DRAFT 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 Waters Act, as amended, (M.G.L. Chap. 21, §§26-53),

University of Massachusetts Boston

is authorized to discharge from the facility located at

University of Massachusetts Boston
100 Morrissey Boulevard
Boston, MA 02125

to receiving water named

Dorchester Bay (MA70-03)

in accordance with effluent limitations, monitoring requirements and other conditions set forth herein.

This permit shall become effective on the first day of the calendar month following sixty (60) days after signature if comments are received. If no comments are received, this permit shall become effective upon the date of signature.

This permit and the authorization to discharge expire at midnight, five (5) years from the last day of the month preceding the effective date.

This permit supersedes the permit issued on April 25, 2000.

This permit consists of 11 pages in Part I including effluent limