aquatic habitat, and which would pose navigation and other human safety risks. (The area eliminated by deploying a fine-mesh barrier net at the mouth or outside of the Broad Canal would be smaller, but still significant). Again, given that MassDEP co-issued the Draft Permit Modification with EPA New England, and is the party in the best position to evaluate whether certain of the necessary permits could be issued, the SOB should have addressed this critical issue.

Moreover, in determining that fine-mesh traveling screens and Geiger screens were not available, the SOB cited uncertainty as to whether proper permits or approvals could be obtained by the local and state historical commissions because construction of such a fish return system could impact the historical sea wall. Again, this same level of uncertainty exists with respect to the construction of a 700-foot long free standing structure that would require some alterations, and would obscure a portion of that seawall. (Construction of a smaller fine-mesh barrier could have similar, although not as severe, impacts on the seawall). In other words, the SOB cannot simultaneously cite to alteration or impact to the historical seawall as a basis for determining one technology is not available, and yet ignore that same issue in proposing that another technology may be available.

Response to Comment 4.16.2

In the Final Permit Modification, EPA requires the exclusion technology to be located within the Broad Canal. See Response to Comment 4.12. Neither EPA nor MassDEP anticipates irreconcilable permitting problems associated with deployment of an exclusion technology within the Broad Canal. See Response to Comment 2.23.

In its February 2001 NPDES Permit Application, the permittee did not evaluate the potential for fine-mesh traveling screens, but stated that likely disruption of the historic Broad Canal seawall would occur with implementation of some of the technologies (pp. 6-53 to 6-54). The difficulties in constructing a fish return system without disrupting the historic seawall complicated the feasibility of a fine-mesh barrier net. New developments in the construction of a public walkway provide a structure on which to locate a fish return system that would not interfere with the seawall. See Response to Comment 4.3. Therefore, EPA no longer considers seawall-related construction challenges of a fish return system to be a basis for eliminating any technologies that would require a fish return system. See Response to Comment 4.7.

Comment 4.16.3
The SOB did not contemplate the greater capital and ongoing costs associated with locating an aquatic filter barrier or fine-mesh barrier net at the mouth or outside of the Broad Canal, as opposed to locating a fine-mesh barrier net within the Broad Canal. These greater costs are significant to the cost-effectiveness analysis that the SOB should have applied in its BTA determination.

The higher costs associated with an aquatic filter barrier or fine-mesh barrier net at the mouth or outside the Broad Canal, combined with the fact that there would be no advantage to locating an aquatic filter barrier or fine-mesh barrier net at the mouth or outside the Broad Canal as opposed to a fine-mesh barrier net in the Broad Canal, means that deployment of a fine-mesh barrier net within the Broad Canal is a more cost-effective option.

Response to Comment 4.16.3
In the Final Permit Modification, EPA requires the exclusion technology to be located within the Broad Canal. See Response to Comment 4.12. Still, EPA has not mandated the use of a single technology but instead has required a suite of design standards that can be met with a number of available technologies, the most appropriate of which is left to Mirant's discretion. As such, EPA is not obligated to assess if one technology satisfying the permit conditions could achieve essentially the same benefits, but at a markedly lower cost, of another technology satisfying the same permit conditions. Because it is not required by law, would have no effect on permit conditions, and serves no public purpose, EPA has exercised its discretion not to perform a cost effectiveness analysis. See Responses to Comments 2.7.7 and 2.20.

Comment 4.17
The SOB did not assess how locating a barrier net or aquatic filter barrier at the mouth or outside of the Broad Canal could increase environmental impacts in the following ways.

Response to Comment 4.17
This comment is entirely prefatory to comments 4.17.1-4.17.5, and individual responses to those comments are below.

Comment 4.17.1
Blocking access to the Broad Canal would effectively eliminate the Broad Canal as potential habitat for some aquatic organisms, and limit it for others. Mirant Kendall's many years of sampling have shown that much of the Broad Canal remains un-influenced by Kendall Station's intake and provides a suitable habitat for a wide range of species, including all life stages of river herring, goldfish, common and golden and bridle shiner, white catfish, brown bullhead, white perch, bluegill, pickerel, yellow perch, striped bass, black crappie, pumpkinseed, and largemouth and smallmouth bass. The sampling results also indicate that the Broad Canal is used as a spawning habitat at least for river herring, several species of sunfish, and largemouth bass.

The adverse environmental impacts of eliminating this habitat are magnified considering the fact that there is no comparable habitat for some of these organisms in the general proximity of the Broad Canal. As has been recognized by EPA New England, the lack of benthic prey, lack of refuge, high salinity, low DO, and toxic sediments in this part of the Lower Basin make it a very poor habitat for most life stages of aquatic organisms native to the Charles River. For example, eggs and larvae in the Lower Basin face significant mortality risk from advection and settling to anoxic depths, whereas in the Broad Canal, this risk is diminished.

Along these same lines, eggs and larvae that would otherwise enter the Broad Canal in the absence of an exclusion technology blocking access would be excluded from this relatively beneficial habitat and be subjected to greater risks of mortality due to advection or settling to anoxic depths that they would face in the Lower Basin. Furthermore, benthic species that populate the Broad Canal, such as yellow perch, pumpkinseed, bass, goldfish, and brown bullhead, would be unable to populate the relatively inhospitable depths of much of the Lower Basin.

Response to Comment 4.17.1
In the Final Permit Modification, EPA requires the exclusion technology to be located within the Broad Canal. See Response to Comment 4.12. EPA agrees that suitable habitat for resident species may exist in the Broad Canal, but the permittee has submitted no evidence to support the claim that there is no comparable habitat for some of these organisms in the general proximity of the Broad Canal. Although poor water quality remains a concern in the Lower Basin, it has been targeted for intensive restoration programs[3] and offers substantial habitat for a number of fish species (Determination Document p. 16-18).

[3] EPA's Clean Charles River Initiative is working towards the goal of making the Charles River fishable and swimmable, in part by targeting bacterial contamination. The initiative has improved the status from limited boating and no swimming in 1995 to nearly meeting all standards for boating and swimming in 2007 (http://www.epa.gov/region1/charles/initiative.html). In addition, a TMDL for phosphorus was

Comment 4.17.2
As proposed in the Draft Permit Modification, Mirant Kendall would be required to create and maintain an unnatural "sweeping velocity" past every portion of the exclusion infrastructure. As discussed in more detail below, inducing a sweeping velocity will require dozens of pumps or jets located at depths throughout the water column, including in the lower portion of the water column. Moreover, the proposed requirement to ensure a "gentle release" of any impinged eggs and larvae also will entail an air-burst or backwash of water at all depths throughout the water column.

As EPA New England has previously determined, agitation of the bottom waters (which would invariably occur through use of these pumps or jets), if it does not de-stratify the water column, poses risks of liberating phosphorus that is currently contained in the sediments. With more phosphorus circulated throughout the water body, EPA New England has concluded that the risks for algal blooms would increase. Moreover, there are risks associated with agitating other toxins currently suspended in the lower water column. While Mirant Kendall does not agree with these prior conclusions reached by the Agencies vis-à-vis the impacts of the diffuser (which would significantly reduce or eliminate stratification), it points out that the Agencies' decision not to authorize the diffuser relied on a rationale that is even more applicable to the deployment and maintenance of any exclusion infrastructure at the mouth or outside of the Broad Canal.

The SOB did recognize the potential for adverse water quality impacts associated with construction of an exclusion infrastructure outside of the Broad Canal. SOB at p. 28. In addition to the increased turbidity, erosion of adjacent shorelines, and the need to manage highly toxic dredged material that EPA New England identifies as concerns in the SOB, Mirant Kendall again points out that EPA New England has previously expressed how agitation of the bottom waters (which contain toxins and dissolved heavy metals, are nutrient rich, and suffer from high salinity, and low dissolved oxygen) would likely cause adverse impacts. But despite briefly identifying decreased water quality from construction as a concern, the SOB did not assess the magnitude of impacts that would be associated with the anticipated four month long construction project. And it did not assess the impacts of ongoing operation at all.

Response to Comment 4.17.2
In the Final Permit Modification, EPA requires the exclusion technology to be located within the Broad Canal. See Response to Comment 4.12. To the extent, if any, that this comment is also intended to apply to an induced sweeping flow *within* the Broad Canal, EPA responds as follows:

A sweeping flow would likely not require dozens of jets or pumps located at depths throughout the water column, but a small number of fish-friendly pumps located at the end of an isolated bounded area within the Broad Canal. *See* Response to Comment 4.25. Any water quality impacts in the river due to a sweeping flow would be related to the

---

approved in 2007, which targets reducing algal blooms by targeting phosphorus discharges into the lower Charles River.

discharge of water pulled through the fish-friendly pump and bypass return. This discharge would be similar to the existing wall discharge for non-contact cooling water, except the volume will be lower and will not have been heated. The existing discharge, based on salinity, dissolved oxygen, and temperature vertical profiles of the Lower Basin, does not cause vertical mixing (see Figure 3-26 to 3-37 of the 2001 NPDES Equipment Upgrade Project volume I, AR 456). Seasonal changes in these parameters during 1998 and 1999 indicate that the existing wall discharge (downstream of Longfellow Bridge) does not disturb the saline, low dissolved oxygen waters trapped below a depth of 5 meters. In particular, there is no evidence of thermal mixing at depth from the plant's outfall on August 3, 2006, when the temperature at approximately 5 meters was 75.5˚F upstream of the Harvard Bridge and 73.1˚F downstream of the Longfellow Bridge. A substantial salinity gradient, evident from an increase of more than 1500% in specific conductance between 4 and 5 meters, was undisturbed by wall discharge downstream of the Longfellow Bridge. Discharge from the wall on this date was 70.6 MGD, which is more than the return system proposed by SAIC (AR 738). Because the existing discharge does not cause vertical mixing that would release nutrient-rich bottom waters and increase the risk of harmful algal blooms, it is unlikely that the proposed fish return system, with a lower discharge volume and similar surface location would impact stratification in the Lower Basin. In addition, the Broad Canal does not have the same issues with phosphorus or toxins in the sediment as does the River, and as such, briefly suspending the sediment from the Broad Canal is not as much a concern as it would be in the River.

The diffuser was proposed to extend over 700 feet along the bottom of the Charles River with 16 discharge ports specifically designed to effectively disperse heat pollution through vertical mixing and destratification. It cannot reasonably be compared to an aquatic filter barrier or fine mesh barrier net.

Comment 4.17.3
The SOB, in discussing wedgewire screens and Filtrex, noted how the large space required for those infrastructures would have an adverse impact on navigation and recreational use in the Lower Basin. SOB at p. 42. But deployment of an aquatic filter barrier (and possibly a fine-mesh barrier depending on its design and size) in the Lower Basin would have an equal or even greater impact on navigation and recreation. This is because such a barrier would physically occupy comparable (if not more) space than wedgewire screens or Filtrex. Moreover, where wedgewire and Filtrex can be located at depth to mitigate some navigation issues, a fine-mesh barrier net and aquatic filter barrier would need to span the entire height of the water column and would protrude above the water line several feet. Furthermore, locating a fine-mesh barrier or aquatic filter barrier at the mouth or outside of the Broad Canal also would foreclose safe and convenient recreational use of the Broad Canal.

Moreover, as MassDEP is aware, Mirant Kendall currently is under a regulatory obligation to construct a new public walkway that will increase the number of visitors and the variety and extent of uses of the Broad Canal. In conjunction with Mirant Kendall's development of this walkway, Twining Properties will be developing a smallcraft marina at the end of the Broad Canal, consisting of a boat dock and a canoe and kayak rental area.

Development of the Broad Canal for these recreational uses is inconsistent with an exclusion technology that blocks off the Broad Canal. Not only would such a blockage effectively eliminate access to the Lower Basin for users of the small-craft marina, but it would impair the opportunity for boaters from the Lower Basin could enter the Broad Canal and dock at the new public walkway.

The SOB does refer back to the Determination Document in theorizing that perhaps any barrier net or aquatic filter barrier can be designed with a flexible floating membrane that will allow for passage of small, un-motorized boats through the barrier net or aquatic filter barrier. SOB at p. 42. But neither the SOB nor the Determination Document provide any detail on how this membrane would be constructed, or whether this type of membrane has ever been deployed in a setting similar to Kendall Station's and safely used by inexperienced boaters on unstable craft (such as canoes and kayaks). Without an evaluation of whether a boat-passage membrane has ever been designed, constructed, and deployed in a successful and safe manner, and considering the special site-specific factors here (i.e., increased small-craft traffic piloted by inexperienced boaters and families), the Agencies cannot determine that such a membrane would not pose risks to human safety. Moreover, use of this theoretical membrane would violate one of the express provisions in the Draft Permit Modification that requires operation of the exclusion technology to "preclude bypasses at all times…."

The SOB also states that this membrane could only provide for passage of non-motorized craft, which suggests that motorized or larger boats will no longer have access to the Broad Canal. As an initial matter, this too would be inconsistent with the Draft Permit Modification. For example, the Draft Permit Modification requires certain monitoring in the Broad Canal that can only be accomplished by boat. Kendall Station's operations, from time to time, also require use of a motorized boat at and around its property. Additionally, Mirant Kendall is not the only entity or person that currently utilizes motorized craft in the Broad Canal. The SOB also fails to consider that an aquatic filter barrier (and possibly even a fine-mesh barrier net) located in the Lower Basin would be such a large structure that it would eliminate use of several of the existing moorings presently used for pleasure craft immediately downstream of the Broad Canal.

Finally, the impacts on navigation caused by the Draft Permit Modification's § 316(b) determination must be viewed in conjunction with the 2006 Final Permit's § 316(a) provisions that require installation of several large buoys in the portion of the Lower Basin below the Longfellow Bridge. EPA New England must assess how the navigational hazards of any exclusion infrastructure (including the dozens of pumps or jets that will need to be installed) in this same general area contribute to the navigation hazards already presented by the monitoring buoys. The significant in-water changes proposed by this Draft Permit Modification as a whole are notable and should be considered as part of the BTA analysis.

Response to Comment 4.17.3
EPA agrees that installing an aquatic filter barrier or fine mesh barrier net across the mouth of the Broad Canal could impede navigation and recreational use. Based on the comments of Mirant and others, and in light of the proposed public walkway and increased boat use, EPA has revised the Final Permit Modification to prohibit installing the exclusion technology at the mouth or outside of the Broad Canal. See Response to Comment 4.12 and related comments.

Comment 4.17.4
The risks to human safety from installing a fine-mesh barrier net or aquatic filter barrier at the mouth or outside of the Broad Canal are numerous. First, as discussed above, such a deployment would increase navigation risks for the canoes and kayaks launched from the smallcraft marina in the Broad Canal. The Agencies must do more than cast this risk aside with an unsupported and conclusory statement about construction of an apparently untested flexible membrane. The Agencies also do not assess how the numerous pumps or jets that would have to be located outside of the barrier net infrastructure in the Lower Basin to try and satisfy the "sweeping flow" design standard (assuming it could be satisfied at all) would affect navigation risks. Given that these structures would have to be located throughout the water column, and that they would increase water velocities and turbulence, there is a risk that they would pose increased safety risks to canoes and kayaks, as well as larger craft. The SOB also failed to assess the dangers associated with locating potentially dozens of electrically powered pumps or jets in a highly-trafficked and accessible area of the Lower Basin currently populated by numerous smallcraft moorings. The potential for electrical system malfunctions and failures, vandalism, or damage due to "anchoring" incidents in an aquatic setting poses additional risks to human safety.

Also, as discussed in more detail below, any fine-mesh barrier net or aquatic filter barrier would consist of vertical steel piles driven into the bottom of the Lower Basin with a maintenance walkway along the surface. This necessary design provides an inviting, yet potentially dangerous, structure to tie up watercraft, to use as a walkway to enjoy the Lower Basin, or to use as a swimming or fishing platform. While Mirant Kendall would certainly seek to design the structure in a manner that reduces unauthorized and potentially dangerous uses by the general public, elimination of such use would be impossible to ensure. The SOB does not consider the impacts of this risk, which could be quite serious. Inevitably, the infrastructure will attract recreational users closer to risks posed by collisions with underwater or above water structures, entanglement with floating membranes, and the inherent risks arising from induced currents whose impacts and effects have not been studied.

Response to Comment 4.17.4
In the Final Permit Modification, EPA requires the exclusion technology to be located within the Broad Canal. See Response to Comment 4.12. As stated in Responses to Comments 4.12, 4.17.1 and 4.17.3, the Final Permit Modification requires that the exclusion technology be located such that recreational boats are allowed unobstructed, safe passage to the Broad Canal, which would prohibit deployment across the mouth of

the Broad Canal. Moreover, as shown in the SAIC Report, a fish bypass/sweeping flow system need not unacceptably impact navigation. See Responses to Comments 2.23, 4.25.

Comment 4.17.5

As the SOB recognized, the effectiveness of a fine-mesh barrier net or an aquatic filter barrier can be compromised by biofouling that can lead to "increased through-screen velocity, overtopping, tunneling, and rips in the fabric." SOB at pp. 33-34. In addition, debris loading will have similar adverse effects on performance. While an air-burst system and/or manual maintenance may help alleviate some of these concerns (although the exact extent of biofouling and debris loading is unclear at Kendall Station absent pilot testing), the potential for debris loading is greater for a technology located in the Lower Basin than for one located within the Broad Canal. This is because an exclusion technology located in the Lower Basin will be exposed to the larger amount of debris that flows down the Lower Basin as compared to the debris that flows into the Broad Canal. Moreover, if an exclusion technology were located outside of the Broad Canal, it would be subjected to potential debris loading on both sides because the Broad Canal contains three storm sewer outfalls that discharge water and debris during storm events.

Response to Comment 4.17.5

In the Final Permit Modification, EPA requires the exclusion technology to be located within the Broad Canal. See Response to Comment 4.12. See also Draft Permit Determination Document at 225 (noting that "during the summer of 2000, a prototype barrier net was placed in front of intake structure #3 and studies were conducted to assess entrainment and impingement of aquatic organisms. The assessment also evaluated the potential for fouling and net durability"). Mirant has not submitted data related to the degree of debris loading in the Broad Canal for EPA's review.

Comment 4.18

The SOB describes that the "best" technology in this context means "surpassing all others in excellence, achievement, or quality." SOB at p. 18. By that definition, the "best" location for any fine-mesh barrier net or aquatic filter barrier cannot be at the mouth or outside of the Broad Canal because such a location potentially increases environmental impacts without offering any added benefit with respect to impingement and entrainment (and possibly compromising performance due to the higher level of debris loading that could occur at the mouth or outside of the Broad Canal).

Moreover, other environmental impacts would increase with a barrier at the mouth or outside of the Broad Canal because the excluded organisms would be more likely to drift into the most concentrated portion of the thermal plume, settling to anoxic depths, or accelerated advective loss, all of which they could avoid -- to a higher degree -- in the Broad Canal.

Response to Comment 4.18

In the Final Permit Modification, EPA requires the exclusion technology to be located within the Broad Canal. See Response to Comment 4.12.

Comment 4.19
The SOB did not adequately evaluate whether a location outside the Broad Canal would be "available" for use of a wedgewire screen or Filtrex.

Response to Comment 4.19
This comment is entirely prefatory to comments 4.19.1-4.19.4, and individual responses to those comments are below.

Comment 4.19.1
As discussed above, one of the factors leading EPA New England to conclude that fine-mesh traveling screens and Geiger screens were not available was the engineering and construction difficulty inherent in constructing a fish return system. But the SOB did not assess whether in-river installation of wedgewire screens or Filtrex poses the same challenges. The construction in the Lower Basin will involve significant dredging, construction of pipes connecting the technologies with Kendall Station's intake, and a construction timeline of at least six months, with capital costs that the SOB cited as approaching or exceeding $20,000,000. SOB at p. 38. The engineering and construction challenges of such an installation, therefore, far exceed those that would be associated with the construction of the type of much more simple fish return system that the SOB originally contemplated and deemed to be unavailable.

Response to Comment 4.19.1
In the Final Permit Modification, EPA requires the exclusion technology to be located within the Broad Canal. See Response to Comment 4.12. See also Response to Comment 4.16.2.

Comment 4.19.2
"Availability" also is a function of whether necessary permits could be obtained to install a certain technology. As described above, Mirant Kendall has identified several permits that it would need in order to install wedgewire screens and Filtrex in the Lower Basin. The SOB did not evaluate whether these permits are reasonably obtainable, and absent such an analysis it cannot conclude that deployment in the Lower Basin is "available." In fact, given the interference with navigation, and increased risks to human safety that wedgewire screens or Filtrex would have in the Lower Basin, it is doubtful that all such required permits could be obtained.

Response to Comment 4.19.2
In the Final Permit Modification, EPA requires the exclusion technology to be located within the Broad Canal. See Responses to Comments 2.23, 4.12.

Comment 4.19.3
The SOB did not address the greater capital and ongoing costs associated with locating wedgewire screens or Filtrex outside of the Broad Canal, as opposed to locating them inside the Broad Canal. These greater costs are significant to the cost-effectiveness analysis that the SOB should have applied in its BTA determination.

The higher costs associated with locating wedgewire screens or Filtrex outside the Broad Canal, combined with the fact that there would be no advantage to locating either technology there, means that deployment within the Broad Canal is a more cost-effective option.

Response to Comment 4.19.3
In the Final Permit Modification, EPA requires the exclusion technology to be located within the Broad Canal. See Response to Comment 4.12. EPA has not mandated the use of a single technology but instead has required a suite of design standards that can be met with a number of available technologies, the most appropriate of which is left to Mirant's discretion; EPA is not obligated to assess if one particular technology from that set could achieve essentially the same benefits as another technology from that set but at a markedly lower cost. See Responses to Comments 2.7.7, 2.20, and 4.16.3.

Comment 4.20
Installing wedgewire screens or Filtrex in the Lower Basin could increase, rather than minimize, environmental impacts.

Response to Comment 4.20
This comment is entirely prefatory to comments 4.20.1-4.20.3, and individual responses to those comments are below.

Comment 4.20.1
The SOB notes that installing wedgewire screens in the Lower Basin could result in algal blooms resulting from the withdrawal of nutrient-rich bottom waters and the subsequent discharge of those waters to the surface. SOB at p. 41. The SOB also recognizes how discharge to the surface of bottom waters relatively high in salinity and low in dissolved oxygen may also adversely impact water quality. SOB at p. 41. Additionally, as mentioned above, the SOB recognized that in-water construction in the Lower Basin could adversely impact water quality. Alden has estimated that the construction time for installing wedgewire screens or Filtrex in the Lower Basin would take approximately six months. Yet despite this significant construction timeline, and the SOB's recognition that construction can have adverse water quality effects, the SOB did not address whether such a long period would create sustained water quality issues that would weigh against a determination that wedgewire screens and Filtrex could reflect BTA in this location.

More important, the SOB also did not evaluate the adverse water impacts of having numerous fish pumps or jets located throughout the water column in the Lower Basin on a long-term operational basis. As described above, these pumps or jets (needed to induce the flow required by the Draft Permit Modification) could adversely impact water quality in the Lower Basin by releasing metals, complex organics and nutrients bound in the sediments, and introducing higher levels of salinity and lower levels of dissolved oxygen to other portions in the Lower Basin's water column. Moreover, the air-burst or backwash that would be necessary to clean the wedgewire screens or Filtrex would also agitate these bottom waters in a sporadic, noncontinuous manner. In light of these risks (some of which the SOB expressly recognized, but did not assess) to water quality associated with installation and operation of wedgewire screens or Filtrex in the Lower Basin, the SOB fails to provide an adequate basis for finding that wedgewire screens or Filtrex in the Lower Basin could constitute BTA.

Response to Comment 4.20.1
In the Final Permit Modification, EPA requires the exclusion technology to be located within the Broad Canal. See Response to Comment 4.12.

Any water quality impacts in the river due to a sweeping flow would be related to the discharge of water pulled through a fish-friendly pump and bypass return in the Broad Canal. This discharge would be similar to the existing wall discharge for non-contact cooling water, except the volume will be lower and the discharge will not have been heated. The existing discharge, based on salinity, dissolved oxygen, and temperature vertical profiles of the Lower Basin, does not cause vertical mixing (see Figures 3-26 to 3-37 of the 2001 NPDES Equipment Upgrade Project volume I, AR 456). There is no evidence that the existing discharge causes vertical mixing that would release nutrient-rich bottom waters and increase the risk of harmful algal blooms. See Response to Comment 4.17.2.

Comment 4.20.2
The SOB recognizes that "[t]he large size of wedgewire screens or a large dock supporting filtration modules could also interfere with the navigation and recreational uses of the Charles River," and then notes that this adverse effect could be minimized by locating the wedgewire screens or Filtrex in the Broad Canal. SOB at p. 42. But the SOB did not explain why wedgewire screens or Filtrex installed in the Lower Basin could reflect BTA. The SOB did not assess the impacts on navigation and recreation that the numerous pumps or jets needed to induce flow would have in the Lower Basin.

Finally, the air-burst systems on wedgewire screens operate by suddenly releasing a large volume of air which will locally decrease the water density and causes significant surface turbulence. The lower water density and surface turbulence may be sufficient to sink or capsize a small watercraft. The SOB did not assess whether this very dangerous effect could be safely mitigated through use of buoys, roping, or in-water fencing. And even if this type of danger could be mitigated by these measures, the Agencies should then evaluate the adverse impact on navigation that such system of ropes or buoys or fences would have on the Lower Basin.

Response to Comment 4.20.2
In the Final Permit Modification, EPA requires the exclusion technology to be located within the Broad Canal. See Response to Comment 4.12. Even if the airburst system could present a danger to navigation within the Broad Canal, it will be sufficiently isolated within the channel of the induced flow system.

Comment 4.20.3

The SOB does not consider whether wedgewire screens or Filtrex located in the Lower Basin face an increased risk of debris loading than if located in the Broad Canal. Given the greater amount of debris that these technologies would be exposed to if located in the Lower Basin, the risks for debris loading are more significant in the Lower Basin. For this reason, there are greater risks of performance issues with wedgewire screens or Filtrex located in the Lower Basin.

Response to Comment 4.20.3
In the Final Permit Modification, EPA requires the exclusion technology to be located within the Broad Canal. See Response to Comment 4.12. Furthermore, the permittee has not submitted (and EPA is not aware of) any data suggesting that debris loading in the Lower Basin is significantly greater than in the Broad Canal.

Comment 4.21
Neither wedgewire screens nor Filtrex installed in the Lower Basin can be considered better than (or even equal to) deployment of those technologies in the Broad Canal. This is because performance is expected to be the same (or even better) in the Broad Canal than in the Lower Basin, while a Lower Basin deployment causes a greater potential for increased environmental impacts due to decreases in water quality and greater risks to navigation. The SOB did not address why the greater risk of adverse impacts associated with deployment in the Lower Basin (many of which it expressly recognized), would not eliminate the Lower Basin as the "best" location for wedgewire screens or Filtrex.

For example, the SOB recognized that locating wedgewire screens in the Lower Basin could result in higher incidents of algal blooms. SOB at p. 41. Given that the SOB recognized this risk, and yet found no added benefits to locating wedgewire screens outside of the Broad Canal, it is difficult to see how wedgewire screens deployed in the Lower Basin could still be the "best" technology compared with wedgewire screens in the Broad Canal. The SOB also recognized that the large size required to deploy wedgewire screens and Filtrex would interfere with recreational uses of the Lower Basin. Again, given this recognition, it is difficult to see why locating wedgewire screens or Filtrex in the Lower Basin could reflect the "best" technology compared with deployment in the Broad Canal.

While, for reasons discussed below, Mirant Kendall believes that neither wedgewire screens nor Filtrex are "available" technologies for deployment anywhere, the purpose of this comment is to point out that the SOB has not established how wedgewire screens or Filtrex in the Lower Basin could reflect the "best" technology available.

Response to Comment 4.21
In the Final Permit Modification, EPA requires the exclusion technology to be located within the Broad Canal. See Response to Comment 4.12.

Comment 4.22
The Draft Permit Modification requires Kendall Station to install and/or operate an unidentified "exclusion technology" that must meet six different design standards. The

SOB did not adequately analyze whether the design standards are "available" or could be achieved by any "available" technology. A technology is not "available" if it cannot feasibly be constructed at all -- either in the abstract or on a site-specific basis. Even if it is somehow feasible to construct a certain technology, that technology is not "available" if its construction, installation, or operation would be sufficiently "difficult" from a technological perspective. Finally, a technology cannot be considered available unless all required permits could be obtained.

Response to Comment 4.22

This comment largely serves as a preface and overview of Mirant's Comments 4.23-4.36, and is consequently largely duplicative and redundant of other comments. EPA has responded to specific comments in detail elsewhere in this Response to Comments.

Mirant Kendall's statement that the aquatic organism exclusion technology required by the Draft Permit Modification is "unidentified" is incorrect. Several exclusion technologies could satisfy the standards, e.g., fine-mesh barrier nets, aquatic filter barriers, and wedgewire screens. *See, e.g.,* SOB at 42. (Of course, the Final Permit Modification allows Mirant Kendall to use *any* exclusion technology that satisfies the permit conditions, including any potential new technology that satisfies the permit conditions but was not evaluated or available at the time of the SOB.)

EPA agrees, in general, that "a technology is not 'available' if it cannot feasibly be constructed at all—either in the abstract or on a site-specific basis." EPA has responded in more detail to Mirant Kendall's specific comments that pertain to this issue.

EPA considered the engineering aspects of applying various control techniques in developing the SOB. *See SOB* at 39-42. EPA candidly acknowledged that "[t]he installation of technology such as fine-mesh traveling screens, barrier nets, aquatic filter barriers, wedgewire screens, and filtration systems presents a suite of site-specific engineering challenges that must be considered in the BTA determination for Kendall Station." *Id.* at 39. In the pages that followed, EPA discussed these challenges and its evaluation of the remaining technologies in light of such challenges. *See id.* at 39-42.

Upon further analysis, in evaluating Mirant's comments and developing the Final Permit Modification, EPA has determined that an aquatic filtration system is not available for Kendall Station at this time. Based on the aquatic filtration system currently available, the installation would be too large to be deployed within the Broad Canal. See Response to Comment 4.44.

In EPA's technical judgment, however, the remaining three options (fine-mesh barrier nets, aquatic filter barriers, and wedgewire screens) could not be eliminated on this basis. EPA also considered engineering issues associated with "gentle release" and sweeping current. *See* SOB at 36, 40, 45-46. In preparing the Final Permit Modification, EPA further considered these issues and modified the permit conditions in response to points raised by Mirant Kendall. EPA has responded in more detail to Mirant Kendall's specific comments that pertain to this issue.

Mirant Kendall also states that "a technology cannot be considered available unless all required permits could be obtained." *See* Response to Comment 2.23.

Comment 4.23
Though couched as "design" standards, the Draft Permit Modification actually proposes operational requirements on Kendall Station that are beyond the reasonable ability of Kendall Station or any existing technology to achieve. The Draft Permit Modification leaves the precise technology unidentified and requires accomplishment of a certain goal or result. But CWA § 316(b) does not allow setting an operation standard unless there is an available technology capable of meeting that standard. CWA § 316(b) requires EPA New England to select an existing "technology" as BTA, and not to establish a suite of operation standards where there is no evidence that those operation standards can be accomplished by any existing technology or set of mutually compatible technologies.

Response to Comment 4.23
This comment largely serves as a preface and overview of Mirant Kendall's Comments 4.23.1-4.23.2, and is consequently largely duplicative and redundant of other comments. EPA has responded to specific comments in detail elsewhere in this Response to Comment.

As a general matter, EPA has discretion to specify BTA permit conditions by requiring (1) a particular technology, (2) performance standards (in terms of adverse environmental impact) , or (3) technical parameters pertaining to the design and operation of the CWIS. *See* Response to Comment 2.26. EPA acknowledges that several of the requirements of the Draft Permit Modification partake of both "design" and "operation." For example, the Draft Permit Modification specified that the permittee must restrict the effective through-media velocity to no more than 0.5 feet per second (fps). This is largely a function of design (ensuring the medium has sufficient square footage) but also includes an operational component (ensuring that the medium is not clogged, torn, etc.). EPA's point in referring to the permit requirements as "design standards" was not to contrast "design standards" with "operational standards," but rather to contrast "design standards" (i.e., pertaining to the technology itself) with "performance standards" (i.e., pertaining to achieved reductions in impingement or entrainment). To avoid confusion created by semantic distinctions between "design" and "operational" standards, EPA in this Response to Comments at times uses the more general term "technical parameters." *Cf. Decision of the General Counsel No. 41*, at 202-03.

EPA agrees, as a general matter, that a NPDES permit may not contain requirements under CWA § 316(b) that cannot be achieved by any available technology. As explained in other responses, in developing the Final Permit Modification, EPA revised some of the Draft Permit Modification's proposed permit conditions. The permit conditions of the Final Permit Modification are achievable by available technologies. EPA has responded in more detail to Mirant Kendall's specific comments that pertain to this issue.

Comment 4.23.1

The Draft Permit Modification proposes that the through-media velocity of the exclusion technology be restricted to “no more than 0.5 feet per second at any point in the media at all times.” But there is no technology currently available that is guaranteed to achieve this level of (perfect) operation. The only analysis of this design standard in the SOB, however, is that certain technologies have been designed to meet this through-media velocity, generally. There is no analysis, however, of whether there is an available technology that can guarantee the Draft Permit Modification’s operation requirement that through media velocity be restricted “at any point,” and “at all times.”

While certain technologies can be designed to achieve 0.5 fps or less under optimal (and even sub-optimal) conditions, the SOB did not assess whether any available technology is proven to guarantee such a through-media velocity “at any point,” and “at all times.” For example, a fine-mesh barrier net or aquatic filter barrier can be designed to achieve such a low through-media velocity, but it is not guaranteed that those technologies will be able to perform in that manner “at any point” and “at all times” because of issues beyond Kendall Station’s control -- that the SOB expressly recognized -- such as rips in the fabric due to large pieces of debris, or localized “hot” spots caused by debris or other biofouling that accumulates prior to when sufficient maintenance can occur. There can also be “hot” spots on wedgewire screens between screen cleanings. See Technical Development Document at p. 4-12. The same risks are also true of Filtrex because velocity distribution over Filtrex candles has been observed to be extremely uneven in various demonstrations and cannot be guaranteed at any given point.

The Phase II Rule (which the SOB relies upon for support of its 0.5 fps through-medium velocity) only would have required that exclusion technologies be designed to achieve that velocity, and would not have required the achievement of that velocity at all point and at all times. 66 Fed. Reg. at 65,274 (“the final regulation requires that the maximum design through screen velocity at each cooling water intake structure be no more than 0.5 ft/s.” (emphasis added)). The SOB does not explain its basis for going beyond what would have been required by the Phase II Rule.

A more appropriate permit provision regarding the through-media velocities, suggested by Mirant Kendall’s BTA Proposal, is to require the exclusion technology to be designed to achieve a 0.5 fps through-media velocity even when approximately 20% of the surface is obstructed due to debris or biofouling, with a provision for reasonable cleaning and maintenance. Such a design requirement ensures that protective through-media velocities will be maintained (even in the face of debris or biofouling that accumulates between air-bursts or maintenance), and that a permit violation does not result from something beyond the permittee’s reasonable control, such as a temporary breach or malfunction of the exclusion technology due to unpredicted natural causes or uncontrollable river conditions.

Response to Comment 4.23.1

At the outset, it is important to correct an error in the comment. EPA derived the 0.5 fps protective through-medium velocity from the studies and analysis in the preamble to the Phase I Rule, not the Phase II Rule. *See* Response to Comment 4.10.4.

As stated in Responses 4.10.2 to 4.10.4 and elsewhere, a low through-media velocity is a critical component of BTA because it ensures that a substantial number of adult and juvenile fish are able to escape impingement. In order for this design standard to perform effectively and avoid bypasses, this through-media velocity must not be exceeded. Each of the four exclusion technologies evaluated in the SOB are capable of achieving through-media velocities no greater than 0.5 fps. However, EPA acknowledges that a temporary breach could cause local velocities to exceed 0.5 fps. In response to Mirant's comment, Part I.A.11.a.2 of the Final Permit Modification has been revised as follows:

> The permittee shall restrict the effective through-media velocity to no more than 0.5 fps at any point in the media to the extent practicable when the exclusion technology is in place.

This requirement is enforceable, achievable, and protective of aquatic organisms at the exclusion technology.

Comment 4.23.2

The Draft Permit Modification proposes that "[o]peration of the exclusion technology shall preclude bypasses at all times…." The SOB did not evaluate this design standard. This design standard, as drafted, raises the same issue as above, namely that it does not merely require that the exclusion technology be designed to preclude bypasses, but requires that no bypasses occur at all. Furthermore, such a requirement is an unreasonable proposal in light of the fact that the Draft Permit Modification proposes deployment of untested and new technologies, without any pilot testing. There is no basis in the record for the Agencies to conclude that it would even be possible to prevent all-bypasses.

The Draft Permit Modification's proposal of no-bypasses is also surprising considering the fact that the 2006 Final Permit recognized the fact that a requirement of "no-bypasses" was infeasible, and instead included the requirement to "design, install and operate the BNS to preclude bypasses due to circumstances within the permittee's control, to the extent practicable." The SOB does not explain why EPA New England has now backtracked on this prior requirement.

Moreover, the SOB does not explain how the no-bypasses requirement would be consistent with operation of any boat bypass that would be needed if a fine-mesh barrier net or aquatic filter barrier were installed at the mouth or outside of the Broad Canal. Absent installing a boat lift, any passage by boats through, above, or around the exclusion technology necessarily creates a bypass for water and organisms as well.

Response to Comment 4.23.2

EPA acknowledges that maintaining zero bypasses at all times may be infeasible in certain situations beyond the permittee's control. Under Part II.B.4 of the 2006 Final Permit and consistent with the effluent bypass provisions at 40 CFR § 122.41(m)(4), bypasses are prohibited with limited exceptions, such as to prevent loss of life, personal injury, or severe property damage, or when no feasible alternatives to the bypass existed.

For consistency, EPA has changed the Final Permit Modification at Part 1.A.11.a.3 as follows:

> Operation of the exclusion technology shall preclude bypasses to the extent practicable, except as otherwise provided by Part II.B.4 of this permit.

Regarding boat bypasses, the Final Permit Modification prohibits blocking the entrance of the Broad Canal, so operation of a boat bypass with a fine mesh barrier net or aquatic filter barrier is not pertinent.

Comment 4.24
The Draft Permit Modification proposes that:

> The permittee shall ensure that the exclusion technology includes a mechanism to gently release eggs and larvae that become impinged. For the purposes of this permit, "gently" means with the minimum amount of force needed to free eggs and larvae and in a manner so as to maximize the probability of survival of eggs and larvae. The permittee shall operate this mechanism at a frequency calculated to maximize the probability of survival of eggs and larvae.

The following comments demonstrate why there is no technology available to satisfy this vague and never applied before (as far as Mirant Kendall can tell) design standard.

Response to Comment 4.24
Comment 4.24 serves largely as a preface for comments 4.24.1 through 4.24.8. As a result of these comments, EPA has reevaluated the "gentle release" requirement and, in the Final Permit Modification, replaced it with a requirement to operate an automated mechanism to minimize debris loading. See Response to Comment 4.24.1.

Comment 4.24.1
Despite proposing this vague and imprecise "gentle release" design standard, the SOB did not identify a single exclusion technology (or set of compatible technologies) designed, deployed or tested to accomplish this design standard. In fact, no such exclusion technology exists. For this reason, this design standard cannot be considered capable of being achieved with "available" technologies.

This design standard consists of three separate and distinct components:

• Gentle release with "minimum amount of force needed to free eggs and larvae…"
• "…in a manner so as to maximize survival…"
• "…at a frequency calculated to maximize the probability of survival…"

There is nothing in the record -- and nothing outside of the record that Mirant Kendall is aware of -- indicating that any one of these three components of this design standard could be satisfied by any existing exclusion technology designed to keep organisms out of the CWIS. The air-burst system used by aquatic filter barriers and wedgewire screens to blast debris from the screens was not designed to try and affect a "gentle release," but rather to blow debris as far away from the screens as possible. The force of these air-bursts is sufficiently violent to preclude them from being considered "gentle." MK Modification Comment Exhibit No. 11. Whether the backwash system used by Filtrex would be any more effective at attempting a gentle release has not been studied, and because Filtrex has not been deployed at a facility with Kendall Station's intake capacity, it is unknown whether the backwash system could be even utilized with sufficient frequency, even assuming it could be seen as effecting a "gentle release."

Response to Comment 4.24.1
EPA agrees that, although existing technologies are designed to clear debris from media, the survival of eggs and larvae is unknown at this time. EPA has concluded, based on current knowledge regarding the survival of eggs and larvae after being released or cleared by available mechanisms, it is not appropriate to require the permittee to achieve a "gentle release" as defined by the Draft Permit Modification. Therefore, the "gentle release" requirement has been revised in the Final Permit Modification.

Nonetheless, available technologies are equipped with a mechanized system to minimize fouling and clear debris to ensure maximum performance of the exclusion technology, and may also promote the survival of impinged organisms by clearing those organisms from the technology. For example, wedgewire screens and aquatic filter barriers typically include an "airburst" mechanism, and barrier net systems can be fitted with a similar system. EPA is requiring the use of a mechanized system to clear debris in the Final Permit Modification because such systems are available and designed to best maximize performance of a technology. EPA has changed the Final Permit Modification at Part I.A.11.a(4) as follows:

> The permittee shall ensure that the exclusion technology includes an airburst, backflow, or comparable mechanism to minimize debris loading. The permittee shall operate this mechanism in a manner and at a frequency provided by the manufacturer's guidelines, except where the permittee demonstrates that an alternative operating method would better maximize the survival of eggs and larvae. If no guidelines regulating frequency are available, the permittee shall operate the mechanism as often as needed to maintain a through-media velocity no greater than 0.5 fps.

The principal purpose of this revised requirement is to minimize fouling and clear debris to ensure maximum performance of the exclusion technology. In this respect, it complements the provisions regarding through-medium velocity and bypasses by ensuring that the system functions properly as an aquatic organism exclusion technology. The manufacturer's guidelines are presumed to reflect proper operation of the technology and therefore, for a particular system, the best technology available. A secondary purpose of the revised provision is to promote the survival of impinged organisms by clearing those organisms from the technology. If Mirant can demonstrate that an alternative manner or frequency of cleaning would better maximize the survival of eggs and larvae at Kendall Station, then such an alternative operating method would reflect the best technology available notwithstanding its departure from general manufacturer guidelines.

Comment 4.24.2
There is nothing in the record, nor any studies that Mirant Kendall is aware of, that attempts to identify or quantify the type of force (i.e., backwash, air-burst, vacuum, agitation, etc.) or intensity of force needed to free eggs and very small larvae of any species -- let alone the target species in the Lower Basin -- from an exclusion technology. And without any information indicating the minimum type of force or intensity of force required to accomplish gentle release, it is impossible to meet this design standard. Moreover, the force would have to be sufficient to expel the eggs and very small larvae far enough away from the exclusion technology to be caught up in the induced sweeping flows designed to prevent re-impingement.

Response to Comment 4.24.2
At this time the type or quantity of force needed to promote survival of eggs and larvae has not been adequately studied. In addition, it is not known whether this force will also be adequate to clear debris, which is the primary purpose of mechanized clearing devices. Thus, EPA has removed the requirement for a "gentle release" and instead, as stated in Response 4.24.1, the Final Permit Modification has been revised to require a mechanized device to clear debris.

Comment 4.24.3
There is nothing in the record (or anywhere else as far as Mirant Kendall is aware) evaluating post-impingement survival rates of eggs or very small larvae that have been released from an exclusion technology. MK Modification Comment Exhibit No. 11. There is no basis, therefore, to conclude that the component of the design standard requiring eggs and very small larvae to be released in a manner that maximizes their survival could be accomplished in the Lower Basin or anywhere for that matter.

In fact, it is uncertain whether eggs and very small larvae would survive even a "gentle" release from an exclusion technology in anything more than de minimis numbers. This is because river herring eggs and very small larvae are relatively fragile and the intensity of the force needed to free them from impingement and propel them through the water body to the sweeping flow may cause significant mortality.

Moreover, it is likely that at least some (if not many) eggs or very small larvae impinged are already dead, and so any release will do nothing to maximize their survival. This is especially true for larger larvae that would be able to avoid impingement when alive. Finally, for the reasons discussed in the comments that follow, it would be virtually impossible to conduct a field study or collect any type of field data that would provide any meaningful assessment as to whether eggs or larvae could be released in such a manner so as to maximize survival.

Response to Comment 4.24.3

At this time the potential for a mechanized system to optimize the survival of eggs and larvae has not been adequately studied. EPA concedes that some eggs and larvae may suffer mortality from impingement on the exclusion technology. However, EPA believes that the low through-screen velocity, coupled with a sweeping velocity to encourage organisms past the exclusion technology, will provide a high level of protection for ichthyoplankton.

EPA disagrees that the potential to gently remove eggs and larvae is not capable of being tested in a manner that would achieve meaningful results, but acknowledges that such tests have not been conducted to date. EPA has removed the requirement for a "gentle release" and instead, as stated in Response 4.24.1, the Final Permit Modification has been changed to require a mechanized device to clear debris.

Comment 4.24.4
There is nothing in the SOB or record indicating how frequently this gentle release must occur so as to maximize survival. As currently worded, however, the Draft Permit Modification would require constant and continuous operation of this mechanism given the assumption that anything less would not ensure "maximization" of survival. But continuous operation would be impossible because it would effectively prevent maintenance of intake flows. And another factor that must be considered when establishing this frequency component of the design standard is the cost and energy penalty associated with operation of the removal mechanism. The SOB currently provides no evaluation of this not insignificant factor.

Response to Comment 4.24.4
As noted above, EPA has eliminated the requirement to operate the release system "at a frequency calculated to maximize the probability of survival of eggs and larvae" and replaced it with a requirement to operate a mechanized system to clear debris in a manner and frequency stipulated by the manufacturer's guidelines. See Response to Comment 4.24.1.

Comment 4.24.5
The SOB contains several statements indicating that EPA New England is aware that no such technology currently exists. First, EPA New England recognizes that the air-burst mechanism on an aquatic filter barrier is meant to "clean off buildup of sediment and materials," SOB at p. 33, and "designed to remove build-up (potentially including impinged eggs and larvae)." SOB at p. 41. The SOB also finds that the air-burst system on an aquatic filter barrier can "try to gently remove eggs and larvae." SOB at p. 47. So, at least with respect to the aquatic filter barrier, the SOB recognizes that it is not designed for the gentle release of "eggs and larvae," and can only speculate that the air-burst technology has the potential to do so. But the SOB does evaluate this potential, which has never been tested and which is not likely capable of being tested in any manner that would yield meaningful results. Moreover, the SOB only reflects on the possibility of release, but contains no analysis on whether the technologies, such as an air-burst system, that have the potential to release impinged eggs and larvae also have the potential for releasing them in a way and at a frequency that maximizes survival.

To the contrary, another statement in the SOB suggests that EPA New England believes that the existing mechanisms designed to free debris would be too vigorous for use in gently releasing eggs and larvae noting that "[t]hese technologies have a more vigorous back-flushing mechanism to release buildup. If, however, the mechanism is designed to release eggs and larvae, the mechanism should be gentle enough to ensure that harm to these fragile life stages is minimized…." SOB at p. 46.

Suggesting that the current mechanisms need to be redesigned to be more "gentle" is an implicit recognition that there is no existing technology capable of achieving this design standard. In this respect, the Agencies propose to require Mirant Kendall to create a new technology to accomplish a goal that is likely not possible, and has never been studied in a manner to determine if it is possible. Such a requirement is inconsistent with the Agencies' authority under CWA § 316(b), which is limited to requiring available technology.

Response to Comment 4.24.5
See Responses to Comments 4.24.1, 4.24.3.

Comment 4.24.6
Finally, there is no dispute that it is uncertain to what degree, if at all, eggs and very small larvae would actually survive the gentlest release that any exclusion technology could accomplish. This is because no exclusion technology has ever been designed, tested, or employed to result in gentle release of eggs and larvae in a manner that maximizes their survival. Moreover, it is unlikely that any study could ever be done that provides reliable results regarding such a gentle release.

On the other hand, there have been many fish collection and return systems deployed and even tested with respect to survivability of the eggs that they return to the water body. But the SOB still concluded that it is uncertain whether such a fish return system would maximize survival of eggs and larvae in the Lower Basin. Given that the SOB already determined that the uncertainty surrounding the ability of organisms to survive a fish return system was sufficient to render that technology unavailable, the gentle release mechanism cannot be considered available due to its even greater level of uncertainty (let alone the substantial doubt) concerning its effectiveness at saving eggs and larvae. In other words, there is less uncertainty surrounding the fish return system that has been deployed in other settings and even tested for survivability when compared with the gentle release requirement that no technology has been even designed to achieve, and which has never been tested.

Response to Comment 4.24.6
EPA has removed the requirement for a "gentle release" and instead, as stated in Response 4.24.1, the Final Permit Modification has been changed to require a mechanized device to clear debris.

As stated in Response 4.24.5, EPA believes that an experimental test of the impact of a release mechanism on ichthyoplankton is possible and would produce meaningful results. Nonetheless, EPA acknowledges that this testing has not been conducted to date. Fine mesh traveling screens have been eliminated because evidence suggests that impingement and removal by a spraywash mechanism of some ichthyoplankton, including species commonly entrained at Kendall Station, results in poor survival.

Comment 4.24.7
The SOB did not assess the cost of creating a technology or redesigning existing technologies in order to accomplish this design standard. Not only will there be research and development costs and capital costs to consider, but there will also be an ongoing energy penalty associated with the operation of the "gentle release" system. The SOB did not attempt to quantify these costs, let alone apply the wholly disproportionate or cost-effectiveness test to determine whether such a design standard can be justified.

But given the fact that a gentle release is unlikely to create any benefits, and given that the costs associated with redesigning or creating a new technology to allow for such a gentle release are not insignificant, Mirant Kendall submits that the costs associated with imposing the gentle release design standard are wholly disproportionate to any benefits, which are merely speculative, and which -- based on the current record -- are expected to be at or near zero.

The gentle release design standard should also be rejected under the cost-effectiveness test that the Agencies should apply as part of the BTA analysis. Any of the technologies identified in the SOB as being potentially available are less expensive if they do not also need to accomplish a gentle release. As the record cannot demonstrate that these technologies without the gentle release do not provide comparable benefits to those same technologies with a gentle release, the addition of the gentle release is not cost-effective.

Response to Comment 4.24.7
EPA has removed the requirement for a "gentle release" and instead, as stated in Response 4.24.1, the Final Permit Modification has been changed to require a mechanized device to clear debris.

The cost of a mechanized system for debris removal is generally included in the cost estimates for each technology. EPA has mandated the use of a mechanized device to clear debris but has not specified which device must be used. Any of the available exclusion technologies would not be as effective without a mechanism to clear debris because the technology would become occluded, which would negatively impact its performance. A cost-effectiveness analysis is not warranted in this case because Mirant is allowed to evaluate the range of available technologies and implement the one it prefers based on the cost-effectiveness of the debris clearing mechanism or any other reason. See Response to Comment 2.7.7; see also Response to Comment 2.12 (regarding cost-benefit comparison).

While EPA has not quantified the energy penalty associated with the debris-clearing mechanism, it is expected to be minimal. Furthermore, other plants have borne the energy penalty associated with a mechanical systems used in conjunction with aquatic filter barriers and wedgewire screens, including Mirant's Lovett Generating Station (which uses an aquatic filter barrier), and Arbuckle Mountain Hydroelectric Project, which is a 400 KW plant that diverts approximately 74 MGD through a wedgewire screen (AR 748, p. 5-14). If this small hydroelectric plant can bear the energy penalty of an airburst backflushing system, EPA sees no reason why Kendall Station, a 256 MW plant, could not.

Comment 4.24.8
The SOB recognized that the Lower Basin is a low flow environment without a sufficient sweeping ambient flow to prevent re-impingement of eggs and very small larvae released from an exclusion technology. SOB at p. 46. But even though the SOB recognizes that a "gentle release" design standard would provide little, if any, benefits in the absence of a sufficient sweeping ambient current, the Draft Permit Modification still requires it. This requirement appears to be based on the assumption that a sweeping current could be artificially induced by Mirant Kendall. While the problems with this assumption are described in more detail below, the purpose of this comment is to point out that there is no basis for a requiring a "gentle release" when ambient flows are insufficient to carry released organisms away from the exclusion technology.

Response to Comment 4.24.8
EPA is requiring a debris release mechanism in the Final Permit Modification because it is an integral component of BTA to ensure continued performance of an exclusion technology. In the Broad Canal, an induced flow is required to ensure debris is swept past the intake structure and returned out to the river. EPA has required a release mechanism to minimize debris loading because, by inducing a flow in the Broad Canal, there will be ambient flow sufficient to carry away debris.

Comment 4.25
The Draft Permit Modification proposes that Mirant Kendall must:

> Ensure a minimum natural or induced sweeping velocity past the face of the exclusion technology that is (1) greater than the through media velocity, and (2) sufficient to maximize the degree to which eggs and larvae that approach and/or are impinged on the exclusion technology are carried away from the media to a location that minimizes opportunity for re-impingement.

The following comments explain the problems with this design standard, and why it cannot be considered "available" for use at Kendall Station.

Response to Comment 4.25
This comment largely serves as a preface and overview of Mirant Kendall's Comments 4.25.1-4.25.8, and is consequently largely prefatory of those comments. EPA has responded to specific comments in detail.

In preparing the Draft Permit Modification, EPA determined that inducing a sweeping flow would be feasible in the Broad Canal based on a variety of factors, including: its professional engineering judgment; a study presented at the 2003 Symposium on Cooling Water Intake Technologies, *see* SOB at 40 n.28; and a presentation by Alden (Mirant's consultant) at the September 19, 2007 meeting, *see* AR 688.

As a result of the points raised by Mirant's comment and in the exhibits Mirant provided, EPA has analyzed this issue in more detail, both by examining induced sweeping flows at other facilities and in other parts of the country, and, with the assistance of EPA's consultant Science Applications International Corporation, Inc. (SAIC), further researching the feasibility of inducing a sweeping flow at Kendall Station. *See* AR 738. EPA has placed additional documents into the record pursuant to 40 C.F.R. §§ 124.17(b) and 124.18(b)(4).

Comment 4.25.1
As currently drafted, this design standard is physically impossible to achieve. The Draft Permit Modification is worded in such a manner that ignores a basic principle of hydrodynamics, which is that flow stream lines cannot cross one another. MK Modification Comment Exhibit No. 11. This means that because the flow at the face of the exclusion technology is necessarily directed towards and through that technology, it would be impossible for any other flow at the face of the technology to be going in any other direction, as is required by this design standard.

Response to Comment 4.25.1
EPA disagrees that a sweeping flow as written is physically impossible to achieve. A sweeping flow is a standard criterion for fish bypass throughout the western coast of the U.S. A sweeping velocity is identified as a parallel velocity vector, and is included as a factor in the National Marine Fisheries Service Northwest Criteria for fish passage. See AR 746. NMFS requires that the sweeping velocity (the water velocity vector parallel and adjacent to the screen face) be greater than the perpendicular velocity (approach velocity at three inches in front of the screen and in the direction of flow). The Washington Department of Fish and Wildlife (WDFW) defines sweeping velocity as "the component of approaching water velocity which moves parallel to the screen surface as a function of screen orientation and the amount of fish bypass flow. High sweeping velocity reduces the chances of impingement or screen entrainment." (WDFW, AR 737). Based on these examples, a sweeping flow is physically possible to measure in association with an intake screen.

Mirant comments that flow stream lines cannot cross one another, and that it would be impossible for any other flow at the face of the technology to be going in any other direction, as required by the sweeping flow design standard. It is true that at a location very close to the face of the technology, the direction of flow will be more greatly influenced by the component flowing toward and through the face. Frictional forces will act to diminish the sweeping current velocity at the face of the technology. For the Final Permit Modification, EPA has clarified the design standard as follows:

> [T]he permittee shall ensure a minimum induced sweeping velocity past the exclusion technology that is greater than the approach velocity. The approach velocity in the direction of the intake flow shall be measured between 6 and 8 inches from the surface of the media and prior to passing through the media.

The altered design standard in the Final Permit Modification addresses Mirant's comment that flow lines cannot cross by requiring the approach velocity to be measured at a reasonable distance from the intake face. See AR 738.

Comment 4.25.2
The Draft Permit Modification is disingenuous to suggest that a "minimum natural" velocity could satisfy this design standard. Generally, there is no ambient sweeping flow in the impounded setting of either the Broad Canal or Lower Basin (see, for example velocity vector information in AR 761).

Response to Comment 4.25.2
EPA agrees that there is no natural flow in the Broad Canal. There is a natural sweeping flow in the River, albeit a minimal one. This is the natural flow referred to in the Draft Permit Modification. However, the Final Permit Modification prohibits an installation in the Lower Basin. See Response to Comment 4.12.

Comment 4.25.3
No available technology exists for creating the type of induced flow the SOB proposes. First, the SOB fails to identify any technology that has been deployed, tested or observed to be capable of creating the type of induced flow required by this design standard. Just as the gentle release design standard would require Kendall Station to create entirely new technology, so too does this sweeping flow design standard. Moreover, the only conceivable technologies that might theoretically come close to achieving this design standard are not available for use at Kendall Station for several other reasons.

Alden explored all of the possible ways in which Mirant Kendall might create a technology capable of coming close to satisfying a design standard requiring an induced sweeping flow. MK Modification Comment Exhibit No. 11. From a technological point of view, there are only two ways to induce a flow. One is to use a series of pumps or jets located adjacent to and along the surface of the exclusion technology. The other way would be to create a bounded area in the water body by use of a seawall. The exclusion technology would be located in this area that is bounded off from the rest of the water body, and pumps located at the end of this bounded area would draw water through that area and past the exclusion technology. But neither one of these theoretical techniques would be available for use at Kendall Station, as discussed below.

Response to Comment 4.25.3
EPA disagrees that no available technology exists for creating a sweeping flow and that the design standard would require entirely new technology. With respect to unbounded,

induced sweeping flow as evaluated in Alden's analysis of sweeping flow (Mirant Comments on Draft Permit Modification, Exhibit 11, AR 736), this may be the case. However, as summarized in the SAIC report (AR 738), there are numerous coarse mesh-screened intakes with induced sweeping flows in use that are designed to protect fish, including angled vertical screens and drum screens where the sweeping flow is induced using either the available differences in water elevation (such as at hydroelectric dams), or fish friendly pumps that return bypass water and fish to the source water safely. EPRI notes that, in particular, screw-impeller pumps "appear to offer a potentially effective means of transporting larval, juvenile, and adult fishes with low resultant mortality." (AR 748 p. 9-1).

At Sioux Power Plant in St. Louis, screw-impeller fish pumps are used in combination with vertical traveling screens to collect fish into a 1,700 foot long return pipe. A biological evaluation of this system revealed that average survival of all pumped fish was 82 percent, and that survival of pumped fish was consistently greater than survival of fish impinged on the traveling screens (AR 748 p. 9-4). The system at the Sioux Plant was based on similar designs at the Monroe Power Plant in Michigan and the Contra Costa Power Plant in California. Recently, fish pumps have been applied to water diversion facilities, such as the Red Bluff Research Pumping Plant and the Tracy Fish Collection Facility at the Tracy Pumping Plant, both in California. Several extensive studies of turbine passage at these facilities indicate relatively high survival of juvenile fish with screw-impeller pumps, ranging from 83 to 100 percent (AR 748 pp. 9-9 to 9-23).

While fish pumps have typically been used in turbine passage of adults and juveniles, there has been some evaluation of impacts on fish eggs and larvae. Cada (AR 742) analyzed literature to evaluate the mortality of fish eggs and larvae due to turbine passage. This study proposed that mortality of early life stages would likely be relatively low because the shear forces and pressure regimes normally experienced are insufficient to cause high mortality rates, and small ichthyoplankton would have a low probability of contact with the turbine blades. In a study of screw-impeller pumps by ESEERCO (AR 750), differential mortality of early and late alewife postlarvae (after accounting for moderate control mortality) was 0 and 14.2 percent, respectively, while yellow perch postlarvae suffered zero mortality as a result of the screw-impeller pump. Thus, while survival of ichthyoplankton in fish pumps is less well studied than survival of adult and juvenile fish, those studies which have been conducted suggest that ichthyoplankton would likely experience high survival during passage with a screw-impeller type pump.

Kendall Station's system would be an innovative application of a mature technology because, although these systems are well-established, they have not been applied in precisely the same environment or with precisely the same site-specific needs; however, the technology, knowledge, and experience necessary to construct a fish bypass system for Kendall Station that incorporates fine mesh and low through-media velocities are readily available. See Response to Comment 2.1 part 4. This design is essentially the "bounded condition" proposed in Alden's assessment and described briefly above. See AR 738.

Comment 4.25.4
In order to accomplish the sweeping flow described in the SOB in an unbounded environment, numerous pumps or jets would need to be deployed throughout the water column along the exclusion technology. MK Modification Comment Exhibit No. 11. Such a deployment would be massive given that any of the available exclusion technologies are relatively large. For example, an aquatic filter barrier alone would represent over 5500 square feet of surface area based on the area needed to achieve its design requirement of having a sufficiently low through-screen velocity. SOB at p. 40. While other exclusion technologies are not as large, they would all have sufficiently large (and non-uniform) surface areas that would require numerous pumps or jets at multiple depths.

Such a massive deployment of pumps or jets throughout the water column is not an available technology for several reasons. First, the engineering and construction difficulties associated with such a deployment exceed those associated with constructing and engineering the type of fish return system that the SOB concluded would not be available. Engineering challenges would include mounting the pumps or jets on or adjacent to the newly constructed exclusion technology, and then calibrating them all to ensure the requisite sweeping velocity. In addition, a power source would be needed for all of these pumps or jets and that would require laying hundreds of feet of electrical wiring into the Lower Basin or Broad Canal. Second, it is very unlikely that Mirant Kendall would be able to obtain all of the permits required for installing such an extensive system of pumps or jets (complete with the requisite electrical grid) in the Broad Canal or the Lower Basin, considering the risk to recreation and human safety.

Response to Comment 4.25.4
EPA, upon considering Alden's report and additional information provided by SAIC, has determined that inducing a sweeping flow in an *unbounded* condition is not available at this time for Kendall Station. See AR 738. Inducing flow in an unbounded condition, in order to create a counter clockwise current and prevent recirculation, may require numerous flow inducing devices both on the exclusion technology and along the far shore. This system may require a substantial volume of water and energy to operate and could potentially pose a safety hazard for boaters. In the case of the *unbounded* condition, EPA agrees with Alden's assessment that the technology is unavailable at this time.

However, EPA has determined that a *bounded* system that induces the transport of organisms outside of the Broad Canal using a fish friendly pump (or some other flow inducing technology) similar to the design of existing fish bypass systems may be applied to any of the suggested exclusion technologies in the Broad Canal. See Response to Comment 4.25.5.

Comment 4.25.5
The only other possible technique for inducing a sweeping flow nearby the exclusion technologies would be to locate wedgewire screens or Filtrex in a bounded area within the Broad Canal and then draw water through that bounded area with a pump or pumps

located near the end of the bounded area. MK Modification Comment Exhibit No. 11. This would more than double the amount of Kendall Station's intake and discharge because an equal amount of water would have to flow past the wedgewire screens or Filtrex as flows into them in order to maintain a sufficient sweeping velocity. That water would then need to be discharged back into the Broad Canal or Lower Basin through fish return piping.

Inducing flows using this technique is not available for several reasons. An initial problem is that Mirant Kendall would have to construct a mechanism for returning the water pumped through this bounded area back to the Charles River. The engineering and permitting difficulties of such a mechanism exceed those that would be associated with a fish return system that the SOB already determined was unavailable. This is because the volume of water that would have to be returned to the Charles River would be significantly greater in an induced flow return system than the volume of water that would have to be returned to the Charles River in a fish return system.

Response to Comment 4.25.5
EPA has determined that inducing a flow in a bounded condition with fish friendly pumps is available and reflects BTA for an installation in the Broad Canal. Alden (in its technical evaluation included as Exhibit 11 with Mirant's comments on the Draft Permit Modification, AR 736) proposed that the volume of intake required by an induced flow system would be twice as much as the existing flow (i.e., an additional 70 MGD). SAIC estimates that the additional flow at the inlet end of a bounded structure as proposed in the technical report could range from as little as 12 MGD to as much as 40 MGD, depending on the technology (AR 738 p.6). While it is true that a technology with a high through-screen velocity, such as a wedgewire screen, would likely require a higher sweeping flow than a barrier net or aquatic filter barrier system with a low through-screen velocity, neither system would require double the volume of Kendall Station's existing intake.

Mirant states that the engineering and permitting difficulties of a mechanism for returning water pumped through a bounded area (1) "exceed those that would be associated with a fish return system that the SOB already determined was unavailable" and (2) render such a system unavailable. The engineering and permitting difficulties of a mechanism to return water to the Charles River do not render it unavailable.

At the outset, it is important to note that a fish return system *would* be available because the pipe mechanism could be coordinated with the support pilings of the proposed public walkway, thus avoiding construction impacts to the historic seawall originally cited as problematic in the SOB. See Responses to Comments 4.3, 4.16.2.

Secondly, Mirant comments that the type of return system suggested by Alden is unavailable because a significantly greater volume of water would be returned to the Charles River with an induced flow return system than a fish return system. More water may be returned to the Charles River in this type of system in comparison to a typical fish return system (e.g., one associated with a traveling screen); however, it is not clear from the comment why this would render the system unavailable. The volume of water to be returned to the River could range from 12 MGD to 40 MGD. The permittee currently discharges up to 80 MGD to the Charles River via its existing outfall pipe. Mirant has not submitted (and EPA is not aware of) any evidence to support the idea that returning this smaller volume to the River would present an insurmountable problem.

The permitting aspects of such a system do not render it unavailable because there is no reason to believe that there would be an irreconcilable conflict with applicable federal, state, or local requirements. See Response to Comment 2.23.

Comment 4.25.6
The SOB did not assess the cost of creating a technology or redesigning existing technologies in order to accomplish this design standard. Not only will there be research and development costs and capital costs to consider, but there will also be an ongoing energy penalty associated with the operation of the induced flow system. The SOB did not attempt to quantify these costs, let alone apply the wholly disproportionate test to determine whether such a design standard can even be justified.

But given the fact that a sweeping flow is unlikely to create any benefits, and given the costs associated with building and operating the necessary infrastructure to create such a flow are so significant, Mirant Kendall submits that the costs associated with imposing the sweeping flow design standard are wholly disproportionate to any benefits, which are merely speculative, and which -- based on the current record -- are expected to be at or near zero.

Moreover, the induced flow technology is not available under the cost-effectiveness test that the Agencies should apply as part of their BTA analysis. Any of the technologies identified in the SOB as being potentially available are less expensive without the sweeping flow. Because it cannot be demonstrated that these technologies without the sweeping flow do not provide comparable benefits to those same technologies with a sweeping flow, the addition of the sweeping flow is not cost-effective.

Response to Comment 4.25.6
In response to Mirant's comment, EPA engaged SAIC to estimate the cost of the system proposed in its technical report. The cost is expected to cost approximately $1.64 million, and could range from $1.12 million to $2.4 million. This cost estimate includes the sheet pile wall, bypass water pumps, and return piping. EPA believes that the cost of this or similar designs can be reasonably borne by the permittee, even with the added cost of the exclusion technology itself. See AR 738 p. 8-9.

Inducing a sweeping flow is a critical component of any BTA installed in the Broad Canal because the technologies are designed to perform most effectively with a cross-current to remove organisms from the area. As suggested by the WDFW, high sweeping velocities may benefit organisms by reducing impingement or screen entrainment (AR 737). Without such a flow, organisms would build up in front of the exclusion technology, potentially suffering greater mortality through competition for food or predation, as well as adversely affecting the effectiveness of the technology. With a sweeping flow and fish bypass to return organisms to the river, impingement and entrainment mortality will be minimized.

These factors apply at Kendall Station. Given the lack of ambient flow in the Broad Canal and the dominance of Kendall Station's intake flow, an exclusion technology located within the Broad Canal but without a sweeping flow mechanism would essentially represent a dead-end for organisms that are free-floating or are motile but cannot escape the station's intake flow (even at 0.5fps). In short, any exclusion technology in the Canal *without* induced sweeping flow would be markedly less effective at reducing impingement and entrainment of eggs and larvae than any exclusion technology in the Canal *with* induced sweeping flow. Therefore, in-Canal exclusion technology without induced sweeping flow is not a credible cost-effective alternative.

Regarding cost-benefit analysis, see Responses to Comments 2.3 and 2.12.

Comment 4.25.7
The SOB does not identify an available technology for achieving the design standard requiring induced flows. The SOB merely states:

- "EPA considers it technologically feasible to induce a sweeping current to discourage fouling and carry eggs and larvae away from the physical barrier." SOB at p. 36.
- "The available information indicates that inducing sufficient sweeping velocity to carry eggs and larvae to a location that minimizes the opportunity for re-impingement is technologically feasible, and EPA is not aware of any unusually difficult obstacles to inducing such a velocity." SOB at p. 41.

But these unsupported and conclusory statements are contrary to the site-specific technological analysis Alden performed, MK Modification Comment Exhibit No. 11, and the above-analysis on availability. Moreover, this second statement is contradictory to the statements elsewhere in the SOB that construction of a fish return mechanism to return eggs and larvae to the Charles River from the Broad Canal is too uncertain and technologically difficult, given that an induced flow presents exponentially greater challenges and uncertainty.

Response to Comment 4.25.7
See generally Response to Comment 4.25. Regarding the issues surrounding a fish return system, see Response to Comment 4.10.5.

For the Final Permit Modification, EPA, assisted by SAIC, further evaluated the application of fish bypass designs and has proposed one available technology to achieve this design standard. See AR 738. Although EPA does not require use of one particular method to comply with the induced flow design standard, SAIC's proposed design indicates that at least one method is available to induce a flow in the Broad Canal. SAIC's design (which is just one of potentially numerous possible designs using fish friendly pumps and bypass piping) induces a sweeping current to transport ichthyoplankton away from the intake and back to the Lower Basin. That design is technologically feasible, and is rooted in available technologies applied at CWISs, hydroelectric dams, and pumping stations nationwide. Consequently, the record indicates that an induced flow is available at Kendall Station.

Comment 4.25.8
The SOB's only effort to demonstrate that a technology is available to induce a sweeping flow that could carry eggs and larvae to safety is a footnote referencing a conceptual theory presented by Coutant five years ago. SOB at p. 40 n.28. The footnote describes that Coutant theorized about "[i]nducing sweeping velocities to reduce impingement at vertical traveling screens." The SOB describes Coutant's presentation as follows: "[a] fan or pump system was proposed to induce flow to divert fish into a bypass, either at a vertical traveling screen or at the entrance to a canal." SOB at p. 40 n.28.

But this description of Coutant's theory does not support the conclusion that a sweeping flow can be induced in a manner that prevents impingement of eggs and larvae. Coutant theorized that an induced flow could potentially divert fish, which are motile, to a bypass channel. His concept does not suggest that it is even theoretically possible to create and implement an induced flow that would carry non-motile eggs or larvae into a similar bypass.

Moreover, Coutant's idea was to see if there was a way simulate the natural sweeping velocity that occurs on the surface of angled traveling screens that helps to promote the bypass of fish, but not eggs and larvae. Because retrofitting a CWIS to accommodate these angled traveling screens may not be feasible in all cases, Coutant was exploring whether it would be possible to recreate the benefits provided by these angled screens without having to do a complete retrofit. Coutant theorized that pumps or fans could possibly be used to generate "turbulent" (as opposed to sweeping) flow, either at an angle prior to (and several feet away from) the screens or at the entrance of an intake canal. Coutant theorized that these "turbulent" flows could then direct fish towards a bypass mechanism that would eventually return them to an area of the water body away from the intake. A.R. 678.

Several critical aspects of Coutant's theory make it wholly unsupportive of the induced flow design standard proposed in the SOB. First, Coutant's theory addressed impingement of fish. Nothing in his presentation indicated that turbulent flows could be used to carry eggs and larvae away from an intake. There is a very good reason why Coutant did not examine this issue, and that is because Coutant's theory is premised on the notion that when fish encounters the turbulent flow, it would trigger a behavioral response in them to swim towards the bypass. Because eggs and very small larvae are not motile, the turbulent flow would do little, if anything, to move them towards the bypass. Coutant's presentation did not suggest or evaluate whether a sufficiently strong flow could be induced that would carry non-motile organisms into the bypass.

Second, Coutant did not evaluate whether turbulent flows should or could be induced across the entire face of the exclusion technology, as the design standard proposed by the Draft Permit Modification would require. Instead, the induced flows in Coutant's study were located several feet away from the traveling screens.

Third, Coutant did not suggest the possibility of gently releasing eggs and larvae impinged on the exclusion technology back into the waterbody where flows have been induced.

Fourth, Coutant's theory was also premised on the ability to construct a sufficient fish return bypass that the SOB has already declared to be unavailable at Kendall Station due to its uncertainty with respect to whether it will maximize survival. Finally, it should be noted that Coutant's theory has never been tested, let alone deployed anywhere. SOB at p. 40 n.28.

For all of these reasons, Coutant's untested theory provides no support for a conclusion that the sweeping flow design standard can be accomplished by an existing technology. The Agencies may not rely on an untested theory (which may not even prove to hold true) regarding one type of induced flow to make a finding that a completely different type of induced flow is not only theoretically possible, but capable of being implemented by existing technology. In other words, the SOB's reliance on Coutant's theory is faulty in two ways. First, it relies on a presentation of a theory that is not even related to the sweeping flow design standard. Second, even assuming that Coutant had theorized about a sweeping flow to carry eggs and larvae away from an exclusion device, the presentation still provides no support for concluding that such a sweeping flow could be created at Kendall Station by an existing technology. This is especially true given the fact that Coutant presented his theory five years ago, and yet there is nothing in the record indicating if his theory was ever subjected to further study or testing to see if it would either work or could be accomplished by existing technology.

Response to Comment 4.25.8
Mirant generally suggests that Coutant's presentation cited in the SOB (at p. 40) does not support the requirement that Mirant induce a sweeping flow to move organisms and debris away from the surface of the exclusion technology. EPA disagrees that Coutant's theory provides no support for the sweeping flow permit requirement, but acknowledges that a more detailed feasibility analysis was warranted and has, with SAIC, provided a detailed evaluation of one possible method of inducing a sweeping flow in the Broad Canal. EPA presents an analysis supporting the feasibility of a sweeping flow in a bounded condition in the Broad Canal, similar to that presented by Alden in Exhibit 12, in the technical report submitted with the Final Permit Modification (AR 736). The basis for the induced sweeping flow requirement Final Permit Modification does not rely solely on Coutant's theory, but rather on the entire administrative record pertaining to this issue, including the SAIC Technical Report (AR 738) and the documents cited in Responses to Comments 4.25.1 and 4.25.3.

Still, the applicability of Coutant's presentation should not be disregarded. Mirant claims that this concept does not apply to the sweeping flow permit requirement because it was intended to divert mobile fish to a bypass channel. The goal of the proposed sweeping flow permit requirement was to prevent re-impingement of eggs and larvae where natural flow was insufficient to carry them away from the surface of the technology (SOB at p. 46). In this way, the objective was to induce a sweeping flow to divert non-motile organisms, via current, to a bypass and away from the exclusion technology. EPA sees no reason why non-motile organisms would not be swept into a bypass with an induced sweeping flow because, unlike mobile organisms capable of responding to a velocity gradient, non-motile organisms will likely move with the prevailing current (i.e., sweeping flow).

Mirant states that Coutant's theory was to "simulate the natural sweeping velocity that occurs on the surface of angled traveling screens that helps promote the bypass of fish." This theory directly applies to EPA's requirement for sweeping flow as it applies to eggs and larvae. EPA acknowledges that Coutant's theory focused on reducing impingement of adults and juveniles in a manner similar to angled traveling screens. Angled screens are not effective in minimizing entrainment because there is no method of exclusion (e.g., fine mesh screening). That angled screens are not effective in minimizing entrainment is not, however, related to whether the prevailing current can direct ichthyoplankton or adult fish to a bypass.

Although the target organism is different, the principles of angled screens (a mature technology) are applicable. Again, EPA sees no reason why non-motile organisms, which naturally travel on prevailing currents in rivers and the open ocean, would not also be swept into a fish bypass with an induced flow. In the design proposed in the SAIC technical report (AR 738), a flow is induced in a bounded channel to move organisms and debris to the end of the channel, through a fish-friendly pump, and through a bypass to an area away from the intake. This design is similar to the process of entrainment, which Mirant has documented occurs at Kendall Station because larvae have been collected in the discharge. In SAIC's design, however, organisms are not subject to shear forces, pressure differentials, and high temperatures that are the primary causes of mortality in the intake pumps and condensers.

With respect to the availability of fish return systems at Kendall Station, see Responses to Comments 4.7, 4.10.5, 4.11. There may be some mortality of ichthyoplankton associated with travel through a fish bypass, but as suggested in the SAIC report, levels are expected to be low.

Thus, Coutant's presentation is applicable in this case because the principles of inducing a flow are similar, EPA sees no reason why non-motile organisms could not be moved with an induced flow, and both EPA and the permittee have concluded that a fish return system is available. Moreover, the SAIC Report supports the viability of induced sweeping flow in the Broad Canal for the purpose of moving eggs and larvae away from the exclusion technology.

Comment 4.26
The Draft Permit Modification's proposes deployment of the primary exclusion technology for "no later than March 1 and ending no earlier than August 31." This design standard, as currently drafted, could be infeasible as well because icing conditions have occurred in the past and will certainly continue to occur in the future in the Lower Basin after March 1, and such icing conditions would make it infeasible to deploy fine-mesh barrier nets or an aquatic filter barrier. While the SOB recognized that icing conditions could prohibit installation or operation of a coarse-mesh barrier net, this finding is equally (if not more) applicable to deployment of a fine-mesh barrier net or aquatic filter barrier.

Moreover, as discussed above, any determination of "availability" must assess whether the costs of installing or operating that technology are wholly disproportionate to the benefits, and EPA New England may also examine cost-effectiveness as part of the BTA analysis as well. Under either cost analysis, the current deployment season required by the Draft Permit Modification cannot be considered available. In this instance, deployment of the exclusion technology would result in additional costs to Kendall Station (in the form of required maintenance, and the costs and energy penalties associated with maintaining the gentle release and sweeping flows) that are wholly disproportionate to the very marginal benefits from deploying technology aimed at decreasing entrainment during a time of the year when there is a de minimis, if any, level of entrainment occurring. The same holds true on a cost-effectiveness analysis where there is no added benefit to maintaining the exclusion technology from March to August as opposed to a shorter period, yet deployment of the exclusion technology will impose additional, unnecessary costs on Mirant Kendall.

Response to Comment 4.26
1. Mirant raises a credible issue regarding icing conditions delaying the deployment of a fine-mesh barrier net or aquatic filter barrier. It is possible that icing in the lower Basin could extend past March 1. Based on this comment, the Final Permit Modification has been modified to accommodate a delay in deployment of the exclusion technology until the ice no longer prevents deployment of the barrier. The revised permit language is included below and in the Final Permit Modification. The language and intent is similar to the provision to allow for a delay in deployment of the coarse mesh barrier net due to icing in the river (Part I.A.11.b). Part I.A.11.a.6 has been revised to read:

(6) The permittee shall maintain deployment of the exclusion technology starting no later than March 1 ***(unless icing conditions in the river preclude such deployment, in which case the technology shall be deployed as soon after March 1 as icing conditions allow),*** and ending no earlier than August 31 of every year.

2. EPA disagrees with the portion of the comment regarding cost-effectiveness and/or cost-benefit analysis and the length of the deployment period, for four reasons.

a. Cost-benefit analysis is inapplicable. See Responses to Comments 2.3 and 2.12.

b. Cost-effectiveness analysis is non-mandatory. See Response to Comment 2.20.

c. Cost-effectiveness analysis, when it is applicable and appropriate, need not be applied to unlimited levels of granularity, particularly given the structure of this permit modification, which allows considerable flexibility to the permittee. *See* Response to Comment 2.20. It is one thing to inquire whether one technology achieves essentially the same benefits as another but at a markedly lower cost. It is another matter entirely to analyze a seasonally applicable requirement and inquire whether fractionally shortening the applicability period could achieve essentially the same benefits as the original but at a markedly lower cost. Taking Mirant's argument to its logical conclusion, there is no limit to the number of deployment season scenarios EPA should analyze for cost-effectiveness. That is, EPA arguably could (and, under such a view, must) compare exclusion technology from March 1 to August 31 to, say, the same exclusion technology from March 1 to August 30, and to the same technology from March 2 to August 31, and to the same technology from March 2 to August 30, and so on, in each case making a finding as to whether the slightly shorter period could achieve essentially the same benefits but at a markedly lower cost. While EPA is certainly *allowed* to undertake such analysis, the reasons why cost-effectiveness analysis is not mandatory in general apply *a fortiori* to this sort of micro-cost-effectiveness analysis.

d. Most importantly, EPA does not agree that there is no added benefit to maintaining the exclusion technology from March 1 to August 31 as opposed to a shorter period. The deployment time period required for the fine-mesh barrier nets or an aquatic filter barrier was not selected to protect only the peak egg and larval densities, but to minimize entrainment losses in the Charles River throughout the spawning period. The protective time period for deployment is fully discussed in the SOB at p.12 and further at Response to Comment 4.36. See also Draft Permit Determination Document §§ 5.1 & 5.7.3(d). In determining a suitably protective time period for deployment, EPA has considered a number of uncertainties that directly affect the year-to-year variability in the timing and duration of each spawning season. Because the Final Permit Modification conditions will presumably be in effect for five years, and may be administratively continued for some additional time period, the time period specified for deployment of the fine-mesh barrier nets or aquatic filter barrier must account for natural and anthropogenic influences that could affect spawning timing and duration well into the future.

While a slightly shorter deployment season might have a slightly lower annual cost, and a *markedly* shorter deployment season would likely have a *markedly* lower cost, the record does not identify a deployment season that is sufficiently shorter so as to have a markedly lower cost yet would achieve essentially the same benefits as the deployment season specified in the Draft Permit Modification. Consequently, EPA does not find any shorter deployment season to be a cost-effective alternative, and has retained this deployment season in the Final Permit Modification.

Comment 4.27

Minimization of AEI contemplates a consideration of more than just impingement and entrainment because there are other factors (e.g., water quality impacts, recreational impacts, human safety impacts, and aesthetic impacts) that could result in the increase of AEI even in light of reductions in IM/E. A permit requirement can only be justified if EPA demonstrates that minimization of any AEI from IM/E is not outweighed by the creation of other adverse impacts.

Response to Comment 4.27
This comment largely serves as a preface and overview of Mirant Kendall's Comments 4.28-4.31.3, and is consequently largely prefatory of those comments. EPA has responded to specific comments in detail, and also provides the following general response.

Factors such as those that Mirant Kendall identifies in its comment (e.g., water quality impacts, recreational impacts, human safety impacts, and aesthetic impacts) typically enter into a BTA determination under the rubric of availability, not of adverse environmental impact. EPA has long construed the "adverse environmental impact" of a CWIS to consist primarily of impingement and entrainment damage. *See, e.g.,* Phase I Proposed Preamble, 65 Fed. Reg. at 49,072; 1977 Draft 316(b) Guidance, at 15 (defining AEI as occurring "whenever there will be entrainment or impingement damage as a result of the operation of a specific cooling water intake structure," and listing six specific factors, all of which pertain to impingement and entrainment damage).

A second component of AEI is the impact associated with the construction of new cooling water intake structures, e.g., from habitat and population displacement, turbidity, and disposal of excavated materials. *See* Phase I Final Rule Preamble, 66 Fed. Reg. at 65,263; Phase I Proposed Rule Preamble, 65 Fed. Reg. at 49,072; Brayton Point Determinations Document, at 7-29 ("With any of these options, the adverse environmental impacts of 'construction' of the technology must also be considered along with alternatives for minimizing those impacts. For example, moving a cooling water intake to a new location might offer potential reductions in entrainment and impingement, but construction activities could have adverse environmental effects that would also need to be considered in deciding whether to require such a re-location under CWA § 316(b)."). However, these construction impacts are generally regulated under other regimes, e.g., CWA § 404, and state and local requirements. *See* Phase I Final Rule Preamble, 66 Fed. Reg. at 65,263; Comment 2.23; Response to Comment 2.23. While section 316(b) clearly grants EPA jurisdiction over the "construction" of CWISs, EPA often defers to those other regulatory regimes for management and mitigation of construction-related impacts. *See, e.g.,* Phase I Final Rule Preamble, 66 Fed. Reg. at 65,263.

After EPA has identified (and, where appropriate, ranked) the technologies that best minimize the adverse environmental impacts described above, EPA may consider relevant water quality and non-water quality impacts, such as those Mirant Kendall identifies in its comment. If any of those impacts are unacceptable, EPA may eliminate the technology as not available for use at the site. *See* SOB at 18-19, 42-43; Response to Comment 2.13; *see also, e.g.,* Brayton Point Determinations Document, at 7-39 (explaining that use of "gray water" as cooling water is not "feasible," i.e., not available, because of collateral concerns such as public health concerns from air emissions), 7-58 (noting that closed-cycle cooling "can achieve significant reductions in adverse environmental impacts," and also noting that retrofitting the technology "presents a number of economic, engineering, and environmental issues," but none of those issues "appear to present a fatal flaw").

In this case, EPA has determined that the installation of technology such as barrier nets, aquatic filter barriers, and wedgewire screens could introduce some non-water quality impacts (e.g., visual aesthetics, or impacts to navigation and recreational uses of the Charles River or Broad Canal), but that these impacts could be minimized through design and construction to support navigation and recreational uses and minimize visual impact. *See* SOB at 42-43. As stated above, upon further analysis, EPA determined that location of technology across the mouth of, or outside of, the Broad Canal is not an available location. See Response to Comment 4.12.

Comment 4.28
The Draft Permit Modification proposes to require an exclusion technology with an opening size of no more than 0.5 mm that will not necessarily minimize any AEI. The SOB recognized how biofouling or debris loading could compromise the permeability of an exclusion device such as a fine-mesh barrier net or an aquatic filter barrier, or lead to rips in the fabric and other causes of bypasses. SOB at p. 33-34. Wedgewire screens also face this same problem in that biofouling and debris loading can compromise performance. It is also true that such potential risks to performance increase as mesh-size or slot-size decreases. Given these facts, a BTA analysis should focus on selection of a mesh size that is no smaller then necessary to exclude fish eggs and larvae to the point at which remaining losses are de minimis. Anything smaller would unnecessarily compromise performance and the ability of the exclusion technology to minimize impingement and entrainment.

Response to Comment 4.28
Regarding "de minimis" losses, see General Response 2.03.

EPA has considered whether restricting opening size to exclude all life stages may compromise performance of the technology. EPA acknowledges that if a 0.5 mm opening becomes occluded by accumulating debris, the potential for bypasses and other malfunctions is amplified. However, a larger opening size may not be protective of small life stages of commonly entrained species (e.g., river herring and white perch).

An opening size of 1.0 mm would potentially allow eggs and larvae of species commonly found in Broad Canal to become entrained. For instance, white perch eggs are typically 0.6 to 0.8 mm in diameter (AR 753) and would likely be entrained with a 1.0 mm opening size. Also, a screen retention study found that a 0.5 mm mesh at 0.5 fps retained 2 to 20 percent of alewife prolarvae and early postlarvae and nearly 90 percent of larger postlarvae, while a 1.0 mm mesh at 0.5 fps did not retain any alewife larvae (Table 4.28-1) (AR 750). In the same study, a 0.5 mm mesh retained nearly 50 percent of yellow perch prolarvae, and 91 to 100 percent of yellow perch postlarvae, but a 1.0 mm mesh at

0.5 fps retained 0 to 1 percent of prolarvae and early postlarvae and 6 to 15 percent of later postlarvae (Table 4.28-1). Based on the ESEERCO study (AR 750) and the average size of entrained larvae at Kendall Station (see Figure 4.28-1), 0.5 mm is the maximum opening size that would effectively reduce entrainment.

Table 4.28-1. Percent of alewife and yellow perch larvae retained at velocity of 0.5 fps with an opening size of 0.5 mm, and 1.0 mm (ESEERCO 1981, AR 750).

Species	Stage	Average Length (mm)	Percent Retained	
			0.5 mm	1.0 mm
Alewife	prolarvae	5.2	2 ± 2.3	--
	early postlarvae	6.6	10 ± 7	--
	early postlarvae	6.6	20 ± 8.2	--
	postlarvae	9.5	89.2 ± 15.7	0
Yellow Perch	prolarvae	5.8	48 ± 14.6	--
	early postlarvae	6.3	91 ± 10.5	0
	postlarvae	7.3	100	6.7 ± 5.8
	postlarvae	8.1	100	15 ± 17.3
	postlarvae	9.3	--	94.5 ± 6.4

Technology with an opening of 0.5 mm offers the "best available" protection for entrainable organisms, but a smaller opening, such as is available with a Gunderboom aquatic filter barrier, would likely be even more effective.[4] For example, a screen size of 0.355 mm retained more than 64 percent of alewife larvae and more than 75 percent of yellow perch larvae (See AR 750).

Employing an airburst or backflushing system to clean off the media would minimize clogging issues that may result from a smaller opening size. Technology with an opening size of 0.5 mm or less and an airburst or backflushing mechanism is available (fine mesh barrier net, wedgewire screen, aquatic filter barrier) and offers the most protection for entrainable species. Based on this evidence, EPA has determined that an opening size of 0.5 mm is an element of BTA.

Comment 4.28.1
The SOB's analysis of the efficacy of various mesh-sizes for preventing entrainment examined three types of entrainables:

- River herring eggs (0.8 mm to 1 mm in diameter)
- River herring larvae (3-5 mm total length)
- White perch larvae (1-3 mm total length)

SOB at p. 45. Mirant Kendall disagrees with the SOB's assessment on the length of the entrained larvae. First, it appears that the SOB's description of "larvae" sizes are actually sizes of early stage (yolk sac) larvae set forth in the studies that the SOB cites. Second, the sizes listed for larvae in the SOB are the lengths at hatching, and do not reflect the

[4] Smaller openings are also available with the Filtrex aquatic filtration system, but EPA has determined that such a system is not available in the Broad Canal at this time. See Response to Comment 4.44.

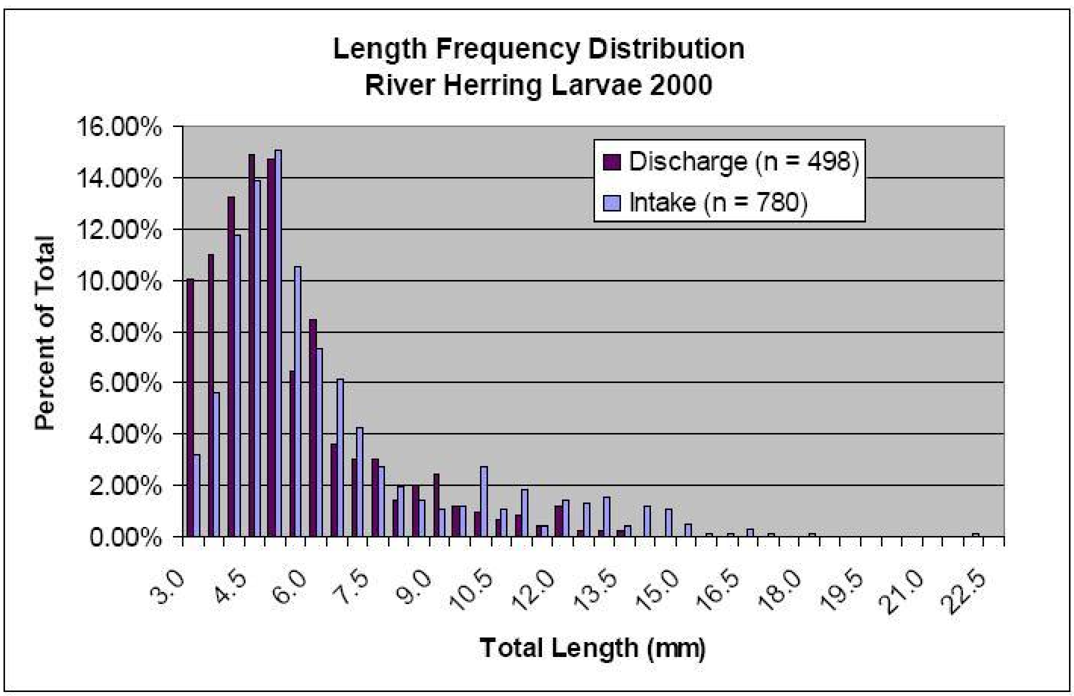
wide distribution of larger sizes actually found in the Broad Canal and do not reflect the most frequently collected sizes. Moreover, even assuming that the SOB's size descriptions took this into account, the SOB should have explained why a larger mesh size would not be expected to reduce entrainment of fish eggs and larvae when it appears that a larger mesh size (up to 1 mm) could so.

Response to Comment 4.28.1

1. The SOB intentionally described the smallest aquatic organisms vulnerable to entrainment, which are early stage (yolk sac) larvae and eggs. The relevance of this point in the comment is unclear. Yolk sac larvae are not excluded from assessments of entrainment mortality under CWA § 316(b).

2. A frequency distribution of *Alosa* larvae captured in the intake or discharge indicates that larvae in the Broad Canal predominantly range between 3 and 8 mm (Figure 4.28-1). According to Jones et al. (Appendix III in Exhibit 5, AR 736), the average river herring egg is 1.0 mm. Based on these estimates 0.5 mm would be a conservative opening size for excluding the most commonly entrained species in the Broad Canal. It is important to note that EPA is concerned with protecting the maximum number of eggs and larvae at

Figure 4.28-1. Total length frequency distribution (mm) for larval river herring collected in the intake and discharge at Mirant Kendall Station, 2000 (From AR 761).



Broad Canal, not just the most frequently collected sizes. As such, a more conservative range of larval sizes will provide the greatest degree of protection of all larvae.

3. Regarding larger mesh sizes, see Response to Comment 4.28.

Comment 4.28.2
In seeking to justify a 0.5 mm mesh-size opening, the SOB referred to Mirant Kendall's prior pilot study on a fine-mesh barrier net with a 0.8 mm opening. The SOB states that Mirant Kendall described how this mesh-size "was only expected to reduce entrainment" of larvae larger than 15 mm. SOB at p. 32. The SOB cannot rely on this statement as part of its mesh-size analysis for a number of reasons.

First, Mirant Kendall now has more data for assessing the size of river herring larvae that are actually entrained. As discussed above and as discussed in the Normandeau Report, river herring larvae begin to develop improved ability to swim at approximately 9 mm, and appear to be able to resist entrainment at around 13 mm.

Second, while it may be theoretically possible for larvae up to 15 mm to pass through a 0.8 mm opening, that does not mean that any larvae smaller than 15 mm will be entrained. This is because larvae will not always encounter the exclusion technology in the straight, head-on manner that would be required for many of them to pass through it. In other words, they will often drift into the exclusion technology sideways or at an angle where their overall length will prevent them from being entrained. Until Mirant Kendall conducts a pilot study to evaluate the performance of different mesh sizes in the unique environment of the Broad Canal, it is impossible to calculate how effective a certain mesh size will be for excluding entrainment of fish and larvae of different lengths.

Response to Comment 4.28.2
Although herring larvae may develop improved swimming ability at 9 mm, many of the larvae entrained at Kendall Station are less than 9 mm, according to the data provided in Normandeau 2008 report (AR 761 p. 58). Larvae may encounter the screening media in several different orientations, including head-first, at an angle, or laterally. Because the head capsule is the smallest part of the larvae, a head-first orientation will allow the most larvae to pass through a larger media opening. While it is true that not all larvae will encounter the screen in this orientation, empirical studies have shown that a 1.0 mm opening results in lower retention (AR 750, AR 749). See Response to Comment 4.28.1. A 0.5 mm mesh size was selected because it is widely available, in use, and offers the greatest level of protection for eggs and larvae at Kendall Station.

Comment 4.28.3
Because a 0.5 mm mesh size increases the risks of debris loading and biofouling (which compromises performance), and because a larger mesh size that would not pose this same degree of risk may achieve an acceptable reduction in entrainment, Mirant Kendall's BTA Proposal contains a pilot test that will help determine the best opening size for a fine-mesh barrier net.

Response to Comment 4.28.3
Debris loading and biofouling can be minimized through the use of automated cleaning mechanisms, which are supported by all of the technologies suggested. With sufficient sweeping flow induced in the Broad Canal, risks of debris loading and biofouling will be

minimized regardless of opening size. The maximum mesh size (0.5 mm) is specified in the Final Permit Modification.

Comment 4.29
A through-medium velocity of 0.5 fps at every point and at all times does not necessarily reflect the best velocity to minimize impingement mortality.

Response to Comment 4.29
This comment is entirely prefatory to comments 4.29.1-4.29.2, and individual responses to those comments are below.

A low through-media velocity, in addition to being readily available, will ensure that the greatest number of organisms will be able to escape impingement. See generally Response to Comment 4.10 and 4.23. However, EPA acknowledges that maintaining this through-media velocity may be impractical because temporary bypasses can be uncontrollable. As stated in Response 4.23.1, the Final Permit Modification has been changed to eliminate the requirement to maintain a 0.5 fps through-media velocity at all times.

Comment 4.29.1
The SOB selected the 0.5 fps through media velocity based on the Phase II Rule that summarized a survey of studies on swim speeds and determined that a 0.5 fps through-media velocity would protect 96% of available species. SOB at p. 47. But relying solely on the Phase II Rule is insufficient for several reasons.

First, the Phase II Rule was developed to establish a nationwide standard. But now that the Phase II Rule has been suspended, EPA New England can no longer simply apply a national standard to Kendall Station because it must apply BPJ on a site-specific basis. Because the Phase II Rule represented a nationwide standard, it applied a significant margin of safety to ensure that the 0.5 fps standard would be protective at all facilities. Such a significant margin of safety necessary to account for site-specific differences across the country is not needed for an individual BPJ site-specific analysis of a single facility.

As discussed in prior comments, the existing data gathered by Mirant Kendall as well as the swim speed studies all support the conclusion that the intake velocities up to 0.9 fps at Kendall Station have not caused more than de minimis impacts due to impingement. The Phase II Rule supports this fact by recognizing how most species studied can endure 1.0 fps. In fact, the Phase II Rule only selected 0.5 fps after applying a safety factor to account for a potential increase in through-media velocities when parts of the barrier become blocked by debris or biofouling. The Agencies should not apply such a safety margin in this case absent a specific finding that biofouling or debris loading at Kendall Station would sufficiently compromise the CWIS technology between cleanings, resulting in more then a de minimis number of fish being impinged. Moreover, Mirant Kendall's BTA Proposal already accounts for debris loading or biofouling incidents by incorporating a design standard that would allow protective through-screen velocities to be met even when up to 20% of the barrier net is blocked.

Response to Comment 4.29.1

At the outset, it is important to correct an error in the comment. EPA derived the 0.5 fps protective through-medium velocity from the studies and analysis in the preamble to the Phase I Rule, not the Phase II Rule. *See* Response to Comment 4.10.4. Of course, EPA did not rely on the *substantive requirements* of the Phase I Rule (which is not applicable to existing facilities). Rather, "EPA cites the preamble to the Phase I Rule (and certain technical information developed for the now-suspended Phase II Rule) *only* for the underlying scientific research and analysis included there, and not for any of the substantive requirements or policy decisions involved in those rules." SOB at 8 n.1 (emphasis in original). In this BPJ-based permit modification, EPA has considered the available data, including the research and analysis developed for nationally applicable regulations, and has separately concluded that 0.5fps is the protective through-medium velocity at Kendall Station. While this conclusion rests in large part on studies and analysis cited in (or even developed for) a national rulemaking, it is a site-specific BPJ determination for Kendall Station.

A number of factors contribute to individual variability in critical swimming speeds, including body size, genetics, temperature, dissolved oxygen, pH, and toxicants, among others. Different species are also likely to have varied swimming speeds. Due to this variability, a site-specific evaluation of swimming speeds would be a valuable resource to determine the most appropriate velocity indicator for a facility (AR 746). Unfortunately, there is limited data available to make an accurate, site-specific determination for intake velocity based on swimming speeds of the species and life stages impinged or entrained at Kendall Station. In the absence of site-specific data, EPA relies on available data from field and laboratory, including data that was used to develop a national standard through-screen velocity of 0.5 fps and Radle's sustained swim speeds, see Response to Comment 4.10.2.

An intake velocity can be specified either in terms of approach velocity (velocity measured a short distance from the screen), which is biologically most important, *see* 66 Fed. Reg. 65,274, or of the corresponding through-screen velocity (velocity of water as it passes between the structural components of the screen), which is more easily calculated when designing a screen. The Phase I Rule's criteria focused on design through-screen velocity screen for this practical reason. At a through-screen velocity of 0.5 fps, EPA's approach velocity, in comparison to NMFS's criteria, would be 0.25 fps (in the direction of the flow) or 0.18 fps (at a 45 degree angle to flow) (AR 746). In other words, by requiring a low through-screen velocity, EPA's criterion is more conservative than NMFS's approach velocity. According to EPRI (AR 746), through-screen velocity is not likely to be as an important factor in whether a fish becomes impinged as is the rest of the velocity field. Approach velocity does appear to be the biologically relevant indicator, and may be an appropriate velocity indicator if precisely defined.

As stated in Response to Comment 4.10.4, EPA agrees that the data presented under the Phase I Rule suggests that many of the species and life stages evaluated could endure a velocity of 1.0 fps. However, an evaluation of data compiled from three swim speed studies (AR 744) indicated that a 0.5 fps velocity would protect at least 96 percent of the tested fish (66 FR 65274). EPA also identified federal documents, an early swim speed and endurance study performed by Sonnichsen et al. (1973), and fish screen velocity criteria that are consistent with this approach. *See id.*

EPA believes that the 0.5 fps requirement is scientifically based, technically sound, and well supported by existing literature on fish swim speeds. Moreover, screens do become occluded by debris and velocity will increase through the portions that remain open. See Response to Comment 4.23.1; see also 66 Fed. Reg. 65,302 (reaching the same conclusion in the development of the Phase I Rule).

Turning specifically to Kendall Station, in this case, a conservative approach velocity (e.g. 0.25 fps as estimated by Mirant) dictated by a through-screen velocity of 0.5 fps is further warranted to ensure that the induced sweeping flow required in the Broad Canal is as small as necessary, and that as many life stages and species as possible can avoid impingement even if the induced sweeping flow system briefly becomes inoperable.

Comment 4.29.2
The design standard as currently written implies that the Agencies have determined that an unacceptably high number of fish will be impinged if any single point of the exclusion technology has a greater through-medium velocity for even the briefest duration of time. Such a determination is unsupported and inappropriate, both because the number of fish currently impinged is so small, and because such perfection is unnecessary and unattainable. The "at any point" or "at all times" requirements cannot be justified as necessary to minimize any AEI due to impingement.

As set forth in Mirant Kendall's Proposed BTA, a permit requirement that the exclusion technology be designed in a manner so as to achieve an acceptable through-screen velocity is more than sufficient to minimize AEI due to impingement.

Response to Comment 4.29.2
A low through-media velocity, in addition to being readily available, will ensure that the greatest number of organisms will be able to escape impingement. See generally Responses to Comments 4.10.2-4.10.4 and 4.23.1. However, because temporary bypasses may occur, the Final Permit Modification has been changed to eliminate the requirement to maintain a 0.5 fps through-media velocity at all times. See Responses to Comments 4.23.1 and 4.29.

Comment 4.30
The Draft Permit Modification proposes to prohibit the occurrence of any bypasses. The SOB did not find, however, that any type of bypass would result in anything more than a de minimis, if any, amount of entrainment. In fact, such a demonstration is infeasible

given the relatively low number of fish, eggs and larvae that even exist at any one time in or around the Broad Canal.

Moreover, the Draft Permit Modification is directly contrary to the 2006 Final Permit that required Kendall Station to "design, install and operate the BNS to preclude bypasses due to circumstances within the permittee's control, to the extent practicable." The Response to Comments recognized how this provision was fully protective because "there are times when components of the BNS may need to be removed for cleaning, maintenance or repair, [and that] during such times, the BNS will not be performing their function of reducing the adverse environmental impacts of impingement mortality and entrainment." Response to Comments at p. H74.

The Response to Comments went on to state that

> 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.

Response to Comments at p. H74. In this way, the 2006 Final Permit struck the appropriate balance between being fully protective, and recognizing that bypasses are either necessary for repairs or maintenance that ensure performance, or that they can be due to circumstances beyond Kendall Station's control. In issuing the final Permit Modification, the Agencies should return to the prior finding that the permit can be fully protective without an absolute requirement of no bypasses.

Response to Comment 4.30
EPA acknowledges that limiting bypasses "to the extent practicable" more accurately reflects the Best Technology Available at this facility. The Final Permit Modification at Part I.A.11.a(3) has been revised accordingly. See Responses to Comments 4.23.1 and 4.29.

Comment 4.31
As discussed in the previous comments, nothing in the record suggests that the gentle release design standard is technologically achievable when used in combination with an exclusion technology as required by the Draft Permit Modification. But even if the design standard could be achieved by an available technology, the requirement should not be imposed unless the Agencies demonstrate that "gentle removal" would save any, let alone more than a de minimis number of, eggs and very small larvae that become impinged on the exclusion technology.

In order to make this determination, the Agencies must demonstrate that the following is true:

• That more than a de minimis number of fish eggs and larvae would be (and remain) impinged in a condition to allow survival on the exclusion technology; and
• That more than a de minimis number of these entrainables would survive a “gentle” release back into the water body, or would otherwise be able to survive for any meaningful duration given the variety of sources of mortality that will remain, such as contact with the numerous pumps or jets inducing a flow (or re-impingement in the absence of a sweeping flow), advective loss, and settling to anoxic depths.

As discussed below, none of these findings could be made on the basis of the current record.

Response to Comment 4.31
The Final Permit Modification has replaced the requirement for a gentle release mechanism with a requirement to operate an automated release mechanism for debris removal. See Response to Comment 4.24.1. Since the “gentle removal” requirement to which this comment objects has been removed from the Permit, no further response is required. For general information regarding the adverse environmental impact of the CWISs at Kendall Station and the concept of a “de minimis” impact, see Response to Comment 2.7.4.

Comment 4.31.1
Currently, the record is silent as to whether a 0.5 fps through-medium velocity, as required by the Draft Permit Modification, would result in any impingement of eggs and larvae. It is possible that such a low through-medium velocity results in a de minimis level of impingement of eggs and larvae. Moreover, the SOB even recognized that one of the fabrics used by an aquatic filter barrier have proven to resist impingement of eggs and larvae. SOB at p. 33.

Response to Comment 4.31.1
Since this comment arises as a subcomment to Comment 4.31, EPA assumes that the comment raises this question not as an abstract matter, but rather in the context of Comment 4.31’s objection to the “gentle removal” requirement in the Draft Permit Modification. The Final Permit Modification has replaced the requirement for a gentle release mechanism with a requirement to operate an automated release mechanism for debris removal. See Response to Comment 4.24.1. Since the “gentle removal” requirement to which this comment objects has been removed from the Permit, no further response is required. For general information regarding the adverse environmental impact of the CWISs at Kendall Station and the concept of a “de minimis” impact, see Response to Comment 2.7.4.

To the extent, if any, that Comment 4.31.1 could reasonably be construed as requiring a substantive response even now that the “gentle removal” requirement has been deleted from the Final Permit Modification, EPA provides the following response:

The principal purpose of the provision that has replaced the former “gentle removal” requirement, as explained in more detail in Response to Comment 4.24.1, is to minimize fouling and clear debris to ensure maximum performance of the exclusion technology. In this respect, it complements the provisions regarding through-medium velocity and bypasses by ensuring that the system functions properly as an aquatic organism exclusion technology. A secondary purpose of the revised provision is to promote the survival of impinged organisms by clearing those organisms from the technology.

Without adequate site-specific data, EPA cannot precisely quantify the potential for impingement of eggs and larvae. The consistent maintenance of 0.5 fps through-medium velocity and an induced sweeping flow that exceeds the approach velocity is expected to minimize impingement mortality of eggs and larvae. The purpose of the cleaning mechanism is to ensure smooth performance of system components so that this may be consistently achieved. Additional technological elements, such as fabrics that are less conducive to impingement, could add a further layer of protection. However, the record does not support reliance on reduced through-medium velocity alone, or in combination with fabrics less conducive to impingement, as sufficient to minimize impingement of eggs and larvae.

Comment 4.31.2
While the violence of the force required to release impinged eggs and larvae and propel them back into the water body is not known, it is likely that whatever force sufficient or technologically available to free impinged eggs and larvae would not be considered gentle enough to maximize survival. MK Modification Comment Exhibit No. 11. Any conclusion to the contrary would be based on speculation given that there are no studies evaluating post-impingement survival (nor could any reliable studies be so designed).

Response to Comment 4.31.2
The Final Permit Modification has replaced the requirement for a gentle release mechanism with a requirement to operate an automated release mechanism for debris removal. See Response to Comment 4.24.1. Since the "gentle removal" requirement to which this comment objects has been removed from the Permit, no further response is required. Regarding the type or quantity of force needed to promote survival of eggs and larvae, see Response to Comment 4.24.2.

Comment 4.31.3
Requiring a "gentle release" will do very little to minimize AEI because impinged eggs and larvae that are freed will not likely survive for any meaningful duration after they are reintroduced to the Lower Basin. Any eggs and larvae released, as discussed above, will be lost to contact with the numerous pumps or jets inducing a flow (or re-impingement in the absence of a sweeping flow), advective loss, and settling to anoxic depths.

For example, even with slightly below-average May River flows of 350 cfs, any eggs in the Lower Basin will be advected from the system before they can develop to later larval stages. MK Modification Comment Exhibit No. 5. Moreover, under those same below average flows, many larvae smaller than 8 mm also will likely be advected. MK Modification Comment Exhibit No. 5. Even if eggs and small larvae were able to avoid advection, they would be unable to survive if they settled into the depths of the Lower

Basin that have unbearably low dissolved oxygen and high salinity. Moreover, in the absence of an ambient or induced flow (which as discussed throughout is infeasible and could increase other environmental impacts if attempted), released eggs and larvae would be subject to immediate re-impingement.

Response to Comment 4.31.3
The Final Permit Modification has replaced the requirement for a gentle release mechanism with a requirement to operate an automated release mechanism for debris removal. See Response to Comment 4.24.1. Since the "gentle removal" requirement to which this comment objects has been removed from the Permit, no further response is required.

As summarized in Section 3, specifically in Response to Comments 3.4, EPA doubts that all eggs and most larvae that are freed from the exclusion technology would likely suffer mortality due to advection and low dissolved oxygen. An induced flow system employing screw-impeller pumps would likely minimize mortality of ichthyoplankton as well. See Response to Comment 4.25. EPA agrees that, in the absence of sufficient sweeping flow, eggs and larvae would be subject to immediate re-impingement. Sweeping flow is a critical component of BTA precisely because re-impingement may result in high mortality, and the SAIC technical report proposes one possible method of achieving an induced flow in the Broad Canal (AR 738).

Comment 4.32
As discussed above, there has never been an exclusion device designed, tested or deployed to "gently" release impinged organisms to the water body in a manner to maximize survival. So therefore any benefits to these small, early-life stages that such a mechanism could provide would be uncertain. Indeed, the Agencies earlier recognized that the survival of impinged eggs and very small larvae "after impingement is uncertain." Determination Document at p. H7-H8.

On the other hand, fish collection and return systems have been designed, installed, operated and assessed with the objective of returning impinged organisms to the water body with minimum mortality. Yet the SOB determines that the benefits of using such a fish return system at Kendall Station were too uncertain to allow that technology to be BTA.

This represents a contradiction not thoroughly reconciled in the SOB. On one hand, the SOB rules out as BTA a technology that has been designed, deployed and tested to accomplish a certain result, but on the other hand requires a technology that has never been designed, tested or deployed to achieve that same result.

Response to Comment 4.32
The Final Permit Modification has replaced the requirement for a gentle release mechanism with a requirement to operate an automated release mechanism for debris removal. See Response to Comment 4.24.1. Since the "gentle removal" requirement to

which this comment objects has been removed from the Permit, no further response is required.

Regarding fish return systems, see Response to Comment 4.10.5. To the extent (if any) that this comment could be construed as pertaining in some manner to fine-mesh traveling screens, see Response to Comment 4.7.

Comment 4.33
By requiring "gentle removal," the Draft Permit Modifications may result in decreased water quality that would occur when an aquatic filter barrier, wedgewire screens, or Filtrex produce the backwash or air-burst necessary in an attempt to remove impinged organisms. This is because even if there were a mechanism that could result in a gentle release, operation of that mechanism would likely agitate the nutrient rich bottom waters in the Lower Basin, and could contribute to seasonal algal blooms or other seasonal negative water quality impacts caused by the periodic disturbance of the lower water column that is relatively high in toxins and metals. The SOB does not address this potential adverse impact to water quality, but EPA New England previously rejected use of the diffuser because of its belief that the diffuser could negatively impact water quality in a similar manner.

Response to Comment 4.33
The Final Permit Modification has replaced the requirement for a gentle release mechanism with a requirement to operate an automated release mechanism for debris removal. See Response to Comment 4.24.1. Since the "gentle removal" requirement to which this comment objects has been removed from the Permit, no further response is required. However, because the point raised in the comment could apply to any backwash, agitation, or airburst mechanism for an aquatic organism exclusion technology, EPA responds as follows.

As a preliminary matter, a cleaning mechanism for an aquatic organism exclusion technology cannot seriously be compared to Mirant's diffuser proposal. The energy involved with the proposed diffuser (providing a flow of as much as 80 million gallons of water on some days) would be far greater then a relatively small cleaning mechanism. The proposed diffuser would impact the entire lower Basin, while the effects of the cleaning mechanism would be confined to the Broad Canal (see Response to Comment 4.12), where contaminated bottom sediments and low dissolved oxygen is not a concern. See Responses to Comments 4.12, 4.17.2. The proposed diffuser would discharge continuously during operation, whereas the cleaning mechanism would be intermittent and short in duration. The concerns EPA has expressed regarding the proposed diffuser—continued high flux rates from the nutrient rich bottom sediments into the overlying water column that will then be mixed and brought up to the surface due to the mixing caused by the diffuser—do not generate serious concerns for a cleaning mechanism for an aquatic organism exclusion technology.

Comment 4.33.1

As discussed above, the airburst systems operate by suddenly releasing a large volume of air which will locally decrease the water density and causes significant surface turbulence. The lower water density and surface turbulence may be sufficient to sink or capsize a small watercraft. The resulting necessary barriers to prohibit small craft from entering the area of this agitation may not sufficiently mitigate this serious risk, and could also pose navigation risks.

Response to Comment 4.33.1
Although there are some airburst systems which result in significant turbulence, there are many designs that can incorporate release mechanisms with much less force or that operate in a way that sequentially pulses air across a barrier over time. For instance, EPA has observed the airburst system of an aquatic filter barrier (D. Gaito, Taunton Desalination Plant site visit 10/17/2008) and noted that the minimal surface turbulence created, which was certainly not enough to tip a small watercraft, was primarily contained on the plant side of the barrier.

Furthermore, an installation in the Broad Canal, the location identified in the Final Permit Modification as BTA, will likely minimize issues related to safety. The Final Permit Modification also requires that deployment of the exclusion technology not obstruct safe passage for recreational watercraft. See Response to Comment 4.12.

Comment 4.34
In order to determine that a sweeping velocity would minimize any AEI due to reimpingement, the Agencies would have had to first conclude that more than a de minimis number of eggs and very small larvae are impinged, that more than a de minimis number of eggs and very small larvae survive the gentle release, and that more than a de minimis number would survive after being transported away from the exclusion technology by this sweeping flow. In other words, if there is nothing more than a de minimis number of live eggs and very small larvae subject to re-impingement, then there can be no justification for a sweeping velocity designed to relocate them.

Moreover, even if more than a de minimis number of impinged eggs and very small larvae could be swept away to avoid re-impingement, the sweeping flow would still not minimize any AEI because in order to minimize the chances for re-impingement, the eggs and very small larvae would have to be swept back into the Lower Basin (or if the technology were located in the Lower Basin, farther downstream). Sweeping eggs and very small larvae into the Lower Basin (or farther downstream) will only increase and accelerate mortality because, as discussed above, eggs and very small larvae in the Lower Basin are subject to high mortality risks from advection or settling to anoxic waters that can also be high in salinity. Sweeping eggs and very small larvae out of the relatively hospitable Broad Canal towards a much more inhospitable environment brings no benefit.

Response to Comment 4.34
The comment relies on a series of incorrect assumptions.

First, regarding EPA's purported obligations regarding a "de minimis" theory, see General Response 2.03.

Second, Mirant incorrectly assumes that the only relevant effect of the sweeping flow is to transport away eggs and larvae that had been impinged and have since been released. That is certainly a major effect. But another important effect is to move eggs and larvae past the exclusion technology so that they are not impinged in the first place. The record suggests that a sweeping flow past the exclusion technology, with a velocity exceeding the approach velocity of the intake, will substantially reduce impingement of eggs and larvae.

EPA agrees that in order to minimize AEI, eggs and larvae must be transported back to the Lower Basin to prevent re-impingement. This transport can be accomplished by a sweeping flow in conjunction with a fish bypass system. Notwithstanding Mirant's conjectures regarding advection, there is not enough evidence regarding advection to suggest that the Lower Basin is an inhospitable environment. Moreover, Mirant's own sampling indicates that, while conditions are not ideal, the Lower Basin supports high densities of ichthyoplankton as well as young-of-the-year river herring and resident species. See Normandeau 2006-07 Monitoring Report (AR 760) and 2008 Assessment Exhibit 5 (AR 761). The natural environment of the Lower Basin is certainly not less hospitable than the Broad Canal, which, without a sweeping flow and return system, would concentrate eggs and larvae in a dead-end canal where the potential for mortality, either due to impingement, entrainment, or predation, would be higher than in the Lower Basin.

Comment 4.35

Inducing an unnatural sweeping flow adjacent to the exclusion technology will likely increase the environmental impacts due to decreases in water quality and other adverse impacts to the environment, as discussed in the comments that follow. For example, and as discussed in more detail below, creating an artificially induced flow will likely lead to changes in the current hydraulic flows in the Lower Basin. MK Modification Comment Exhibit No. 11. In issuing the Final Permit Modification, the Agencies must consider the potential adverse impacts that changing the current hydrodynamics of the Lower Basin may have to both organisms and water quality.

Response to Comment 4.35

EPA has considered the potential adverse impacts that changing the current hydrodynamics of the Lower Basin could have to both organisms and water quality, and has determined that the impacts would be minimal considering that the change in hydraulic flows in the Lower Basin would be minimal. The flow required to be induced to sweep ichthyoplankton from the Broad Canal would be in the range of 12 to 40 MGD, and would be isolated to one portion of the Broad Canal directly in front of the exclusion technology. See Response to Comment 4.25.5. The discharge of bypass water to the Charles River would be a surface discharge and would be unlikely to disturb the vertical stratification currently present. See Response to Comment 4.17.2.

Comment 4.35.1
The potential environmental impacts of an induced flow in an unbounded area through the use of numerous pumps or jets are numerous. First, because these numerous pumps or jets must be suspended in the waterbody, there is a very high possibility that their continual operation will injure or kill more organisms than would actually be saved by virtue of the sweeping flow. This is because the induced flow will increase -- by more than double -- the flow towards the CWIS technology and will consequently subject twice as many non-motile organisms to potentially violent contact with the pumps or jets inducing the flow. MK Modification Comment Exhibit No. 11.

In discussing the dangers of entrainment, the SOB recognized that entrainment can subject organisms to "shear forces from mechanical pumps [and] physical stress and injury," SOB at p. 8, yet the Draft Permit Modification's sweeping flow design standard will require installation of numerous pumps or jets that will impose this very same adverse impact on the now excluded entrainables, as well as an equal number of entrainables that would not have otherwise been entrained. In other words, it is impossible to square the Draft Permit Modification's requirements to eliminate entrainment with its provisions that will potentially subject twice as many fish eggs and larvae to the same types of dangers associated with entrainment. Considering the extremely low -- if any -- number of organisms expected to be saved by the induced flow, as discussed above, it is likely that the net effect of an induced flow in an unbounded area will result in more organisms being killed than are saved from entrainment into Kendall Station.

The induced flow could also double the amount of debris that is drawn towards the exclusion technologies, possibly leading to decreased performance.

The fact that there would have to be numerous pumps or jets at multiple depths to maintain the required sweeping flow would likely alter the flow patterns of the Broad Canal and the Lower Basin, which in turn could result in decreased water quality, and increased recirculation. MK Modification Comment Exhibit No. 11. The SOB did not evaluate how or to what magnitude these flow patterns would be altered, and whether these altered flow pattern will cause more harm to water quality and organisms than whatever reductions in impingement mortality, if any, changing flows in the Lower Basin would accomplish.

Finally, the pumps or jets, as discussed above, would be expected to agitate the bottom waters, which is an effect the SOB has recognized could lead to decreased water quality. MK Modification Comment Exhibit No. 11. This too was not considered in the SOB.

Response to Comment 4.35.1
EPA agrees with Alden's assessment that an unbounded flow is not available at this time. However, an induced sweeping flow system is available at Kendall Station in a *bounded* condition within the Broad Canal. See Response to Comment 4.25.4; AR 738.

Comment 4.35.2

An induced flow in a bounded area in the Broad Canal also could increase environmental impacts in the same way as an induced flow in an unbounded area. By inducing a sweeping flow in a bounded area in the Broad Canal, Kendall Station's intake flow would be more than doubled because the fish pumps required to create the sweeping flow would have to draw in an equal amount of water as Kendall Station's intake. MK Modification Comment Exhibit No. 11. This will consequently result in more than twice as many entrainables being drawn into this bounded area (and entrained by the fish pumps) that are currently entrained at Kendall Station. So the net result would be subjecting more than twice as many entrainables to contact with the CWIS technology, and subjecting all of these entrainables to the uncertainties -- already recognized by the SOB -- associated with survival of the fish return mechanism designed to return them to the Lower Basin.

While some fish pumps have been designed to minimize mortality of juvenile and adult fish, some mortality would occur. MK Modification Comment Exhibit No. 11. And even if the mortality rate for eggs and larvae entrained by these pumps and subjected to a fish return was, by way of example, 50%, the requirement of an induced flow will actually kill just as many eggs and larvae as are currently entrained because at least twice as many eggs and very small larvae will be entrained by the fish pumps (even though only half experience mortality). The SOB does not address how it is consistent to require the elimination of entrainment through Kendall Station while at the same time requiring entrainment through fish pumps and a lengthy fish return system that could kill the same number of (or even more) eggs and very small larvae than were previously entrained.

Doubling the flow into this bounded area with the induced flow will also increase the amount of debris that is drawn towards the exclusion technologies, possibly leading to decreased performance. Additionally, doubling both the volume of flow into the Broad Canal as well as the resulting doubling of the discharge would also alter the flow patterns in the Broad Canal and Lower Basin, which as discussed above, could potentially result in serious consequences to the water quality in the Lower Basin. See MK Modification Comment Exhibit No. 11 (AR 736). The altered flow patterns could also pose navigation risks to small crafts such as kayaks, canoes, small sailboats, and sculls. The SOB did not evaluate the significance of all of these, or other, adverse impacts due to a large alteration of existing flows, and therefore did not assess whether it is worth risking the uncertainties and very possible adverse impacts associated with artificially altering the Broad Canal's and Lower Basin's current flow patterns in return for a sweeping flow that it did not demonstrate would actually reduce impingement mortality.

Response to Comment 4.35.2
Mirant comments that *"The fish pumps required to create the sweeping flow would have to draw in an equal amount of water as Kendall Station's intake . . . . subjecting more than twice as many entrainables to contact with the CWIS technology."* See Response to Comment 4.25.5.

"While some fish pumps have been designed to minimize mortality of juvenile and adult fish, some mortality would occur . . . by way of example, 50%." EPA does not dispute that "some" mortality would occur. Recognizing that Mirant's "50%" figure was offered

"by way of example," EPA finds no evidence in either Mirant's comment, the attached Alden memorandum, or any other source suggesting that mortality through the fish return system would approach 50%. Ichthyoplankton regularly survive turbulence and swift currents in their natural habitat. *See* Response to Comment 4.10.5. Moreover, the fact that the necessary increased flows are substantially less than Mirant states means that even unexpectedly high mortality through the fish return system would still result in reductions in mortality.

Consider, for example, the facility as it currently operates, at a high but reported daily intake of approximately 79 MGD, with an assumed 100% entrainment mortality. Adding the exclusion technology but no sweeping flow would minimize *entrainment*, and operating a release mechanism but no sweeping flow would somewhat reduce impingement mortality. However, without a sweeping flow and return system, such a system would concentrate eggs and larvae in a dead-end canal where the potential for mortality (from impingement, entrainment, and/or predation) would still be extremely high. Now consider adding the sweeping flow, which could be as low as 12 MGD. See Response to Comment 4.25.5. (Mirant could elect to install one of the technologies which would require a higher sweeping flow, but that would be Mirant's choice, not a requirement of the Final Permit Modification.)

With 91 MGD being drawn into the Canal, to be sure, approximately 15% more entrainable organisms would encounter the system. But the egg and larvae mortality rate caused by the fish pumps and fish return system would have to be 87% in order to be as high as that of the current system. Even assuming a lower intake rate of 60 MGD (i.e., 72 MGD with the additional sweeping flow), the mortality rate of the total intake and induced flow system would need to be 84% in order to equal the mortality of the present system. Indeed, even assuming a low-demand month with only 40 MGD intake (i.e., 52 MGD with the additional sweeping flow), the mortality rate would still need to be 77% in order to equal the the mortality of present system. Since EPA expects the actual mortality rate for eggs and larvae to be substantially lower than 77%, let alone 84% or 87%, the sweeping flow and fish return system are expected to result in substantial decreases in mortality, notwithstanding the increased total flow.

"Doubling the flow into this bounded area with the induced flow will also increase the amount of debris that is drawn towards the exclusion technologies, possibly leading to decreased performance." First, as noted above, the increase in flow need not be "double." Second, the debris removal mechanism coupled with an induced sweeping flow would clear small debris, such as fine particulates, from the surface of the technology and transport debris from the Broad Canal. In addition, installation of a trash rack (e.g., 1-inch spacing) at the entrance to the bounded area would prevent larger debris from entering the bounded area. The tiered debris removal systems (trash rack and debris clearing mechanism with induced flow) would act in concert to maintain the performance of the exclusion technology.

"Serious consequences to the water quality in the Lower Basin." See Responses to Comments 4.17.2, 4.35.

"Navigation risks." The induced flow system would be unlikely to cause major alterations in flow patterns that would pose navigation risks for kayaks, canoes, small sailboats, and sculls. First, the increase in water flow into the Broad Canal would likely be minimal. SAIC estimates that the inflow into the Canal with a required volume of no more than 1.5 times the existing intake volume would be 0.15 fps (AR 738 p. 7). This inflow would not disrupt recreational boating into or out of the Canal. Second, the discharge of water to the Charles River from the induced flow return system would be unlikely to pose navigation risks because it could be designed to minimize impacts to boaters. The return flow would be much less than 80 MGD, which is the current maximum plant discharge from the existing wall outfall. The existing discharge has not, to EPA's knowledge, presented issues with recreational boaters in the past, which suggests that a similar pipe discharge for the induced flow return system with a lower discharge volume would be unlikely to present risks. Even if the velocity of the induced flow return discharge is substantially greater than the existing wall discharge, it could be designed to dissipate quickly and if located nearshore and downstream of the Broad Canal, could be isolated from recreational boaters. Discharging at depth (e.g., 5 feet) rather than at the surface may also dampen potential issues for recreational boaters.

See also Response to Comment 4.25.

Comment 4.36
The Draft Permit Modification proposes to require that the exclusion technology be deployed no later than March 1 and until August 31. This provision is not necessary to minimize any AEI due to entrainment.

As the SOB acknowledges, entrainment data demonstrate that the "94% of eggs and 95% of larvae were collected in May and June." SOB at p. 12. The SOB goes on to acknowledge that entrainment at Kendall Station "peaks in May and June." SOB at p. 12. There is no basis for believing that this will change in the future.

The longer an exclusion technology is deployed, the greater are the risks that its performance will be compromised from biofouling or debris loading or other bypasses. Deployment should not be required for longer than necessary for minimizing entrainment. In other words, if the exclusion technology were deployed two months before the peak entrainment season (as the Draft Permit Modification currently requires), it would increase the chances that by the time the peak entrainment season came around, the performance of the technology has decreased from its original level due to two months worth of debris loading and biofouling, even with reasonable cleaning and maintenance.

Deploying the exclusion technology from April 15 to July 15, as Mirant Kendall's Proposed BTA would do, reflects BTA for minimizing entrainment because it would result in a potential exclusion of 100% of entrainable fish eggs and 99% of the fish larvae based on the data collected over the past several years. The SOB indicates that this level of reduction in entrainment is acceptable. See SOB at pp. 31, 33, 34.

Furthermore, the Draft Permit Modification currently proposes that the primary BTA be in place by March 1, and does not include an exception for icing periods. But not making a provision for icing does not minimize AEI because when the Lower Basin is cold enough to ice over, it is cold enough to inhibit anything more than a de minimis level of spawning runs or activity. See the life history data in Appendix 5-3 in the 2001 Permit Application, A.R. 454.

Response to Comment 4.36

In the year 2000, the permittee conducted ichthyoplankton sampling from March 13 through September 6. During this one year of sampling, 94 percent of eggs and 95 percent of larvae were collected in May and June. However, because current spawning activity and overall river herring densities are at such low levels (*see* AR 766), EPA must consider protection of river herring eggs and larvae from entrainment throughout the spawning period, not just during peak densities.

Also, the percentages of eggs and larvae referred to in the SOB were based on samples collected at six locations once a week, in the year 2000. This sampling design is not unreasonable and likely captured the timing of peak densities of ichthyoplankton in the river for that year. However, due to the sporadic and patchy nature of fish egg and larvae distribution in a river, especially when densities are not at their peak, as well as the year to year variability from one spawning season to the next, the one year of data collection that the permittee refers to cannot be expected to accurately represent the overall presence of eggs and larvae with any confidence in future years. This is one of the uncertainties that EPA considered when determining the deployment time period for the exclusion technology.

Mirant maintains that there is no reason to expect that the timing and duration of the presence of ichthyoplankton in the lower Basin will change in the future. EPA does not agree. The Charles River is a dynamic system. In the Determination Document, EPA discussed several factors that will likely affect the timing and duration of spawning and the presence of ichthyoplankton in the future.

For example, in the Draft Permit Determination Document, EPA reported the following:

> Precisely identifying the timing of events or periods when certain life stages of a given fish species are present in nature is difficult to accomplish because many variables such as water temperature, genetic variation within a species, latitude, weather events, lunar cycles, tides, photo period effects, salinity, flow rates and limited fish passage all influence the timing of such events. Coutant (Natl. Acad. Sci./Natl. Acad. Eng., 1972) indicates, for example, that shifts in spawning dates by nearly one month are common throughout the United States.
> (DD, Section 5.1, at 38.)
>
> It is reasonable to expect that continued improvement in water quality and anadromous fish passage will improve the spawning success of alewife in future

> years. As alewife spawning stock size increases in the direction of historic levels, the number of spawning fish entering the lower Charles River Basin will increase, but the duration of the run may also increase (NOAA, 1998).
> (DD, Section 5.7.3d, at 96)

In addition to the variables already listed, additional factors that influence the timing and duration of spawning specific to the Charles River can also be identified. The impacts of a multi-year shad restocking program, improved fish passage at Watertown Dam, reduced thermal loading at MKS from protective temperature limits for half the river, and improved water quality all play a role. Although it is difficult to predict detailed impacts on the Charles River, climate change may also play a role in modifying timing, intensity and duration of spawning activity and ichthyoplankton presence.

EPA does not agree that there is no added benefit to maintaining the exclusion technology from March to August as opposed to a shorter time period. As mentioned earlier, a time period necessary to protectively bracket and account for variability in egg and larval presence is fully discussed and justified by EPA in the DD and the SOB. As stated earlier in this response, the deployment time period required for the fine-mesh barrier nets or an aquatic filter barrier is not designed to protect only the peak egg and larval densities, but to minimize entrainment losses in the Charles River throughout the spawning period. Because the Final Permit conditions will be in effect for five years, and possibly be administratively continued for some additional time period, the time period specified for deployment of the exclusion technology must account for natural and anthropogenic influences that will affect spawning timing and duration well into the future. *See* Response to Comment 4.26.

EPA understands that the longer any exclusion technology is deployed in the river, the greater the potential for biofouling, debris loading or other bypasses. Nevertheless, this potential operational complication is trumped by the need to minimize adverse environmental impacts by deploying this technology when there is a potential for entrainment. Based on the factors listed above, there is sufficient uncertainty and variability of egg and larval presence in the Lower Basin in the future that the protective time period of deployment specified in the Draft Permit Modification has been retained in the Final Permit Modification.

It is worth noting that the Final Permit Modification actually *shortens* the deployment period for entrainment reduction technologies as compared to the 2006 Final Permit. Part I.A.11.a.(1) of the Final Permit required that a barrier net sufficient to reduce the entrainment of eggs and larvae must remain in place year round, except when icing conditions in the river reasonably preclude their deployment. This permit modification reduces that requirement to March 1 through August 31, except when precluded by icing. *See* Response to Comment 4.26.

Comment 4.37
In addition to the comments above that would be applicable to the Draft Permit Modification's "secondary BTA," Mirant Kendall notes the following.

Response to Comment 4.37
This comment is entirely prefatory to Comments 4.37.1-4.37.2, responses to which are found below.

Comment 4.37.1
First, the SOB does not fully evaluate whether the "secondary BTA" can be justified at all. This is because, as Mirant Kendall has discussed above, the impingement levels observed at Kendall Station are extremely low and reflect a de minimis impact that is not subject to § 316(b) regulation.

Moreover, the secondary BTA is required to be in place when the primary BTA is not in place. This means that the secondary BTA must be in place from September until March except when icing prohibits deployment. But the this deployment can only be justified if the SOB had determined that more than a de minimis level of impingement occurred during the months the secondary BTA is required to be in place. The SOB did not separately focus on this issue in assessing impingement.

In other words, in order to require a secondary BTA, the SOB must demonstrate that there is AEI due to impingement during the times of year when the secondary BTA is required to be in place. Based on the current record, such a demonstration would be difficult to make because in determining that there was AEI from impingement, the SOB heavily relies on a single impingement event in 2000 that occurred during the time of year when the primary BTA would have been in place anyway. Therefore, that single impingement event cannot be used as a basis for requiring the secondary BTA to be deployed during other times of the year when there is an absence of any similar events, and much smaller numbers of impinged fish.

Response to Comment 4.37.1
Regarding a "de minimis" theory, *see* General Response 2.03 and Responses to Comments 3.1-3.3.

EPA acknowledges that impingement mortality is highest in May and June, a period when the exclusion technology will be deployed under the Final Permit Modification. However, nearly 18 percent of impingement occurred between December and February (IMPINGE-1, AR 760). Consequently, a secondary BTA is necessary to minimize impingement mortality during the six months of the year when the aquatic organism exclusion technology is not required to be deployed. See also General Response 2.03 (de minimis), Responses to Comments 3.1-3.6 (de minimis), 4.26 part 2 (granularity of analysis). Moreover, the secondary BTA is also required when the primary exclusion technology is deployed but not functioning properly. For example, if the permittee were to install a primary exclusion technology that suffered a failure during the month of May, the coarse mesh barrier net would minimize impingement of adult and juvenile fish until the primary technology were restored to operation.

Comment 4.37.2

Deployment of either wedgewire or Filtrex would be on a permanent basis. They would each be connected directly to Kendall Station's intake and could not be circumvented in any manner. Deployment of a coarse-mesh barrier net in addition to either of these technologies provides no benefits. The Final Permit Modification should delete the proposed requirement for the secondary BTA in the event that either of these technologies is installed.

Response to Comment 4.37.2
Under Part I.A.11.b, the coarse-mesh barrier net requirement is contingent upon, and only applies during, two possible circumstances: (1) that the exclusion technology is not deployed, or (2) the exclusion technology is not functioning properly. If neither contingency arises, the coarse-mesh barrier net requirement will never be triggered. Consequently, no change to the Final Permit Modification is necessary.

Comment 4.37.3 from Rae Stiening
Page 12. 11d (2), "..inspections..": The draft permit requires the permittee "…repair damage…as soon as practicable." This section is vague and ambiguous, both as to what constitutes significant damage and what "as soon as practicable" means. The permit should specify the length of time the power plant can continue to operate with damaged fish nets. That length of time should depend on the extent of the damage and be related to the harm done to the fish population being protected by the permit. If the plant is shut down, the permittee would have to purchase power from other producers to replace any power that the permittee had contracted to supply. The cost of doing this is a suitable incentive for the permittee to make prompt repairs. Stopping the production of power at the Kendall Station to repair a fish net will not result in an electricity shortage.

Response to Comment 4.37.3:
Since the permittee is required to inspect the coarse mesh barrier net once per week, it is possible that a net could become damaged and need repair but that this might not be known for several days. It is difficult to predict in advance how long unknown repairs of unknown damage should be expected to take, and therefore EPA declines to select a time frame within which a damaged net must be repaired. Rather, based on its practical experience developing and enforcing NPDES permits, EPA selected the "as soon as practicable" language as an appropriate and reasonable requirement. The intent of the provision is to require prompt repair without overspecifying a repair schedule and/or holding Mirant to an unattainable standard. Rather, the intent is to require repairs at a pace consistent with good engineering practice and reasonable under the circumstances (e.g., weather), without unnecessary delay in either commencing or executing the repairs. Section 316(b) does not require EPA to set some pre-determined time limit such that, if repairs exceed that time even for entirely legitimate reasons, the facility must cease operation.

Moreover, the permit modification also contains provisions to minimize adverse environmental impact during such repair periods. As soon as the permittee becomes aware that the coarse mesh barrier net is not functioning properly, which would include circumstances that allow adult and juvenile fish to pass through this net, the permittee is required to begin operation of the traveling screens (See Part I.A.11.c.). Upon operating its traveling screens, the permittee would be required to collect all fish that are impinged on these screens and return all live fish to the receiving water. In addition, as set forth in Part 1.A.11.a.3, the permittee shall preclude bypasses, except otherwise provided by Part II.B.4 of the permit. This provision is in the General Conditions and describes measures that the permittee must take when bypasses occur.

Comment 4.38
In addition to the comments above that would be applicable to the Draft Permit Modification's "tertiary BTA," Mirant Kendall notes the following.

Response to Comment 4.38
This comment is entirely prefatory to Comments 4.38.1-4.38.3, responses to which are found below.

Comment 4.38.1
As with the secondary BTA, the SOB has not provided a justification for why the tertiary BTA must be operated. In order to do so, the Agencies must first determine that there would be AEI due to impingement mortality if the tertiary BTA were not operated. But again, it would be difficult to make such a determination on the current record because the current levels of impingement at Kendall Station are so low that they constitute a de minimis impact, and considering that Kendall Station has rarely removed a live fish from its traveling screens in the past several years of operation when those screens constituted the only CWIS. So given the fact that a de minimis number of live fish are collected from the screens when those screens are operated year round, it cannot be concluded that more than a de minimis number would be collected during the brief periods when both the primary and secondary BTAs are not in place.

Response to Comment 4.38.1
For context, it is worth summarizing the tertiary BTA provision to which Mirant objects. The tertiary BTA provision applies only when neither the exclusion technology nor the coarse-mesh barrier net is deployed or functioning properly. The provision simply requires the permittee to operate its existing traveling screens, rotate them once every eight hours, and return any live adult or juvenile fish collected or trapped on the traveling screens to the water.

In other words, Mirant argues that a provision, applicable only when neither the primary nor the secondary CWIS technology is functioning, requiring Mirant to rotate traveling screens every eight hours, and return to the water any fish that are not yet dead, is excessively stringent. EPA disagrees. During the (hopefully brief) periods when no other technology is functioning, it is entirely reasonable to require the permittee to attempt to release any live fish impinged on its traveling screens every eight hours. See also Responses to Comments 2.7.4 and 3.1 to 3.6.

Finally, it is worth noting that Mirant's own consultant (Alden), as part of a report submitted in support of Mirant's own proposal to install a barrier net in fulfillment of section 316(b), acknowledges that:

> The net would not eliminate the need to operate the existing traveling water screens. The screens would have to be ready to operate in the event of severe blockage or failure of the net material. In order to assure reliable operation, each screen would have to be rotated daily and maintained on a routine basis. Maintenance requirements for the circulating water pumps would not change with the net in place.

Mirant Comments, Ex. 13, at 2.

Comment 4.38.2
The requirement that live fish be returned to a "location that maximizes their survival and prevents re-impingement on the intake screens" is so vague that it does not provide any guidance as to what it requires. It is unclear if that provision would allow Kendall Station personnel to return a live fish to the Broad Canal, or whether they would have to transport a live fish in a bucket and across the street and dump it over the historic seawall and into the Lower Basin, or if the Agencies contemplate something else entirely.

Response to Comment 4.38.2
EPA has revised the provision to provide clarity and address Mirant's concern. The revised language states:

> All live adult and juvenile fish collected or trapped on the traveling screens shall be returned to the Lower Basin downstream of the head wall of the Broad Canal.

Comment 4.38.3
Deployment of either wedgewire or Filtrex would be on a permanent basis. They would each be connected directly to Kendall Station's intake and could not be circumvented in any manner. The traveling screens, therefore, will be eliminated if wedgewire screens or Filtrex were to be installed. The Final Permit Modification should delete the proposed requirement for the secondary BTA in the event that either of these technologies is installed.

Response to Comment 4.38.3
Under Part I.A.11.c, the traveling screen requirement is contingent upon, and only applies during, limited circumstances when *neither* the exclusion technology *nor* the coarse-mesh barrier net is deployed or functioning properly. However, EPA acknowledges that if the selected exclusion technology is operated year-round and results in the CWIS being re-configured such that the intake flow is no longer intercepted by the traveling screens, the tertiary BTA requirement is no longer applicable. Consequently, the following provision has been added to Part I.A.11.c(1) of the Final Permit Modification:

> The requirements of Parts I.A.11.c.(2), I.A.11.e.(3), and I.A.14.d.9(a) do not apply if the permittee has (i) installed a year-round exclusion technology and (ii) rerouted the intake piping in a manner that physically excludes any traveling screens from intercepting the cooling water flow.

Comment 4.39
In addition to developing various "design standards," the SOB concluded that fine-mesh barrier net, aquatic filter barrier, wedgewire screens or Filtrex all could constitute components of a BTA at Kendall Station.

Besides the fact that none of these technologies (or any others) would be able satisfy the Draft Permit Modification's design standards, each of these technologies -- save for fine-mesh barrier nets as described in Mirant Kendall's BTA Proposal -- are unavailable for additional reasons other than those already covered above. These reasons are discussed in the following comments that also address various other issues that the Agencies should consider in issuing the Final Permit Modification.

Response to Comment 4.39
This comment is generic and largely prefatory to more specific comments pertaining to specific technologies. EPA has responded to the more specific comments below, but provides the following introductory response for background.

Fine-mesh barrier nets, aquatic filter barriers, and wedgewire screens are all available technologies because they can be implemented at Kendall Station and achieve the design and operational standards of the Final Permit Modification.

Fine-mesh barrier net. A fine mesh barrier net with a 0.5 mm opening size is available commercially from manufacturers such as Gunderboom, Inc (which is separate from the manufacturer's aquatic filter barrier system with double-layer mesh and an integrated airburst mechanism). For example, several 0.425 mm single-layer woven barrier nets are currently being successfully operated (since 2008) in association with the New York Waterfalls art display at several locations in the East River in New York. According to EPRI 2006, the optimal installation of a barrier net should be located to achieve a maximum approach velocity of 0.25 fps, and 75 percent of the installations summarized achieved approach velocities less than 0.5 fps (AR 748, p. 6-3). While barrier nets are the only available technology that is not typically manufactured with a built-in mechanism for debris removal, airburst or reverse-flow systems can be operated in concert with a barrier net. *Cf.* Mirant Comments, Ex. 13, at 2 (proposing a barrier net system with an air diffuser located at the base of each net panel that would release a volume of air to dislodge accumulated debris and biofouling). The net could be incorporated into the design of the support pilings for the proposed public walkway in the Broad Canal. In this case a sheet pile barrier wall, fish-friendly pump, and fish bypass would be required to induce the required sweeping flow.

Aquatic Filter Barrier. An aquatic filter barrier with an opening size of 0.5 mm or less and through-medium velocity of less than 0.5 fps is available at this facility. In the Broad

Canal, a 601 foot barrier (assuming 12 foot depth) could be incorporated in the design of the support pilings of the proposed walkway, where possible. In this case a sheet pile barrier wall, fish-friendly pump, and fish bypass would be necessary for the required induced sweeping flow. Another potential configuration would be a floating intake filter pool 12 ft deep, 15 ft wide, and 177 ft long (AR 758), which would minimize the space required for deployment.

Wedgewire Screens. A wedgewire screen with a slot size of 0.5 mm or less and through-slot velocity no greater than 0.5 fps is available at this facility. At least one manufacturer, Intake Screens, Inc., makes a cone-shaped screen, rather than a T-shaped screen, which may be better suited for the limited space in the Broad Canal (AR 759). An induced sweeping flow would be necessary and may require a sheet pile barrier wall, fish-friendly pump, and bypass system.

The record indicates that at least the above technologies are available at Kendall Station, but the permittee has the flexibility to evaluate the range of technologies and implement any technology it prefers based on location, water quality, cost effectiveness, construction, or any other reason. Although the record indicates these technologies reflect the best technology available for minimizing adverse environmental impact, it is important to reiterate that Mirant's obligations are defined completely by the design and operational standards specified in the Final Permit Modification, and that if site-specific or other operational considerations render the technology less effective than expected, that reduced effectiveness will not be held against Mirant. See Response to Comment 2.17.

Finally, as explained below in more detail, EPA agrees that, based on currently available aquatic filtration system technology and design configurations, an aquatic filtration system such as Filtrex is not "available" at Kendall Station at this time.

Comment 4.40
Mirant Kendall concurs that "[d]ue to passive flow into the Broad Canal and low debris loading in the Charles River, Kendall Station is particularly well suited to barrier net technology…." SOB at p. 31. This is one of the many reasons why Mirant Kendall's BTA Proposal selects a fine-mesh barrier net.

A fine-mesh barrier net with an appropriate opening size will reduce to a de minimis level, if not eliminate completely, the entrainment of eggs and very small larvae. With respect to impingement, the net can be designed with a through-mesh velocity that is sufficiently low to prevent impingement.

Response to Comment 4.40
EPA agrees that a fine-mesh barrier net with an appropriate opening size will minimize the entrainment of eggs and very small larvae, and that it can be designed with a through-medium velocity that is sufficiently low to prevent impingement of larger organisms. EPA has determined that an appropriate opening size is 0.5 mm or smaller, and that a sufficiently low through-medium velocity is 0.5 fps or less. A barrier net with mesh size

no greater than 0.5 mm would satisfy the Final Permit Modification's requirements provided that the through-screen velocity is less than 0.5 fps, the barrier net is equipped with a mechanical device for clearing debris, and it is used in conjunction with a fish bypass system and induced flow. If these design standards are met, the barrier net would minimize both impingement and entrainment.

Comment 4.40.1
The space needed to construct a fine-mesh barrier net with a 0.5 mm mesh size opening and a 0.5 fps through screen velocity is less than the space required to construct an aquatic filter barrier. Moreover, a fine-mesh barrier net meeting these design criteria could be constructed in the Broad Canal in a manner that is incorporated into and consistent with the soon-to-be built public walkway, while an aquatic filter barrier could not. Moreover, installation of a fine-mesh barrier net in this way will result in the loss of only 0.2 acres of habitat in the Broad Canal, whereas installation of an aquatic filter barrier will result in the loss of 3.8 acres of habitat in the Broad Canal and Lower Basin.

It is unclear whether or not the SOB recognizes this fact because it is ambiguous as to what type of "barrier" it recognized would have to be deployed in the Lower Basin rather than the Broad Canal. SOB at p. 40. But, as set forth in more detail in Mirant Kendall's BTA Proposal, deployment of an effective fine-mesh barrier net is possible in the Broad Canal. MK Modification Comment Exhibit No. 13.

Response to Comment 4.40.1
To the extent that the comment supports the viability of a fine-mesh barrier net with a 0.5 mm mesh size opening and a 0.5 fps through screen velocity as an available technology in the Broad Canal, EPA agrees.

To the extent that the comment suggests that an aquatic filter barrier is not available at Kendall Station because of unacceptable impacts (e.g., space, habitat loss) or technical difficulties (e.g., integration with public walkway), EPA disagrees.

In response to Mirant's comment concerning the space available for an aquatic filter barrier, EPA investigated the matter further. An estimate for a Gunderboom MLES for Kendall Station measuring 601 ft long and 12 ft deep was provided by A. McCusker (AR 758). Based on this estimate, an aquatic filter barrier would be longer than a comparable fine-mesh barrier net with an opening size of 0.5 mm. However, the frontage of the facility is approximately 700 ft, which would accommodate an aquatic filter barrier of this size. Alternatively, a configuration such as an intake filter pool, which minimizes linear space could also be available. A. McCusker estimated an intake filter pool for Kendall Station would be 177 feet long, which could likely be accommodated in the available space without impeding navigation. Thus, while an aquatic filter barrier may be larger than a fine-mesh barrier net, neither technology is so large as to be excluded from the Broad Canal based on space limitations. Further, Mirant does not provide any specific reason why an aquatic filter barrier could not be integrated into the public walkway. An aquatic filter barrier could potentially be integrated into the public walkway, and if not, it does not make this technology unavailable, even if it would have to be installed differently than a fine-mesh barrier net might be installed.

Finally, EPA does not agree that an aquatic filter barrier would result in any substantial habitat loss in the Broad Canal. Because the technology must not block the entrance to the Broad Canal, resident fish may travel in and out of the canal freely. A small portion of habitat between the intake and filter barrier would be lost, but this loss would be more than compensated for by increasing protection from impingement and entrainment.

Therefore, the above considerations do not render an aquatic filter barrier unavailable at Kendall Station. Moreover, an aquatic filter barrier has at least one technological advantage over barrier nets: it is equipped with a mature and effective technology for clearing debris. Nonetheless, the Final Permit Modification provides the permittee with the flexibility to install and operate a fine mesh barrier net provided that the technology meet all of the design standards required in Part I.A.11.a.

Comment 4.41
The SOB concluded that a coarse-mesh barrier net "would not reduce entrainment of eggs and larvae…." SOB at p. 32. This conclusion rests upon the incorrect assumption that any mesh size larger than the larvae's head capsule size would not exclude that larvae. But larvae do not always (or even frequently) encounter the barrier net in a head-on, perpendicular manner that would create a risk of entrainment. Also, late-stage larvae are capable of a behavioral response when encountering a barrier net, and may react in a manner that reduces their potential for entrainment. Therefore, a barrier net with an opening size greater than the head capsule size will still work to exclude some of the mobile stages of the otherwise entrainable larvae.

Response to Comment 4.41
EPA agrees that a coarse mesh barrier net, such as the ¼-inch (almost 6.4 mm) net proposed in the Draft Permit Modification, may exclude *some* larger larvae, because some individuals may not approach the net head first and/or may be capable of a behavioral response. However, a coarse mesh net cannot be considered effective, let alone the "best" technology available, in preventing entrainment. Results suggest that a 2 mm mesh (let alone a 6.4 mm opening) does not appear to reduce entrainment below 60 percent with larvae in the 8 to 18 mm size range – the size of larvae most commonly entrained at Kendall Station (A.R. 749 p. 2). Even a 1 mm opening size is not sufficient to preclude alewife and yellow perch larvae smaller than 9 mm. At 0.5 fps, a 1.0 mm mesh was unable to retain any alewife postlarvae as large as 9.5 mm, while a 0.5 mm mesh retained 89% of test larvae. Similarly, at 0.5 fps, a 1.0 mm mesh could not sufficiently retain more than 15% of yellow perch larvae smaller than 9.0 mm, while a 0.5 mm mesh effectively retained over 90% of yellow perch larvae as small as 6.3 mm (AR 750). Also see Response to Comment 4.28.

EPA has determined that a 0.5 mm opening size is BTA because it is available and provides the highest degree of protection for eggs and larvae.

Comment 4.42
The SOB incorrectly concludes that an aquatic filter barrier could constitute BTA at Kendall Station. As the SOB recognizes, an aquatic filter barrier would have to be constructed in the Lower Basin because insufficient space exists in the Broad Canal to install a properly designed aquatic filter barrier. SOB at p. 40. But installation of an aquatic filter barrier is not available in the Lower Basin for the reasons discussed in the comments above. Moreover, the SOB did not adequately consider the following issues relating to deployment of an aquatic filter barrier.

Response to Comment 4.42
This comment is generic and largely prefatory to the more specific comments below, to which EPA has responded. Regarding available space in the Broad Canal, EPA has re-evaluated the space requirements and concluded that there is adequate space in the Broad Canal for an aquatic filter barrier. See Response to Comment 4.40.1. EPA has not altered its determination that an aquatic filter barrier would constitute BTA at Kendall Station. See also Response to Comment 4.17.

Comment 4.42.1
In the Determination Document, the Agencies found:

> 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.

Determination Document at p. H60. The SOB did not explain why EPA New England has changed its position and now believes that an aquatic filter barrier can reflect BTA. The same questions concerning aquatic filter barriers that existed at the time when EPA New England drafted the Determination Document persist to this day.

Response to Comment 4.42.1
First, it is important to reiterate that neither the Draft Permit Modification nor the Final Permit Modification "command that the Gunderboom technology be used at MKS." EPA has determined that an aquatic filter barrier is one of several technologies that reflect BTA at Kendall Station, and has developed permit requirements that could be satisfied by, but by no means require, use of an aquatic filter barrier.

Second, the Determination Document was issued in 2004. In the past four years aquatic filter barriers have been deployed at a number of sites and for a multitude of purposes. These include Lovett Generating Station in New York (at which an aquatic filter barrier was installed in 2004 and for which an important study was conducted in 2005-2006 and issued in 2007), Taunton River Desalinization Plant in MA (began operation in spring

2008), and an experimental project to provide a safe swimming area in the Lower Charles River (AR 748, AR 740, AR 751). The best studied aquatic filter barrier, a full-scale deployment at Lovett Station in 2004, effectively reduced entrainment by 92 percent in 2005 and 89 percent in 2006 (AR 748 p. 7-6). Based on new evidence gathered since the issuance of the Determination Document, EPA has concluded that an aquatic filter barrier is available as BTA for this facility. See also Response to Comment 2.1, part 4 (availability of technology).

Comment 4.42.2
The record contains no information (nor does any exist that Mirant Kendall is aware of) suggesting that an aquatic filter barrier would be an effective exclusion technology in the absence of a sufficient sweeping ambient flow. The three facilities that the SOB cites in support of its conclusion that an aquatic filter barrier could be BTA at Kendall Station all experience greater ambient flows than those present in the Lower Basin, which the SOB recognized as being a "low flow environment" with an average velocity of 0.021 fps and a maximum average monthly velocity of 0.104 fps. SOB at p. 46.

An ambient flow is necessary to ensure that performance of the aquatic filter barrier is not compromised due to debris loading or biofouling. The SOB recognized that the performance of an aquatic filter barrier could be compromised in such a way, but did not consider the fact that the lack of ambient flow in the Lower Basin would exacerbate this problem to the extent that an aquatic filter barrier would not perform effectively. Moreover, even if it were possible to create an induced flow similar to a sufficient ambient flow (which it is not, as discussed above), there is no evidence of an aquatic filter barrier being successfully deployed with such an induced flow.

Response to Comment 4.42.2
EPA agrees that an aquatic filter barrier requires a sufficient sweeping ambient flow in order to be effective. EPA has determined that inducing a sweeping flow sufficient to ensure the performance of the technology is available in the Broad Canal and would be required with deployment of an aquatic filter barrier at this location. See Responses to Comments 4.17 and 4.25.

Comment 4.42.3
The SOB notes that the effectiveness of an aquatic filter barrier would depend on its ability to return impinged organisms to the water while on the very same page indicating that shad eggs did not adhere to the aquatic filter barrier fabric used at the Lovett Station. SOB at p. 33. Given that the only data the SOB relies on with respect to impingement on an aquatic filter barrier found that eggs did not become impinged, it is unclear why the SOB then assumes that impingement of eggs and very small larvae on an aquatic filter barrier would constitute a problem that would require use of the unproven and uncertain "gentle release" design standard.

The SOB also recognizes that the reports from Lovett indicate that aquatic filter barriers pose a "low risk for impingement mortality of eggs and larvae," and even cites scientific literature as support for that statement. SOB at p. 33. But then the SOB seems to disavow that finding by claiming that EPA New England "has not independently evaluated the effectiveness of this technology…." SOB at p. 33. In issuing the Final Permit Modification, however, the Agencies cannot disavow reports and scientific literature by simply stating that they have not conducted an independent evaluation because that is precisely their obligation in setting § 316(b) requirements -- to evaluate each technology using the reasonably available data.

Response to Comment 4.42.3
The "gentle release" requirement has been removed from the Final Permit Modification. See Response to Comment 4.24.1.

The SOB's statement that "EPA has not independently evaluated the effectiveness of this technology" was not intended to cast doubt upon it, but only to avoid creating the mistaken impression that EPA had reviewed the study and was able to confirm its conclusions. Much of the scientific data on the performance of the aquatic filter barrier has been conducted for and by industry professionals, and in some cases the data are not publicly available. In this case, EPA meant only that the data in question has not been reviewed by EPA scientists because the data had not been made available to EPA beyond the review presented in Raffenburg et al. (AR 767). This statement was not meant to suggest that the results were fraudulent or questionable. Since the issuance of the Draft Permit Modification, the results of one impingement mortality study has been made available to EPA and confirms that survival of blueback herring eggs after exposure to the G-weave fabric of the Gunderboom MLES is very high (between 80% and 100%) (AR 740). However, even if impingement mortality of eggs on an aquatic filter barrier is low, a sweeping velocity must be available to move eggs and larvae away from the technology. Without a sweeping flow, released eggs and larvae would become re-impinged, and would suffer eventual mortality due to predation or starvation as densities of ichthyoplankton increase.

Comment 4.42.4
The SOB recognized that biofouling could result in decreased performance and damage to an aquatic filter barrier. SOB at p. 33-34. But despite this recognition, the SOB did not evaluate what the risks of biofouling would be for an aquatic filter barrier located in the Lower Basin, despite the fact that the SOB recognized several factors (e.g., nutrient rich waters, stagnant conditions) that contribute to biofouling.

Response to Comment 4.42.4
EPA has modified the Final Permit Modification to require that the aquatic organism exclusion technology be located in the Broad Canal, not in the Lower Basin. See Response to Comment 4.12. Consequently, the risks of biofouling for an aquatic filter barrier located in the Lower Basin are irrelevant.

More generally, the record does not suggest that biofouling would render an aquatic filter barrier unavailable as a technology. No data on biofouling was submitted with Mirant's pilot test of a barrier net system. However, during long-term deployment of a

Gunderboom MLES aquatic filter barrier in the Hudson River, the airburst system and frequent monitoring was sufficient to minimize fouling (Attatchment A, AR 691).

Comment 4.42.5
The SOB concludes that operation of an aquatic filter barrier would not impose any energy penalties on Kendall Station. This is incorrect. Operation of the aquatic filter barrier's air-burst system would impose an ongoing energy penalty on Kendall Station.

Response to Comment 4.42.5
EPA acknowledges that operation of an aquatic filter barrier may impose a small energy penalty. However, at a 256-megawatt facility, the energy required to operate the air-burst system will be a minuscule fraction of generation. Other plants, such as Lovett Generating Station and Taunton Desalinization Plant (which is much smaller than Kendall Station) have been capable of enduring this penalty, and EPA sees no reason why Kendall Station could not. See also Response to Comment 4.24.7.

Comment 4.42.6
Mirant Kendall concurs with the SOB's conclusion that noise mitigation would not be necessary for an aquatic filter barrier.

Response to Comment 4.42.6
EPA concurs.

Comment 4.43
The SOB states that wedgewire screens could constitute BTA at Kendall Station. But in addition to the reasons stated in the comments above, the following factors were not properly evaluated in the SOB as part of the BTA analysis of wedgewire screens.

Response to Comment 4.43
This comment is generic and largely prefatory to more specific comments pertaining to specific technologies. EPA has responded to the more specific comments below.

Comment 4.43.1
As discussed above, wedgewire screens in the Lower Basin are not available for several reasons. But many of these reasons also warrant against deployment of wedgewire screens in the Broad Canal. Specifically, the following factors -- central to any analysis of availability – were not thoroughly assessed in the SOB and warrant against wedgewire screens being deemed available:

- Construction/engineering difficulties: the infrastructure changes to the current intakes (and possibly the historic seawall) poses sufficiently difficult construction and engineering difficulties, including substantial in-water construction around what will at that point be an existing public walkway. Moreover, inducing a flow past the wedgewire screens will require a fish return system of a greater magnitude than the one that would be required by the fine-mesh traveling screens. In this sense, the construction and engineering of wedgewire screens in the Broad

Canal are equivalent to or exceed those posed by the type of fine-mesh traveling screens originally contemplated by and deemed to be unavailable in the SOB.

- Energy penalty: operation of the wedgewire screen's air-burst feature will impose an energy penalty on Kendall Station that the SOB did not consider.
- Costs are wholly disproportionate to benefits: the installation and operation of wedgewire screens involves significant capital, operation and maintenance, and energy penalty costs. Given what will be the limited, if any, benefit to AEI (based on the low magnitude of Kendall Station's current impact as described in the above comments), these costs are wholly disproportionate to the benefits.
- Not cost-effective: Mirant Kendall's BTA Proposal is expected to result in an equivalent minimization of IM/E as a wedgewire screen is predicted as having. This fact, combined with the much greater costs of wedgewire screens, would make wedgewire screens unavailable under a cost-effectiveness analysis.

Response to Comment 4.43.1

Construction and engineering aspects

1. EPA did consider the construction and engineering challenges associated with implementing wedgewire screens at Kendall Station and determined that they were not insurmountable and thus not a reason for their elimination as BTA. See SOB at 41-42. Mirant's comment notes that construction and engineering of wedgewire screens could be *difficult*, but does not provide any further information that would support a finding that these challenges render wedgewire screens *unavailable* at Kendall Station. *See* Response to Comment 2.17 part 1.

2. The proposed public walkway may offer both challenges and opportunities. That is, it may complicate construction, but it also offers infrastructure for a fish bypass system in connection with a fish-friendly pump to induce flow. See Response to Comment 4.9 and 4.10.5. On balance, EPA does not find that it renders wedgewire screens unavailable at Kendall Station.

3. Construction and engineering difficulties were not the primary reason fine-mesh traveling screens were eliminated from further consideration as BTA in either the SOB or in this Response to Comments. See Response to Comment 4.7.

Energy penalty. The energy penalty associated with the operation of the wedgewire screen's airburst system is minimal, has been borne by smaller plants, and would not impact operations at the facility. See Response to Comment 4.24.7; cf. Response to Comment 4.42.5.

Cost-benefit analysis. Under currently applicable law, Section 316(b) does not permit cost-benefit analysis. *See* SOB at 15-16, Response to Comment 2.12.

Cost-effectiveness analysis. EPA is not required in this instance to conduct a cost-effectiveness analysis. See Responses to Comments 2.7.7, 2.20. Ultimately, the permittee will choose which technology to implement and can base this decision on any factor, including cost-effectiveness.

Comment 4.43.2
Mirant Kendall provided comments above indicating why deployment of wedgewire screens in the Lower Basin would not likely minimize any AEI. Locating wedgewire screens in the Broad Canal, instead, also would not minimize any AEI.

As Mirant Kendall commented previously, operation of the wedgewire screens' backwash function can cause a violent and dangerous agitation of the surface waters. This could pose a danger with the increased canoe and kayak traffic expected in the Broad Canal. The SOB does not assess whether sufficient measures could be taken to eliminate this risk. The SOB also does not assess whether the increased currents around the Broad Canal due to the induced flows would be problematic to navigation.

The SOB continually recognizes that effectiveness of wedgewire screens depends on an adequate ambient current. Specifically, the SOB states that "wedgewire screens reduce entrainment and impingement both through physical exclusion and hydrodynamics by using the flushing action of currents present in the source waterbody," SOB at p. 34, and notes how "a sufficient ambient current must be present in the waterbody to aid organisms in bypassing the structure, and how Alden "suggest that higher channel velocities and low through-slot velocities would result in the highest rate of protection." SOB at p. 34. The SOB goes on to state that "the lack of a sufficient, naturally occurring sweeping current could contraindicate the application of this technology…." SOB at p. 41.

But despite all of these findings, and despite the fact that the SOB recognizes the very low ambient flows in the Broad Canal and Lower Basin, the SOB still maintains that wedgewire screens could constitute BTA at Kendall Station. SOB at p. 34. Presumably, this conclusion is premised on EPA New England's belief that it would be possible to create an induced flow past multiple wedgewire screens that would supplant the ambient flows necessary for effective operation. But there are several problems with this assumption.

First, inducing such a flow would be entirely experimental as Mirant Kendall is not aware of it being done anywhere. Second, even if it were possible and did not have any of the likely adverse impacts described in other comments above, there is still nothing in the record supporting the conclusion that wedgewire screens would be effective in an artificial flow environment, especially when that induced flow would double the amount of debris and organisms that would encounter the wedgewire screens. Finally, the SOB itself admitted that an induced flow could only "potentially" allow for the successful operation of wedgewire screens. SOB at p. 41. Given that the SOB itself did not definitively conclude that a sweeping flow could be induced to simulate the natural flow required for successful operation, wedgewire screens cannot be considered available.

Response to Comment 4.43.2
EPA disagrees with Mirant's argument that deployment of wedgewire screens would not minimize AEI in the Broad Canal.

Navigational issues. Wedgewire screens would be isolated from recreational boaters by the barrier wall constructed for the induced flow system. As such, boaters will not be impacted by the backflush system. According to the estimates provided by SAIC, the induced flow system could be designed to minimize the resulting increase to the inlet velocity at the entrance to the Broad Canal (AR 738). One estimate results in an average estimated inlet velocity of 0.15 fps (an increase of 0.05 fps), which is unlikely to become problematic to navigation.

Induced flow. EPA has determined that a sweeping flow and fish bypass is available for the Broad Canal, and will provide sufficient ambient current to ensure the screens perform effectively. First, as explained above, although Kendall Station's system would be an innovative application, the induced flow technology itself is mature. See Response to Comment 4.25.3. Second, EPA is unaware of (and neither the record, nor Mirant's comment, contains) any evidence suggesting that wedgewire screens would function less effectively in an artificial flow environment than in a natural flow environment. Third, even if the volume of debris and organisms were doubled from present levels, EPA is unaware of (and neither the record, nor Mirant's comment, contains) any evidence suggesting that these higher flow levels would impact the performance of the wedgewire screens. Wedgewire screens have been deployed at other locations with similar or even greater loads and intake volumes than would apply at Kendall Station, in the Hudson, Delaware, and Kansas Rivers, and on Lake Michigan (AR 748). The wedgewire screens at Oyster Creek Nuclear Station in New Jersey functioned well with respect to removal of debris by air backflushing even with high debris loads in spring and summer (AR 748 p. 5-12). Finally, regarding "potentially" as compared to "definitively," see Responses to Comments 2.1 part 4, and 2.17.

Comment 4.43.3
The SOB observes that wedgewire screens have only been used at "smaller-capacity facilities or in conjunction with a closed-cycle cooling system." SOB at p. 34. Absent an evaluation of whether such technology could be consistent with Kendall Station's operations, the SOB cannot conclude that wedgewire screens are available at Kendall Station. Specifically, the Technical Development Document recognized that wedgewire screens may not be available at larger-capacity facilities because insufficient space may exist on the waterbody floor to accommodate the greater number of screens that would be required while at the same time minimizing any interference with navigation or other uses of the waterbody. It went on to state that "[c]onsideration of the impacts in terms of space and placement must be evaluated before selecting wedgewire screens for deployment." Technical Development Document at p. 4-12.

Given the large number of screens that would need to be deployed in the Broad Canal to accommodate Kendall Station's intake, and given that the soon-to-be-built public walkway will limit the available space, and given the increased recreational uses of the Broad Canal, it is likely that a consideration of space and placement would preclude wedgewire screens as BTA at Kendall Station.

Response to Comment 4.43.3
The SOB does indicate that "many of the current installations have been at smaller-capacity facilities or in conjunction with a closed-cycle cooling system." SOB at p. 34. However, EPRI (AR 748) summarizes the installation of wedgewire screens at many facilities with much larger intake volumes than Kendall Station, including Eddystone Station (633 MGD) and J.H. Campbell Station (489 MGD), as well as facilities of similar intake volumes, including Jeffrey Energy Center (71 MGD) and Charles Point Recovery Facility (60 MGD). Even with the limited space available in the Broad Canal, EPA believes that wedgewire screens, especially smaller cone-shaped screens, could be BTA for Kendall Station. For example, Intake Screens, Inc, manufactures a cone-shaped wedgewire with 0.5 mm slot size and a through-slot velocity of no greater than 0.5 fps that measures 12 feet in diameter and is less than 4 feet high. This model has a maximum flow rate of 32.7 cfs (AR 759). This model is uniquely suited for shallow environments and may be configured to fit within the space limitations of the Broad Canal.

Comment 4.43.4
Construction of wedgewire screens would take approximately six months. During construction, each of Kendall Station's intakes would have to be disabled for approximately eight weeks. While recognizing generally that construction could impact operations, SOB at p. 37, the SOB did not sufficiently assess and weigh this factor in making its BTA determination.

Response to Comment 4.43.4
Mirant suggests that each intake (3 in total) would require a six month shutdown during construction of wedgewire screens. Presumably, if one intake is shutdown at a time, the facility would experience a 24-week period during which plant capacity would be a two-thirds of total capacity. At a permitted capacity of 80 MGD, the plant capacity during the six month construction period would be approximately 53.3 MGD. Based on an actual intake flow of 58 to 70 MGD (from 2006 and 2007 daily plant intake flow data, AR 760), this would result in decrease of approximately 7 to 23 percent. Depending on how the plant timed construction, the reduction in flow could be even lower. Therefore, EPA believes that reduced operations during construction could be accommodated without substantially impacting the facility's ability to generate power for that particular year.

Comment 4.44
The SOB states that Filtrex could constitute BTA at Kendall Station. In addition to the reasons stated in the comments above, the following factors should have been more thoroughly with respect to Filtrex.

Response to Comment 4.44
As explained above, EPA has reconsidered its initial location determination and now agrees with Mirant that a location of the exclusion technology within the Broad Canal represents BTA for this facility at this time. As designed, the full-scale deployment of 30 modules at Taunton River Water Supply will be supported by a 20-foot by 36-foot dock (Epsilon 2006 p. 6, AR 679). With a similar configuration, a deployment of 115 modules at Kendall Station (the estimated number of units necessary to overcome head loss,

Exhibit 12, AR 736), could require as much as, if not more than, four times the area at Taunton. This amount of surface area may not be available within the Broad Canal in conjunction with an induced flow system and with the existing infrastructure and new public walkway, while still allowing sufficient room for navigation of recreational boats. This deployment would be the largest installation of Filtrex to date. Other available technologies are primarily subsurface. While these may require substantial space, a subsurface installation can take advantage of the entire depth of the Canal to increase available surface area, while Filtrex, as currently proposed for the Taunton River, is primarily a surface design. Therefore, based on currently available aquatic filtration system technology and design configurations, an aquatic filtration system such as Filtrex is not "available" at Kendall Station at this time.

That conclusion does not foreclose the possibility that an alternative configuration of an aquatic filtration system might become "available" for installation in the Broad Canal in the future. If future advancements reduce the number of units compatible with space limitations in the Broad Canal, an aquatic filtration system in the Broad Canal could reflect BTA. Moreover, the Final Permit Modification does not prohibit use of such a system, if one becomes available and Mirant elects to use it.

Because EPA has reached this conclusion, it is not necessary to provide detailed responses to comments 4.44.1-4.44.5. EPA has responded briefly to those comments to the extent appropriate.

Comment 4.44.1
In this comment, Mirant provides numerous other reasons why, in its view, Filtrex is unavailable, including: Filtrex has never been deployed as part of a CWIS at any power plant, let alone a power plant with Kendall Station's intake; Filtrex is an emerging technology that is undergoing field deployment and testing on a smaller scale; construction/engineering difficulties; unacceptable head loss unless at least 115 Filtrex modules were installed; possible lack of available space; energy penalty from operation of Filtrex's backwash feature; costs that are "wholly disproportionate to the benefits"; and not being cost-effective.

Response to Comment 4.44.1
As explained above, an aquatic filtration system is not available at Kendall Station at this time. See Response to Comment 4.44. Therefore, no response is necessary to Mirant's additional arguments why an aquatic filtration system would not reflect BTA.

Comment 4.44.2
Mirant argues that, since Filtrex has never been deployed in the § 316(b) setting, EPA must conduct an even more thorough and searching analysis than it otherwise would have to with established technologies, and that absent such an analysis, EPA cannot rationally conclude that an experimental technology with no track record of success could constitute BTA at Kendall Station.

Response to Comment 4.44.2

As explained above, an aquatic filtration system is not available at Kendall Station at this time. See Response to Comment 4.44. Therefore, no response is necessary to Mirant's additional arguments why an aquatic filtration system would not reflect BTA. That said, EPA does not agree with the arguments stated in the comment. See Responses to Comments 2.1 part 4 and 2.17.

Comment 4.44.3
It is very possible that installation of Filtrex would result in an unacceptable level of head loss at Kendall Station's intake pumps. MK Modification Comment Exhibit No. 12. This head loss could significantly impair Kendall Station's operations, and is an effect that was not considered in the SOB. Unless it can be determined that Filtrex will not have this type of crippling impact on Kendall Station's ability to operate, Filtrex cannot be considered BTA at Kendall Station.

Response to Comment 4.44.3
EPA agrees with the comment, based on the aquatic filtration system technology available at this time. In the Final Permit Modification, EPA requires the exclusion technology to be located within the Broad Canal. See Response to Comment 4.12. EPA agrees that, in the proposed configuration and with the estimated number of units necessary to overcome head loss at Kendall Station, an aquatic filter system is not BTA because the required space within the Broad Canal is not available at this time. See Response to Comment 4.44.

Comment 4.44.4
Construction of Filtrex would take approximately six months. During construction, Alden has estimated that each of Kendall Station's intakes would have to be disabled for approximately eight weeks. While recognizing generally that construction could impact operations, SOB at p. 37, the SOB did not sufficiently assess and weigh this factor in making its BTA determination.

Response to Comment 4.44.4
As explained above, an aquatic filtration system is not available at Kendall Station at this time. See Response to Comment 4.44. Therefore, no response is necessary to Mirant's additional arguments why an aquatic filtration system would not reflect BTA. See also Response to Comment 4.43.4 (temporary shutdowns).

Comment 4.44.5
As set forth in MK Modification Comments Exhibit No. 12, the planned deployment of Filtrex in the Taunton River does not provide any basis for determining that Filtrex could constitute BTA at Kendall Station. Among other things, the intake flow at Kendall Station is much greater, and much more space would be required to install the Filtrex at Kendall Station. Furthermore, debris will be swept away from the Filtrex in the Taunton River because the Taunton River has much higher ambient currents (influenced by the tides) than the Broad Canal. Moreover, the importance of having such a sweeping current is underscored by the fact that the Filtrex installation in the Taunton River will only be

operated during portions of the tidal cycle when there are sufficient sweeping currents. Finally, Kendall Station may face greater problems associated with head loss.

Response to Comment 4.44.5
As explained above, an aquatic filtration system is not available at Kendall Station at this time. See Response to Comment 4.44. Therefore, no response is necessary to Mirant's additional arguments why an aquatic filtration system would not reflect BTA. That said, EPA does not agree that the facts that (1) an aquatic filtration system at Kendall Station would be far larger than that proposed for the Taunton River Desalinization Plant (primarily due to a larger intake capacity), (2) that the technology is emerging, and (3) application to a large power plant such as Kendall would take innovation, would necessarily prevent an aquatic filtration system from reflecting BTA, if available space were not an issue. *See* Response to Comment 2.1 part 4.

Comment 4.45
As discussed in the comments above, Mirant Kendall has accepted the Agencies' invitation, see SOB at pp. 6, 48, to develop and submit a proposal for a CWIS technology that it believes could reflect BTA for Kendall Station if additional impingement reductions become necessary. Because of the experimental nature of the technology proposed (which is the same as all of the other technologies identified as potentially available in the BTA), pilot testing is a necessary component of this BTA Proposal in order to ensure that the technology is capable of being deployed successfully in the Broad Canal.

Mirant Kendall's BTA Proposal, developed in conjunction with Alden, is set forth fully in the attached exhibit entitled "Kendall Station Best Technology Available Proposal -- Installation and Operation of a Barrier Net System." MK Modification Comments Exhibit No. 13. Mirant Kendall hereby incorporates that exhibit into this comment, and requests that the Agencies respond to that proposal as if it were a stand-alone comment.

In developing its BTA Proposal, Mirant Kendall has sought to address the primary concerns articulated by the SOB, as described below:

Reduction in entrainment: In order to minimize environmental impacts due to entrainment, Mirant Kendall's BTA Proposal relies on the seasonal deployment of a fine-mesh barrier net with a sufficiently small mesh-size (to be determined upon review of the pilot testing) to exclude eggs and very small larvae from Kendall Station's intakes.

Reduction in impingement: In order to minimize environmental impacts due to impingement, the barrier net will be designed to have a less then 0.1 fps approach velocity and a less than 0.5 fps through-mesh velocity that will reduce impingement.

Mirant Kendall's BTA Proposal offers additional benefits over the other CWIS technologies contemplated by the SOB, including:

- Lower risk for adverse water quality impacts compared with options that would withdraw or otherwise disturb bottom waters high in nutrients and salinity and low in dissolved oxygen;
- Preservation of a larger portion of the Broad Canal habitat than other potential technologies, such as an aquatic filter barrier;
- Integration into soon-to-be constructed public walkway would minimize any adverse aesthetic impacts, and any impacts to navigation, recreation and safety;
- Obtaining all necessary permits would be more certain when compared with other options; and
- Depending on the results of the pilot study, would not be a cost-prohibitive technology, either under the wholly disproportionate standard, or a cost-effectiveness analysis.

Response to Comment 4.45
EPA has reviewed Mirant's BTA proposal, contained in Exhibit 13 ("Kendall Station Best Technology Available Proposal - Installation and Operation of a Barrier Net System, AR 736) to Mirant's comments. EPA appreciates Mirant's effort in developing this proposal.

At a high level of generality, EPA concurs that a fine-mesh barrier net system can reflect BTA at Kendall Station. *See* SOB at 32, 43. Mirant's BTA proposal includes many positive features, such as a through screen velocity less than 0.5 fps (and design approach velocity less than 0.1 fps), an automated air cleaning system, off-season use of coarse-mesh (1/4") barrier net panels, and a backup plan to rotate the existing traveling water screens once per shift and remove any impinged fish found on the screens. Moreover, several of the requirements of the *Draft* Permit Modification with which Mirant's BTA proposal did not necessarily comply (e.g., gentle removal) have since been replaced in the Final Permit Modification.

However, Mirant's BTA proposal includes several elements that, in EPA's final analysis, do not reflect BTA. Principally, these are mesh size potentially as high as 1.0 mm, and absence of a sweeping flow system. See Responses to Comments 4.25, 4.28. Consequently, while many elements of Mirant's proposal reflect BTA, the proposal as a whole does not. Further information is provided in the responses to individual detailed comments.

Comment 4.46
As discussed above, Mirant Kendall's BTA Proposal includes a component for pilot testing. But regardless of whatever technology the Final Permit Modification ultimately selects, Mirant Kendall submits that the Final Permit Modification should contain an express provision for the reasonable pilot testing of that technology.

Pilot testing is appropriate here for two significant reasons. First, the technologies proposed by the Draft Permit Modification and Mirant Kendall's BTA Proposal represent technologies that are innovative and experimental. None of them are in wide-spread use, and all of them are still emerging. The SOB frequently recognized this fact. Moreover, the existing deployments of these technologies offer little in the way of guidance for anticipating how they would perform at Kendall Station. Given this level of uncertainty, pilot testing is in the Agencies' interests in order to ensure that whatever technology is installed is effective at reducing impingement and entrainment without causing other more serious adverse impacts, which most if not all of the potential technologies identified by the SOB as being potentially available have the potential to do. Absent pilot testing, there is no guarantee that any technology (even one meeting all of the Draft Permit Modification's design standards) will actually perform effectively in the Lower Basin given the almost stagnant and highly stratified waters, among other unique site-specific factors.

Second, whatever CWIS technology is installed will require millions of dollars in capital expenditures and will result in a permanent change to the Broad Canal's infrastructure. Requiring such a commitment -- especially when the infrastructure changes will be to an area of increasing recreational use --without any idea as to whether the technology will perform is not rational.

Response to Comment 4.46
Mirant requests that the Final Permit Modification include an express provision for pilot testing. Although Mirant does not say so in this comment, one might presume that the provision that Mirant requests would include development of a pilot study plan, *in situ* testing, a report to be submitted by Mirant, subsequent discussions, and presumably a contingency for EPA to alter or relax permit requirements based on the results of the study. *Cf.* Mirant Ex. 13, at 7.

It is worth noting, in this context, that the 2006 Final Permit contained a plan review process under which the permittee would submit plan for MassDEP's review and approval. *See* 2006 Final Permit, at 14. These conditions were included as conditions of state certification. *See id.* at 13; 2006 Response to Comments, Response to Comment H1, at H17; Water Quality Certification for NPDES Permit MA 0004898 (Mirant Kendall Station, Cambridge, MA) (Sept. 13, 2006), at 14.

EPA has declined to include pilot testing in the Final Permit Modification, for two reasons.

First, as a matter of law, NPDES permits cannot contain compliance schedules for technology-based section 316(b) requirements. *See* Response to Comment 2.27. A pilot testing process provided in the permit itself would, in essence, involve a compliance schedule by which the permit would essentially exempt the permittee from complying with the substantive requirements of section 316(b) for part of that time. *See, e.g.,* Mirant Comments, Ex. 13, at 7 (first 7 months, and, after *in situ* tests, more than one year, apparently involve no CWIS technology other than existing).

Second, the environmental circumstances, and history and expected future of this permitting process, militate against delay. Mirant submitted its initial NPDES permit renewal application to EPA over seven years ago. Although EPA issued a Final Permit to

Mirant in 2006, that permit never took effect because of the subsequent petitions for review. After this Final Permit Modification issues, the appeal (currently stayed) will resume, not only for the section 316(b) conditions in this Final Permit Modification, but also for the remainder of the 2006 Final Permit. The appeal process could take years, during which more spawning seasons may pass in the Charles River. Although information can be gained through pilot studies, even the most ambitious testing schedule could delay BTA implementation for an additional year or more.[5]

If Mirant is unable to comply immediately with the Final Permit Modification's Section 316(b) requirements upon their effective date and EPA determines that an administrative compliance order is appropriate, and EPA also determines that pilot testing is an appropriate element of a compliance schedule with respect to any aspect of the Final Permit Modification's requirements, such could be arranged through the administrative compliance order.

Comment 4.47
For the reasons advanced in these comments, the Agencies should determine that the impacts of impingement and entrainment at Kendall Station are de minimis and do not warrant modifications to the existing CWIS. If the Agencies determine to the contrary, however, in exercising their best professional judgment and considering all of the cost issues, non-water environmental impacts, constructability issues, and other factors as required under CWA § 316(b) and state law, the Agencies should determine that BTA for the Kendall Station consists of one of the following two options:

- Installation of fine-mesh traveling screens within the existing three or four bays in the Broad Canal, with a fish return system constructed along the public walkway to be installed by Mirant Kendall; or

- Installation of the fine-mesh barrier net system as proposed in Mirant Kendall's BTA Proposal.

Neither of those installations should occur until after the completion of appropriate pilot tests to select the most effective designs under a reasonable schedule set out in the Final Permit Modification.

Response to Comment 4.47
See generally Responses to Comments in Section 3 and specifically Response to Comment 3.1 and 3.4 (non-de minimis nature of impingement and entrainment at Kendall Station); Responses to Comments 4.7, 4.10, and 4.11 (fine mesh traveling screens); Response to Comment 4.45 (Mirant's BTA proposal); 4.46 (pilot testing).

[5] Of course, if Mirant does decide to seek review of the conditions of the Final Permit Modification, nothing prevents Mirant from voluntarily conducting a pilot study while the appeal is pending. As part of its initial permit renewal application, Mirant voluntarily performed and reported on a three month pilot study conducted in 2000, using a prototype of the barrier net it proposed. A voluntary pilot study performed with complete knowledge of the applicable permit requirements would be even more useful.

The requirements of the Final Permit Modification are stated at Part I.A.11 and summarized below.

As explained in the SOB and in this Response to Comments, EPA has determined that BTA at Kendall Station can be achieved by any technology that fulfills the requirements included in Part I.A.11 of the Final Permit Modification. Specifically, the permittee must install an exclusion technology in the Broad Canal that minimizes entrainment with an opening size of 0.5 mm or less, a through-media velocity of 0.5 fps or less, and a debris removal system. In addition, the permittee must incorporate with any exclusion technology an induced flow system to transport ichthyoplankton and other small aquatic organisms out of the Broad Canal. Several technologies are capable of fulfilling these requirements, including a fine mesh barrier net, aquatic filter barrier, and wedgewire screen, in concert with an induced flow system such as that proposed in the SAIC report. However, the permittee is authorized to install any system that meets the design and operational standards specified in Part I.A.11.a of the Final Permit Modification.

Additionally, if the exclusion technology will be deployed seasonally, the permittee must provide year-round protection from impingement mortality by installing a coarse mesh barrier net. No induced flow system is required with a coarse mesh net. Finally, if both the exclusion technology (if seasonal) and coarse-mesh barrier net are not operating, the permittee must operate the existing traveling screens as described in Part I.A.11.c of the Final Permit Modification.

5. COMMENTS ON MONITORING

General Comment 5.0
[Section 5 of Mirant's comments begins with an un-numbered introductory paragraph. EPA has styled this as General Comment 5.0.]

The Draft Permit Modification proposes an overly broad and unsupportable array of biological monitoring and reporting requirements. Mirant Kendall acknowledges that the Agencies wield considerable discretion to impose monitoring requirements as part of their permitting process. But that discretion should not be confused with absolute authority. Any monitoring requirements must be reasonably related to the performance of the selected exclusion technology. Further, any monitoring should avoid greater harm to the environment than the activity being monitored, should have a clear relationship to compliance, and should be feasible. As the comments below point out, some of the biological monitoring and reporting requirements proposed in the Draft Permit Modification are unreasonably onerous, unrelated to performance requirements imposed by the Draft Permit Modification, or infeasible with any known techniques. Mirant Kendall acknowledges that it made similar comments on the Draft Permit and sought review of the 2006 Final Permit partly on this basis. None of the changes proposed by the Agencies in the Draft Permit Modification help justify its unreasonable monitoring requirements, and some worsen them.

General Response 5.0
This comment is entirely prefatory of the specific comments that follow. EPA's responses are contained therein. In particular, see the following:

- Relationship between monitoring requirements and determining performance and/or permit compliance of exclusion technology: Response to Comment 5.1.
- Feasibility and extent of burden of monitoring requirements: Responses to Comments 5.5-5.11.
- Harm to environment of monitoring vs. activity being monitored: Responses to Comments 5.3, 5.12.

Comment 5.1
The biological monitoring and reporting proposed in the Draft Permit Modification are so extensive that they exceed the limits of the Clean Water Act and its implementing regulations. While Mirant Kendall recognizes that the regulations 40 C.F.R. § 122.44(i) and 40 C.F.R. § 122.48 might authorize imposition of biological monitoring requirements in a NPDES permit, neither the Act nor the regulations supports monitoring and sampling as conceived by the Agencies. That is because § 122.48 makes clear that monitoring requirements must relate to the regulated activity, in this case implementation of best technology available to minimize the adverse environmental impact (AEI) from impingement mortality and entrainment (IM/E).

Once an exclusion technology is selected and implemented, Kendall Station's monitoring obligations should be limited to ensuring the technology's proper performance. Yet, the Agencies propose monitoring and sampling requirements that have nothing to do with the regulated activity. For example, the requirement that Mirant Kendall determine the sex and reproductive condition of impinged fish is not related to the technology's proper performance. See Part I.A.14.d.9(a)(iii). In the final Permit Modification, the Agencies should reduce the monitoring requirements to only those measures required to ensure that the technology continues to operate properly.

Response to Comment 5.1
1. Framework
There are several bases for the entrainment and impingement monitoring provisions in the Final Permit Modification. These independent bases include (a) the need to assess cumulative adverse environmental impacts, in part to support future permit determinations, 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 Final Permit Modification, it is appropriate to set monitoring requirements for entrainment and impingement, especially given the design standards of the impingement mortality and entrainment (IM/E) reduction technology and the seasonal and year to year IM/E variability documented in the lower Basin.

These monitoring requirements are also authorized by CWA §§ 402(a) and 308(a). Under section 402 of the Clean Water Act, EPA "shall prescribe conditions for [NPDES] permits to assure compliance with the requirements of [section 402(a)(1)], including conditions on data and information collection, reporting, and such other requirements as [it] deems appropriate." CWA § 402(a)(2), 33 U.S.C. § 1342(a)(2). Similarly, "[w]henever required to carry out the objective of [the Clean Water] Act . . . the Administrator shall require the owner or operator of any point source to . . . install, use, and maintain such monitoring equipment or methods (including where appropriate, biological monitoring methods), . . . and . . . provide such other information as he may reasonably require." CWA § 308(a)(A), 33 U.S.C. § 1318(a)(A). Permits must specify "[a]pplicable reporting requirements based upon the *impact* of the regulated activity." 40 C.F.R. § 122.48(c) (emphasis added). Permits also must contain "[r]equirements concerning the proper use . . . of monitoring . . . methods (including biological monitoring methods when appropriate)." *Id.* § 122.48(a).

EPA also notes that another Mirant comment objected that EPA "did not assess what level of AEI from IM/E at Kendall Station's CWIS . . . would exist post the proposed modifications." *See* Comment 2.7. But in Comment 5.1, Mirant objects to permit requirements that are designed, in part, to assess what level of AEI from IM/E at Kendall Station's CWIS will exist post those very modifications. If it is important (as Mirant argues in Comment 2.7) to attempt to *forecast* AEI after implementation of a CWIS technology, it is difficult to understand why it would not be even more important to actually *measure* AEI after implementation of that same CWIS technology. In this case, as in many permits, EPA has focused on the latter.

Finally, EPA notes that after adequate data is collected and assessed, it may be possible to reduce these data collection requirements in the future. *See* Response to Comment 5.4.

2. Example presented
Mirant states that "…the Agencies propose monitoring and sampling requirements that have nothing to do with the regulated activity." However, in this comment, Mirant gives only one example: that Mirant Kendall must determine the sex and reproductive condition of impinged fish.

EPA does not agree with Mirant's contention that this requirement is unnecessary or inappropriate. First, information about the reproductive condition and the sex of impinged fish is necessary to compare current data with historical impingement data collected by Mirant. For example, Mirant maintains that during at least two historical impingement mortality events at MKS (June 11 and 12, 2000; June 10 and 13, 2002), the impinged river herring were likely in a weakened post-spawning condition. *See* Mirant Comment 3.1.2. By including this information in its comment, Mirant implicitly acknowledges that condition and reproductive stage are valuable parts of the assessment used to determine the impact this mortality had on spawning activity that year. It is unclear whether Mirant determined the reproductive stage and physical condition of these fish through a direct observation recorded on a field sheet or just through a circumstantial association with the time period the fish were killed. As part of the permit requirement going forward, regulators will have greater confidence when evaluating descriptions of the reproductive condition of impinged fish (i.e. post-spawning condition), because this information will come from a direct observation required by the permit.

Second, it is biologically important to know whether, for example, an impingement mortality event involving 300 river herring was comprised mostly of mature adult females that were about to spawn, or was mostly represented by male river herring that were in a weakened condition because they had just spawned. The difference between these two scenarios is very meaningful to the impact of the impingement event on the lower Basin. Removing mature females from the system before they have an opportunity to spawn is of more concern than the removal of males that have already spawned that year. This information will be directly related to the extent to which, both qualitatively and quantitatively, the primary exclusion technology (and, when applicable, the secondary BTA) are minimizing adverse environmental impacts when they are functioning properly.

While EPA believes this data collection is necessary, it must also be pointed out that the information collection requirement will only apply on rare occasions. Fish will only be impinged on the traveling screens of the CWISs and be subject to collection when *neither* the primary BTA (exclusion technology) *nor* the secondary BTA (coarse-mesh barrier net) is deployed and functioning properly. The operation of the traveling screens and the attempt to promote survival of impinged organisms is described as a final protective measure. It is not expected to be in use very often. However, when the traveling screens must be used, data regarding any fish impinged will provide valuable information on the number, type and condition of fish that the primary and secondary BTA could have prevented from being impinged if they had been operational. This is a reasonable measure of performance of the technology.

When this activity is required, the Final Permit Modification notes that, after every rotation, material collected must be inspected for live fish, either by plant personnel or another method, in a manner that maximizes the survival of impinged fish, and that all live adult and juvenile fish collected or trapped on the traveling screens be returned to the receiving water as soon as practicable and in a manner and location that maximizes their survival and prevents their re-impingement on the intake screens. *See* Part I.A.11.c.

Therefore, unless Mirant voluntarily installs automated fish return systems at the traveling screens, an agent for Mirant will already have to come in close contact with each impinged fish. The several stages of reproductive condition are relatively straightforward to recognize, and it is not strictly necessary to have a biologist on site to make those determinations. *See* Response to Comment 5.9. If the fish are in a spawning or sometimes even a post spawning condition, a gentle abdominal squeeze will often reveal whether the fish is male (expression of white milt) or female (expression of yellowish roe). Since the intent is not to sacrifice these fish to determine their sex, during times of the year other than spawning, sex may not be possible to determine for all species. That is why the Final Permit Modification requires the permittee to determine the sex and reproductive condition of the impinged fish "if possible." *See* Final Permit Modification Part I.A.14.d.9.a.

The above should not be taken to mean that EPA has required this information solely because it will only happen infrequently, or because the information is relatively simple to collect (although those facts certainly support its reasonableness). As stated above, this basic biological monitoring requirement will provide necessary information to evaluate the adverse impact of impingement mortality and the effectiveness of BTA technology at Kendall Station.

Comment 5.2
As Mirant Kendall describes elsewhere in these comments, a pilot study of the selected exclusion technology must be performed prior to its full-scale implementation. The Draft Permit Modification would require Mirant Kendall to comply with all of the proposed biological monitoring and reporting requirements within roughly two or three months of the effective date of the permit. The final Permit Modification should provide that any program of biological monitoring and reporting should be sequenced to account for the pilot study and installation of the modifications to the CWIS.

Response to Comment 5.2
EPA has not revised the Final Permit Modification to allow for pilot studies. See Response to Comment 4.46.

Comment 5.3
As Mirant Kendall explained in its appeal of the 2006 Final Permit, the gillnet sampling which the Agencies required in Part I.A.14.d.2 of that permit would cause greater fish mortality than Kendall Station's impingement. See Supplemental Petition at pp. 189 - 190. For instance, in every year between 2003 and 2005, the number of blueback herring caught in gillnets exceeded the number of bluebacks impinged by 1.3 to 400 times. The number of alewives caught in gillnets is similarly high as compared to the numbers of alewives impinged, exceeding the number of impinged alewives by 3.5 to 9 times.

And as Mirant Kendall described earlier in these comments, the gillnetting also would cause more mortality than the number of equivalent adults lost due to impingement at Kendall Station. As the Agencies' goal is to reduce fish mortality, there is no legitimate reason to impose a permit requirement that would cause far greater mortality. The Agencies should remove the gillnetting as a permit requirement.

By that comment, Mirant Kendall does not mean to suggest that gillnet data are unimportant. Mirant Kendall anticipates that in the future, it will continue from time-to-time to ask Normandeau Associates to collect such data under its Research Permit issued annually by the Division of Marine Fisheries under M.G.L. c.130. But annual collections as proposed in the Draft Permit Modification should not be mandatory.

Comment related to 5.3 from MACZM
CZM's only concern is that certain methods required in the biological monitoring section may do more harm than good to the anadromous fish in the Charles River. CZM would like to see the gill and fyke net sampling described in Sections I.A.14.d.2 and I.A.14.d.5 removed. Estimates of the population of adult anadromous fish in the Charles River are not necessary to measure the effectiveness of the required exclusion technologies. It is already well known that river herring populations are very low statewide. These populations are so at risk that Marine Fisheries has prohibited the take and possession of river herring in Massachusetts. CZM does not believe that the gill and fyke net efforts required in the modified NPDES permit will provide information that is valuable enough to allow the applicant to request a variance from the river herring prohibition. There are less destructive sampling methods (e.g. counting fish that pass through fishways) that may provide population estimates if EPA and MassDEP deem them necessary to determine the effectiveness of the exclusion technologies.

Response to Comment 5.3 and comment related to Comment 5.3 from MACZM
Mirant's comment overlaps substantially with Comment 3.1.3. See Response to Comment 3.1.3.

Parts I.A.14.d.2 and I.A.14.d.5 contain a variety of net sampling requirements, most of which are not within the scope of this permit modification. *See, e.g.,* Final Permit Modification Part I.A.14.d.2 (requiring subsurface net sampling in the lower Basin "to determine if fish are utilizing relatively deep areas"). The only net sampling requirement in Parts I.A.14.d.2 and I.A.14.d.5 that the Draft Permit Modification proposed to modify, or that the Final Permit Modification in fact modifies, is Part I.A.14.d.2's requirement to conduct gill net sampling at Station G1 in the Broad Canal during the rare and limited circumstances when neither the exclusion technology nor the coarse mesh barrier nets are deployed and functioning properly. To the extent that Mirant's or MA CZM's comments address requirements that have not changed since the issuance of the 2006 Final Permit and are not within the scope of this permit modification proceeding, no response is necessary.

Mirant's comparison of gill net mortality to impingement mortality, based on its voluntary gill net sampling program, is inappropriate. Mirant's voluntary gill net sampling program has included a variety of locations (although in most years, it has *not* placed gill nets in the Broad Canal). The mortality from this voluntary program cannot meaningfully be compared to mortality that might arise from Part I.A.14.d.2's requirement to conduct gill net sampling at a single location in the Broad Canal under unusual circumstances (failure of both primary and secondary exclusion technologies). *See also* Response to Comment 3.1.3. In addition, Part I.A.14.d.2 requires Mirant to conduct less-destructive[1] fyke net sampling in addition to the gill net sampling, and to replace the gill nets with fyke nets if the initial fyke net results indicate that they provide comparable data. *See also* Response to Comment 3.1.3.[2] Thus, the limited nature of the gill net requirement at Station G1, combined with the requirement to explore replacing gill nets with fyke nets, will result in lower sampling mortality than suggested by the comment. Moreover, as noted in Response to Comment 3.1.3, fish mortality from biological sampling, while regrettable, allows important environmental information to be collected, whereas mortality from impingement at a CWIS only provides information on the degree of unnecessary mortality caused by the water withdrawal process. For these reasons, EPA disagrees with Mirant's argument that the gill net requirement should be removed on the grounds that it would cause more mortality than the CWISs' impingement.

MACZM comments that data gathered from the gill and fyke net sampling requirements is not necessary to measure the effectiveness of the required exclusion technologies. With respect to the limited sampling that Part I.A.14.d.2 requires at Station G1, EPA disagrees; under the circumstances of primary and secondary exclusion technology failure, comparing fish in the Canal to fish impinged on the traveling screens provides valuable information regarding the performance of the exclusion technology by showing how many fish *would have been* excluded by the primary or secondary exclusion technologies if they had been operational. The deployment of one gill net in the Broad Canal will also provide a comparison of fish species that enter the Broad Canal with the species that are ultimately impinged on the CWISs. The other gill net and fyke net sampling required by these sections (i.e., at Station B1 and Lock Number 3 of the New Charles River Dam) has been included in the permit to provide valuable information to

---

[1] When deployed correctly and checked within a reasonable time-frame, fyke nets are a less destructive sampling tool than gill nets.

[2] In order to substitute fyke nets, or any other less destructive fish sampling method, for gill nets, their side-by-side performance must be compared in the field for a period of time. Without this overlap to evaluate the catch per unit effort relationship of the two methods, historical gill net data voluntarily collected by Mirant could not be compared with fyke net data collected in the future.

support other permit requirements that are outside the scope of this permit modification.[3] With respect to Mirant's ability to obtain a variance from MADMF's river herring take prohibition (i.e., a research collection permit), the 2006 Final Permit explicitly provides that if sampling as described therein is not allowed, then Mirant must implement alternative available methods to obtain comparable information. *See* Part I.A.14.d (unchanged from 2006 Final Permit).

Mirant also states that it "will continue from time-to-time to ask Normandeau Associates to collect such data under its Research Permit issued annually by the Division of Marine Fisheries." EPA expresses no view on Mirant's voluntary sampling conducted pursuant to a MADMF permit. However, EPA does not agree that this anticipated voluntary sampling "from time-to-time" is an appropriate substitute for the permit's structured sampling requirements. Gill net data, if collected under a responsible sampling plan, which isolates as many variables as possible, can provide valuable information about resident and anadromous fish in the lower Basin. But conducting sampling without a predetermined, organized sampling plan which is based on scientific principles could lead to biased results that may support only one selected hypothesis. Sporadic sampling may, for example, under-represent or exclude altogether data that supports an alternate hypothesis regarding the impact of MKS on fish in the lower Basin. Deleting the permit's structured sampling requirements in favor of allowing the permittee to collect data at its discretion and without constraints may well cause needless fish mortality with no objective, meaningful data resulting from the effort and environmental impact.

Comment 5.4
As the Agencies recognize in Part I.A.11.d of the Draft Permit Modification with respect to inspections of the exclusion device, there is a decreased need for monitoring after some period of time in which the results are acceptable. The Draft Permit Modification does not present a similar possibility for reducing the requirements in Part I.A.14.d.7, d.9, or d.11. Mirant Kendall proposes a two-year period after which it could seek the Agencies' approval to reduce the frequency of sampling and analysis.

Response to Comment 5.4
EPA agrees with the general concern contained in the comment, but the permit already addresses this concern and no changes need to be made.

Parts I.A.14.d.7, d.9, and d.11 require the permittee to include monitoring results in the Annual Monitoring Report. Part I.A.14.e. (Regular Monitoring Program Evaluation) allows the permittee, as part of each year's monitoring data submittal, to make recommendations for improvements to the monitoring program, including further monitoring or studies and/or reductions in monitoring or studies (Part I.A.14.e.1). Also, additional or reduced sampling stations and increased or decreased sampling frequency may be proposed (Part I.A.14.e.3.). In short, the requirements in Parts I.A.14.d.7, 9, and

[3] It is also worth noting that alternative biological monitoring using trammel nets and hydroacoustics are also included in the permit provisions to which MA CZM refers. Both of these information collection methods are less destructive than gill nets. *See* Response to Comment 3.1.3.

11 are subject to reductions or other improvements pursuant to the process established in Part I.A.14.e.

Because the permit already allows Mirant Kendall to seek, and EPA to approve, reductions in the frequency or breadth of sampling and analysis, no change has been made to the Final Permit Modification.

Comment 5.5

The 2006 Final Permit requires beach-seine sampling at several locations, including the Fiedler Station. Part I.A.14.d.1. Fiedler Station is rocky and not safe for nighttime sampling. The site is also characterized by several cobbles and boulders that make it difficult to haul nets to shore; frequent snags allow fish to escape. Mirant Kendall has not voluntarily sampled at Fiedler since 2005 when it occasionally employed an electroshocker to stun fish within the net before they could escape. The Agencies should replace the Fiedler Station with the Magazine Station where Mirant Kendall sampled during daytimes and nighttimes in 2006 and 2007, as well as during daytimes in 2003 and 2004.

Response to Comment 5.5

Based on the statement made by the permittee that the Fiedler Station is rocky and not safe for night-time sampling, combined with the information that the permittee has not sampled at Fiedler Station since 2005, EPA agrees that the Final Permit Modification should exclude Fiedler Station as a beach seine sampling location. However, Magazine Station is not comparable to Fiedler Station in the lower Basin and should not be included in the permit as a substitute sampling area. Magazine Station is located upstream of the BU Bridge, in a more riverine environment, in contrast to the impoundment like characteristics of the area where the Fiedler Station is located. Magazine Station is also further away and upstream of MKS, so this shoreline habitat is not influenced by MKS in a way that is comparable to the Fiedler Station shoreline area. Taking this into consideration, beach seine sampling will not be required at Magazine station as a substitute for Fiedler Station. Instead, a beach-seine sampling station will be established as close to Fiedler Station as practical. This station will balance the need to maintain a sampling station that is generally similar to overall conditions at Fiedler Station, while providing a safe and reasonable reach of shoreline to haul a beach-seine effectively.

The Final Permit Modification has been revised as follows:

> Part I.A.14.d.1. Beach Seine and Push-net Sampling
>
> (a) Beach seine collections will be made at four locations, designated Hyatt (S4), Storrow (S3), Lagoon (S2), and ***Near Fiedler (S1A)*** ~~*Fiedler (S1)*~~ as shown on Attachment H**. Collections will not be made at Fiedler (S1). Station S1A will be established as close to Fiedler Station (S1) as practical, in a shoreline area that is suitable for beach seining.** Finfish will be sampled in the lower Charles River using a 100 foot by 6 foot, ¼-inch mesh nylon beach seine. Since previous sampling showed that the bottom at the Hyatt Station was generally free of

> obstructions during previous sampling events, two hauls will be made there while a single haul will be made at the remaining sites. To improve collection efficiency at the rocky collection sites, ~~particularly Feidler Station,~~ an electroshocker may ~~will~~ be used inside the beach seine. Each haul will be standardized to the extent possible by walking one-third of the net perpendicular to shore, turning parallel to shore while deploying the middle third, then returning to shore while deploying the final one-third. Sampling will begin during July of each year and will continue weekly through the end of November or until river herring are not collected for two consecutive weeks. For the first year, if the effective date of the permit is after August 31, the permittee will initiate this sampling the following July. The sampling shall continue while the permit is effective."

Comment 5.6
The 2006 Final Permit requires an ichthyoplankton sampling method utilizing two or three straight-line transects at each of five specified locations, oriented parallel to the shore, and at two separate depths. 2006 Final Permit, Part I.A.14.d.4. That method requires a towboat to travel 575 meters, but there is not enough room below the Museum of Science to travel 575 meters. And above the Museum of Science, 575 meters would reach nearly to the Longfellow Bridge.

Due to those space constraints, the Agencies should instead require a circular tow which provides the highest quality plankton sample, particularly in the relatively narrow areas of the Charles River, such as below the Museum of Science and at Soldiers Field.

Response to Comment 5.6
EPA understands that there is a lack of room to tow a paired ichthyoplankton net in one direction and filter the required volume of water when sampling below the Museum of Science. EPA does not favor a circular towing approach as a substitute, however.

When towing a pair of ichthyoplankton nets in a bongo frame, the objective is to keep the net frame perpendicular to the water that is moving into the net. This allows both nets to filter approximately the same amount of water in the same way. This objective is best accomplished by towing in a straight line, if possible. If the net assemblage is being towed at an angle, as when the net is towed in a circle, the net on the "outside" of the turn may filter more water than the net positioned on the "inside" of the turn. Turbulence caused by the turning of the net may also interfere with optimum "fishing" of the nets.

Although the optimum towing run is an uninterrupted straight-lined tow, EPA recognizes that such a towing run may not be possible at specific stations or under specific conditions, and that Mirant or its consultants may be in the best position to determine which adjustments to make to a specific towing run. Consequently, the Final Permit Modification has been modified to allow alternative sampling tow configurations, including multiple straight-lined transects or circular towing, if one continuous straight-lined transect cannot be achieved.

One option to consider is towing in a straight line in one direction until the boat runs out of room, closing or removing the net from the water, repositioning the tow boat, and towing in a straight line in the opposite direction, but adjusting the transect a boat width or so to the left or right of the first run. If there is an appreciable downstream current at the time, the ichthyoplankton nets must be towed upstream only. In this case, after towing in a straight line upstream until the boat runs out of room, the net would be closed or removed from the water and the boat would relocate back to the original downstream starting point, allowing a boat width or so to the left or right of the first run. These options are illustrative only, and the Final Permit Modification allows Mirant flexibility in determining a comparable collection transect.

Part I.A.14.d.4 of the Final Permit Modification has been revised as follows:

> Tow speeds will be maintained at 1 to 1.3 m/sec (2 to 2.5 knots), each tow covering a straight-lined transect***. If, on a particular sampling run, it is not feasible to run an uninterrupted straight-lined tow, then the permittee may substitute a comparable collection transect (for example, multiple straight-lined tows or a circular tow) and record (1) why an uninterrupted straight-lined tow was not feasible, and (2) the reasons supporting the permittee's selected collection transect.***

Comment 5.7

A small towboat traveling at 1.2 meters per second with a plankton collection net over the side should not travel in a straight line due to the effects of the drag exerted by the net. In order to travel in a straight line, the net must be towed behind the boat, but engine prop wash will cause a sample bias and will cause the net to rise out of the water. As previously commented, a circular tow provides the highest quality sample because the net can be kept away from the boat wake. The Charles River is wide enough to collect three discrete, circular tows between the Boston and Cambridge shores.

Response to Comment 5.7

EPA does not agree with the permittee's assessment regarding straight line towing. First, the draft permit states a range of towing speed from 1 to 1.3 meters per second. If the paired bongo nets being towed behind the boat in a straight line begin to rise out of the water, either the towing speed can be reduced (down to 1.0 meter per second), a weight can be attached to the net frame to keep the nets submerged, and/or additional tow line can be fed out to ensure the net remains below the surface.

EPA recognizes that the ichthyoplankton near surface tow must not be filtering water disturbed by the engine prop wash. The permit specifies that the near surface towing depth must be at a 20% depth from the surface to the bottom, not directly at the surface. Based on the total depth at the transect and the proper amount of line deployed for the nets, the near surface net tow will not be under the influence of the engine prop wash.

Regarding discrete circular tows, see Response to Comment 5.6.

Comment 5.8
As commented above, there are segments of the Charles River where its particular characteristics support an alternative to the Agencies' one-size-fits-all approach. For example, in the relatively shallow depths in the Charles River at Soldiers Field and at the Museum of Science, a better sample would be obtained by utilizing duplicate oblique tows rather than the proposed straight-line tows at 20% and 80% depths which are appropriate elsewhere in the Charles River.

Response to Comment 5.8
More useful information concerning the distribution and make up of eggs and larvae in the Charles River is obtained from ichthyoplankton tows at two discrete depths, rather than a single oblique tow. If the transect is so shallow that a 20% and an 80% depth from the surface to the bottom is virtually filtering the same depth in the water column, then only the near surface depth must be sampled. The field sheet shall document that there was insufficient depth for a near bottom tow.

No modification to the permit is necessary to allow for flexibility in sampling in response to the characteristics of the sampling location.

Comment 5.9
The Draft Permit Modification requires that Kendall Station employ the traveling screens whenever the exclusion technology and coarse-mesh barrier nets are not in use, to rotate the screens every 8 hours in order to dislodge impinged organisms, to collect and inspect the dislodged material for live fish, and to determine the sex and reproductive condition of each live fish prior to returning it to the water in a manner that maximizes its survival. Part I.A.14.d.9.(a)(iii).

Kendall Station does not employ any biologist on its staff, but making the proposed determination of sex and reproductive condition would require Kendall Station to hire a biologist to be available every eight hours. That is an overly burdensome requirement, particularly given the low numbers of impinged fish and the even lower and sporadic incidence of fish impinged on the traveling screens that will be live and capable of being returned, especially after the further human handling this would require. The final Permit Modification should omit the requirement to determine the sex and reproductive condition of live fish.

Response to Comment 5.9
EPA disagrees. The requirement to determine the sex and reproductive condition of live fish is not overly burdensome. *See* Response to Comment 5.1. As explained there, under the terms of the Final Permit Modification, the traveling screens will only be subject to impingement of adult or juvenile fish when *neither* the primary exclusion technology *nor* the secondary coarse mesh barrier net are in place. This would be very limited periods of time.

An impingement monitoring program that may require biological expertise is not an uncommon requirement at a power generating facility. For example, the ongoing impingement monitoring program at Pilgrim Nuclear Power Station (PNPS) requires a contract biologist to be on-site early in the morning, in the afternoon, or after midnight, depending on which of the three days of the week sampling is required. In addition, the requirement to document unusual impingement events at PNPS has required contract biologists to travel to the facility at all hours and with short notice (Marine Ecology Studies, January – December 2007, PNPS Report No. 71, October 15, 2008; AR 772).

The Final Permit Modification does not require that the sex and reproductive condition assessment be made by a biologist in every instance. While that is certainly preferable, it is not required. In the infrequent case where neither the primary exclusion technology nor a backup coarse mesh barrier net are in place, eight hours notice should be enough time to allow a qualified individual to arrive on-site. If a qualified biologist is not available, basic training in fish sex determination and reproductive condition could be provided to Kendall Station personnel to fulfill this requirement until the necessary expertise arrives. Also, technology such as digital cameras or camcorders could be used to record the live fish collected every eight hours. This visual information could then be reviewed by a biologist at some later period to assist in collecting the required information.

Comment 5.10

The Draft Permit Modification proposes that Kendall Station must determine the number and condition of eggs and larvae impinged on the primary exclusion device. Part I.A.14.d.9(b). But it is not feasible to collect and inspect eggs and larvae impinged on exclusion media in a way that would not cause its own impacts on the organisms and defeat the ability to assess the conditions of impingement alone. Determining the number and condition of impinged eggs and larvae would require removing them from the exclusion device using pumps and nets, removing the nets from the water, sorting the organisms with the aid of lights and magnifying devices, transferring live eggs and larvae to a holding facility and holding the live eggs and larvae to determine latent survival rates. Even if it were feasible to sample impinged ichthyoplankton by removing them from the exclusion media -- it is noteworthy that the Agencies do not point to any successful attempt to do so -- it is doubtful that a sample of sufficient size could be obtained. The proposed analysis of the number and condition of eggs and larvae impinged on the primary exclusion device should be deleted from the final Permit Modification.

Response to Comment 5.10

To understand why this type of monitoring is central to the overall assessment of the minimization of impingement and entrainment at the facility, it is important to understand the expected operation of the primary exclusion device. The objective of the primary exclusion barrier is to minimize mortality to fish eggs and larvae. The degree to which the barrier prevents these organisms from being entrained into the MKS CWISs is measured in the monitoring required in Part I.A.14.d.7 (Entrainment Reduction Technology Evaluation). Mirant's comments did not object to the substance of this requirement or to the necessity of measuring the effectiveness of a technology as deployed in the field.

However, as a general matter, the use of a barrier to exclude organisms from entrainment presents the risk that those same organisms may suffer mortality from impingement against the barrier itself. If an exclusion technology's principal effect was to exchange entrainment mortality for impingement mortality, no reduction in adverse environmental impact would be achieved. Therefore, EPA has required a mechanism to assess impingement mortality against the exclusion technology in the Final Permit Modification's comprehensive monitoring plan.

EPA does not agree that it is not feasible to collect and inspect eggs and larvae impinged on exclusion media in a way that would not cause its own impacts on the organisms and defeat the ability to assess the conditions of impingement alone. EPA does not share Mirant's assumption that pumps and nets must be used to extract impinged eggs and larvae found on the exclusion media. As one alternative method, a section of exclusion medium could be carefully isolated, detached from the exclusion device, removed from the field and examined at an on-shore field lab. The ability to remove and replace "test sections" of the exclusion device could be designed into the device. Once the section of exclusion device is removed from the field, a method such as the one outlined by Raffenberg et al. (Impingement Studies, page 7 of 18; AR 767) could be employed to evaluate the viability of eggs and larvae impinged on the surface of the exclusion device.

In order to obtain a sufficient sample size to allow for a meaningful statistical treatment of the data, as required in Part I.A.14.d.9.(b)(v), the permittee would need to determine the number of "test sections" needed, the size of the "test sections," and the number of times each monitoring event would be repeated.

Comment 5.11

Any sample of eggs and larvae "gently removed" from the exclusion media would likely include transient organisms and/or additional eggs and larvae living near or feeding off of the exclusion media. It would be impossible to determine which organisms were removed and which had not been impinged. Likewise, fish eggs and larvae experience naturally high mortality rates. Consequently, many dead eggs and larvae could end up impinged on the exclusion media. Any post-removal sampling of eggs and larvae likely would include eggs and larvae that die pre-impingement without any means of distinguishing between pre-impingement and impingement-related mortality. Accordingly, this requirement must be deleted from the final Permit Modification.

Response to Comment 5.11

EPA has removed the requirement of a "gentle release" mechanism from the Final Permit Modification because EPA has determined that this mechanism is unavailable at this time. *See* Response to Comment 4.24.

Based on this modification, Part I.A.14.d.9.(b) has been revised in the Final Permit Modification, as follows:

1. Part I.A.14.d.9(b)(i) has been revised as follows:

> ***Each year, the permittee shall conduct sampling to determine to the extent practicable the number of eggs and larvae that become impinged on the exclusion technology~~, the number and condition of such impinged eggs and larvae that are released by the action of the exclusion technology, and the number and condition of eggs and larvae that remain impinged on the exclusion technology.~~***

2. Part I.A.14.d.9(b)(iii) has been deleted.
3. The subparagraph numbered as Part I.A.14.d.9(b)(vi) in the Draft Permit Modification has been revised as follows:

> ***The raw data, calculations and results of this ichthyoplankton survivability evaluation shall be presented in the AMR. The report shall include the density and condition of eggs and larvae ~~first~~ impinged~~, those estimated to be dislodged by the exclusion technology mechanism, and those remaining on the media, both as raw numbers and relative percentages~~.***

4. The subparagraphs of Part I.A.14.d.9(b) have been renumbered to reflect the deletion of subparagraph (iii).

Comment 5.12
The collection and inspection procedures that would be required to comply with the Agencies' proposed ichthyoplankton survivability sampling requirements also is likely to introduce extremely high levels of mortality due to the organisms' fragility. The sampling induced mortality would skew the sampling results because Mirant Kendall would not be able to isolate one source of mortality from another. Sampling-induced mortality would likely exceed impingement mortality. Accordingly, this requirement should be deleted from the final Permit Modification.

Response to Comment 5.12
EPA does not agree that the collection and inspection procedures, when designed and executed properly, would introduce extremely high levels of mortality.

Based on information obtained from Gunderboom, Inc. (Andrew McCusker, personal communication, June 11, 2008; AR 773), and from Raffenberg, et al. (AR 767), eggs and larvae impinged on an exclusion technology have been subsequently inspected while still minimizing mortality. The key to minimizing mortality is to avoid removing impinged eggs and larvae from the exclusion device using suction pumps and nets. As described in Response 5.10, when a section of the exclusion media is isolated and carefully removed from the field for inspection, there is no collection mortality from attempting to remove the ichthyoplankton by scraping or sucking the organisms off the exclusion media.

Comment 5.13
For the reasons stated in this section, the results of ichthyoplankton survivability sampling will not provide valuable or reliable data. A similar conclusion was reached by

Ed Radle, Emeritus Fisheries Biologist formerly with the New York State Department of Environmental Conservation, in an assessment of ichthyoplankton impingement on an aquatic filter barrier. In his conclusions on the potential for larval fish impingement on the AFB, Radle (1998) states:

> [With respect to bay anchovy] there is no chance that impinged larvae could be collected off the boom without the collection itself inducing mortality; one would be unable to judge the source of mortality. . . In addition, contamination of any samples contemplated with non-impinged fish is highly likely; it would be difficult to put a lot of credence in the validity of any sample that was collected. . . It seems reasonable to conclude that the mortality POSSIBLY imposed . . . on the egg and very early larval stages, would not be great enough to warrant embarking on the difficult task of sorting out any mortality that does occur.

Radle, E., Memorandum: Assess the likelihood of ichthyoplankton impingement on the deployed boom. Gunderboom File: Impingement on Boom; A Closer Look (October 13, 1998), a copy attached as MK Modification Comments, Exhibit No. 14. While Radle's comments addressed bay anchovy, they are equally valid here.

There are too many uncontrollable factors that would influence and undermine the value of any survivability data. The Agencies cannot reasonably require sampling without value and, therefore, the ichthyoplankton survivability sampling requirements should be deleted from the final Permit Modification.

Response to Comment 5.13
As stated in Response to Comment 5.10, without an assessment of ichthyoplankton survivability on the exclusion device, it is impossible to determine whether the exclusion device is reducing adverse environmental impacts in the Charles River. EPA's objective is to collect reliable information to evaluate whether the effort put forth to deploy and maintain an exclusion device is in fact minimizing adverse environmental impact.[4]

EPA acknowledges that evaluating ichthyoplankton survivability on an exclusion device deployed in the Charles River presents challenges. In Response 5.10, EPA outlined a technique using removable "test sections" of the exclusion device, which will eliminate collection mortality from suction pumps or scrapers and provide useful information regarding ichthyoplankton survivability on an exclusion device.

The evaluation done by Mr. Radle (Exhibit 14, AR 736) pertained to a very large Gunderboom, Inc. Marine Life Exclusion System (MLES), with dimensions of 300 feet long by up to 30 feet deep. The MLES was deployed in an unbounded, high energy segment of the Hudson River, with a 3 foot tidal range and flows of up to 160,000 cfs.

[4] Of course, Mirant's obligations under the NPDES permit pursuant to CWA § 316(b) are defined completely by the design and operational standards specified in the Final Permit Modification. If site-specific or other operational considerations render the technology less effective than expected, that reduced effectiveness will not be held against Mirant. *See* Response to Comment 2.17. This does not, however, obviate the need to collect data to assess the technology's effectiveness as deployed.

The MLES surrounded a power plant (Lovett Generating Station) with an intake of 391 MGD. Radle opined that, under these conditions, a meaningful evaluation of ichthyoplankton survivability on the exclusion media would be problematic.

The site-specific challenges and degree of environmental variability under which that exclusion device was deployed in the Hudson River is very different from the site-specific conditions documented at Kendall Station. Indeed, the Kendall Station site more closely resembles a controlled, laboratory environment when compared with conditions at Lovett Station in the Hudson River. The exclusion device here will be much smaller and installed in the relatively controlled, low energy conditions of the Broad Canal. This dead end canal has no flow of its own and no tidal range. The technology will be installed under bounded conditions. The variability associated with sample collection under these conditions is expected to be much more manageable. Therefore, impingement survivability results obtained using a collection program that minimizes additional mortality will be useful.

Comment 5.14
Until an exclusion technology and design are selected and installed, monitoring requirements cannot adequately assess the technology's performance. Those assessments are the only valid bases for requiring monitoring of ichthyoplankton impingement. Once a technology and final design are chosen, Mirant Kendall will work with the Agencies to identify an appropriately scoped monitoring protocol.

Response to Comment 5.14
The Final Permit Modification sets forth the design and operational requirements for the exclusion technology. The monitoring requirements in the Final Permit Modification were designed to be compatible with any exclusion technology and location that complies with Part I.A.11 of the modified permit. No additional scoping for a monitoring protocol is necessary.

Comment 5.15
At page 18 of the Draft Permit Modification, Part I.A.13 references Part I.A.11.e. The Draft Permit Modification does not contain a Part I.A.11.e. Mirant Kendall suggests that the correct reference is to Part I.A.11.d.

Response to Comment 5.15:
The comment is correct with respect to the Draft Permit Modification. However, due to the addition of a new subparagraph in Part I.A.11, the subparagraph formerly numbered as Part I.A.11.d is now Part I.A.11.e. Consequently, the Final Permit Modification at Part I.A.13 now correctly refers to Part.I.A.11.e.

6. OTHER COMMENTS

Comment 6.1.1 from Rae Stiening
The permittee should be prohibited from drawing cooling water from the Charles River and discharging heated water into the Broad Canal. This operating mode was used years ago.

Comment 6.1.2 from Mark Jaquith
There must be some serious consideration of acceptable alternatives. One is not to renew the permit. Kendall Station is one of the largest polluters of the Lower Charles. It is an established fact that the heat load introduced into the river by this plant creates a "dead zone" harming several fish species. In summer months, water flow from upriver is low and the Charles River basin is effectively a lake. I have been told that in four days, Kendall Station draws a volume of water through its cooling system equal to the volume of water present between the Longfellow Bridge and the dam at Science Park, and in a month an amount equal to all the water in the river from the B.U. Bridge to the harbor dam.

This effectively makes the Charles River Basin Mirant's private cooling pond. That may not be the best use of our natural resources. The plant produces a very small portion of the region's electricity and no one would suffer without it.

The land on which the facility is located is likely worth more as a development parcel than as an electricity generation plant.

Response to Comments 6.1.1 and 6.1.2
A facility's cooling water intake system may have implications under two different sets of provisions of the Clean Water Act: the provisions regarding thermal discharge (principally, section 316(a)), and the provisions regarding cooling water intake (principally, section 316(b)). A cooling system may be subject to several different inquiries: (1) whether its system for controlling the heat of its effluent represents the Best Available Technology; (2) whether its heat discharge violates water quality standards; (3) whether a variance should be granted because technology or water-quality based standards applicable to discharge of heated effluent would be more stringent than necessary to assure the projection and propagation of a balanced, indigenous population of shellfish, fish, and wildlife; and (4) whether its cooling water intake structures reflect the Best Technology Available for minimizing adverse environmental impact.

The scope of this permit modification was explicitly limited to cooling water intake structure requirements under section 316(b). Consequently, to the extent that the comments address the discharge of heated water—i.e., to the extent it raises the first three questions—no response is necessary.

To the extent that the comments suggest that open-cycle cooling does not represent BTA because it is an outdated technology, EPA agrees that for new facilities, and at least some existing facilities, closed-cycle cooling represents BTA. However, as explained in the

Fact Sheet, closed-cycle cooling is not available at Kendall Station because of a lack of available space for cooling towers.

To the extent that the comments suggest that the appropriate determination under section 316(b) is that BTA is for Kendall Station not to operate at all, EPA disagrees. Ideally, "[a]ll environmental harm should be avoided," but this goal is qualified by the reality that "the continued operation of a facility will, in most cases, prevent this result." *Decision of the General Counsel No. 41*, at 203. It is at least conceivable that the best technology available for minimizing adverse environmental impact at a particular facility could be capacity reductions to levels (e.g., zero) that effectively force the plant to cease operations entirely, although only in rare circumstances could such a requirement be "reasonably borne" by the facility. *See* Responses to Comments 2.18.1, 2.22. However, that is not the case here. As explained in the SOB and the Response to Comments, the conditions of the Final Permit Modification reflect the best technology that is available at Kendall Station.

Comment 6.2 from Rae Stiening
The permittee should be required to post all reports and correspondence with the EPA regarding the operation of the fish nets on a web page that is accessible to the public. The same information should also be posted on a bulletin board visible from the Broad Canal boardwalk that is being constructed by the permittee.

Response to Comment 6.2
In the response to comment document that was issued along with the final permit in September of 2006, EPA addressed various comments regarding a requirement for the permittee to provide real-time data on a website that it establishes and maintains. *See* 2006 Response to Comments, Response to Comment I13 and related comments, at I13 (AR 672). Although there was significant public interest in such reporting, EPA stated:

> EPA has decided that it is appropriate to require the permittee to report this real time information only to the permitting agencies. As with other monitoring data collected as part of the NPDES permit requirements, to the extent allowable by law, EPA anticipates making data submitted under this permit publicly available within a reasonable time frame.

EPA reaffirms that response, which applies to monitoring data as well as any submissions or reports made by the permittee.

Regarding the posting of information on the proposed walkway, this request should be directed to the Cambridge Conservation Commission. This entity has the authority to review and approve the design of this proposed walkway which has been submitted by the permittee and an abutting property owner.

The permit modification has been revised to require the permittee to report dates when exclusion technologies, such as a barrier net, are deployed as well as explaining why any deployed technologies were not operable and actions taken to avoid or prevent or minimize future operational outages. See Part I.A.14.a.3(f) of the final permit modification.

Comment 6.3 from Rae Stiening
The "Statement of Basis" document is somewhat misleading on page 37 when it states "These upgrades increased the facility's peak capacity from 113 MW to 283 MW…". In the context of this permit, only the summer capacity of units whose operation results in the discharge of heat into the Charles River should be counted. The appropriate numbers are 63 MW and 207 MW. For these revised numbers I have made reference to a page from the SEC form 8-K submitted by Mirant on April 27, 2001, and to the attached letter of Mark H. Freise.

Response to Comment 6.3
The commenter is correct. The peak production capacity stated in the 2006 final permit and this permit modification noted a peak capacity of 283 MW. This figure included the combined 46 MW capacity of 2 jet engine units, one of which has since been removed from the property. The commenter notes that the actual summer capacity is 207 MW for those units whose operation results in the discharge of heat into the Charles River. Although this appears to be a reasonable approximation of the summer capacity, it is important to note that this Final Permit Modification is concerned solely with cooling water intake structures, not with heat discharge. In any event, the statement of basis cannot be changed after the public notice period. The clarification is made in this response for the record.

Comment 6.4 from Rae Stiening
In a February 2004 fact sheet (EPA-821-F-04-003) announcing the (now partially suspended) Phase II regulations, the EPA stated, "Large power plants have flexibility to comply and to ensure energy reliability." In this context "flexibility" was a list of variances under which an activity prohibited by the CWA could be continued in the event that compliance was not cost effective. There may have been some justification for this approach in times past when power plants were components of integrated public utilities. Literal application of the CWA could possibly have had a severe economic impact on a particular group of consumers. However, power plants are no longer public utilities. A competitive market has been established in the Boston area in which consumers have access to power from many producers and the overall supply considerably exceeds demand. The power market is managed by ISO New England. The provisions of the draft permit that are based on the "flexibility to comply" concept as outlined above should be removed. Even if the Phase II regulations are restored by the Supreme Court, I would argue that the absence of a reliability consideration precludes the granting of variances to the Kendall Station.

[*Note*: On August 4, 2008, Dr. Stiening sent an e-mail message further explaining this comment, which EPA, in its discretion, accepted as a clarification to the timely comment. In this message, Dr. Stiening stated:]

> The word "flexible" appears in the top paragraph of page 27 in the "Statement of Basis." "...the Agency has proposed flexible yet...secondary and tertiary

> requirements applicable when the primary exclusion technology is not deployed or is malfunctioning." The implementation of this concept is found in part c on the bottom of page 11 of the "DRAFT Permit Modification". I do not think that there is a legal basis for the flexibility of continued pumping when the only intake protection available does not meet the permit specifications.
>
> I do not object to the use of "flexible" in the context of the EPA specifying a net having properties that can be verified by inspection and leaving it to Mirant to decide how to fabricate and install the net. However, a build-to-spec contract has the danger that if what Mirant builds meets the spec but not the objectives of the CWA the EPA will have a problem. Presumably you can require review and prior approval of the plans submitted by Mirant.

Response to Comment 6.4
This Final Permit Modification is not based on the Phase II Rule at all. Consequently, it is not necessary to respond to the portions of the comment characterizing the "flexibility" elements of the now-suspended Phase II Rule. With respect to variances, the Final Permit Modification does not contain any variances to the requirements of CWA § 316(b), but rather specifies what section 316(b) requires at Kendall Station. (The 2006 Final Permit does contain a thermal discharge variance under CWA § 316(a), but the thermal discharge provisions of the 2006 Final Permit are beyond the scope of this permit modification process.)

Under section 316(b), EPA is authorized to consider energy efficiency in determining BTA. *See Riverkeeper II*, 475 F.3d at 100 n.12; *Riverkeeper I*, 358 F.3d at 195-96. In this case, EPA determined that none of the selected technologies presented unacceptable energy impacts. *See* SOB at 42-43; *see also* Response to Comments 4.24.7 and 4.42.5.

The cited reference to "flexible" in the top paragraph of page 27 in the SOB is:

> [T]he Agency has proposed flexible yet environmentally protective permit conditions that allow the permittee to select from among several aquatic organism "exclusion technologies" that meet specified technology-based design standards, as well as secondary and tertiary requirements applicable when the primary exclusion technology is not deployed or is malfunctioning.

As is clear from the context, the "flexible" permit conditions are those "that allow the permittee to select from among several aquatic organism 'exclusion technologies' that meet specified technology-based design standards." This corresponds to Part I.A.11.a of the draft (and final) permit modification. EPA and MassDEP have provided flexibility to the permittee in this SOB regarding the specific design of BTA components. The determination of this flexibility was made because EPA believed that the permittee was better suited to determine which combination of technologies would meet the goals of the permit modification. EPA and MassDEP have determined the specifications required in the permit modification reflect BTA. The permit modification does not require that Mirant submit plans to EPA, let alone that EPA review and approve those plans. Rather, by the permit's terms, Mirant may select, design, install, and operate any aquatic organism exclusion technology that meets the specified standards. That said, as noted on p.44 of the SOB, "[o]nce the new final permit conditions become effective, EPA anticipates issuing an administrative compliance order with a schedule for implementing these BTA requirements."

The comment raises the possibility that "what Mirant builds meets the spec but not the objectives of the CWA." EPA understands this to refer to the possibility that Mirant might design, install, and operate an exclusion technology that complies with the BTA-based conditions of the permit modification, and yet the technology might prove to be less effective at reducing entrainment and/or impingement than EPA had assumed. It is always possible that an as-built technology will not function as effectively as envisioned, and for this reason EPA has declined to base either the BTA determination or the permit conditions on specific numerical forecasts. *See* Response to Comment 2.26.1. Ultimately, CWA § 316(b) requires that the CWIS reflect the best technology available for minimizing adverse environmental impact. The permit's requirements reflect the best technology available, and if Mirant installs and operates technology that meets these requirements, the objectives of section 316(b) will be met.

The comment also objects to Part I.A.11.c of the permit modification, which governs operations when neither the exclusion technology nor the coarse-mesh barrier net are deployed or functioning properly, and allows Mirant to operate using the existing traveling screens until either the exclusion technology or the coarse-mesh barrier net can be reinstated. EPA understands the comment to propose that, when neither the exclusion technology nor the coarse-mesh barrier net are deployed or functioning properly, Mirant should be required to cease operations. This proposal is not inherently irrational: since the existing traveling screens do not reflect BTA, one can argue that the facility should not be able to operate using a CWIS that EPA agrees does not reflect BTA. However, this argument is neither compelled by law nor practical.

As a legal matter, section 316(b) requires the best technology "available." Under Parts I.A.11.a-b of the permit modification, Mirant is required to deploy the primary or secondary exclusion technology at all times except when precluded by icing conditions. Put differently, there is a very limited set of circumstances under which Mirant is *not* required to operate one of these technologies. Part I.A.11.c applies to these limited, hopefully brief periods. By definition, during such limited periods neither the exclusion technology nor the coarse-mesh barrier net are actually "available." At such times, the best technology that is actually "available" would be the existing traveling screens. As a practical matter, EPA understands that, in the real world and under water, even the best technology available may not function properly 100% of the time. There may be occasional, hopefully brief periods when the exclusion technology or coarse mesh barrier net may cease to function effectively, and repair may not be instantaneous. The purpose of Part I.A.11.c is to minimize the adverse environmental impact that occurs during those periods. Requiring Mirant to cease electrical generation during those periods, as the comment suggests, might hold the facility to an unattainable standard of reliability for these technologies.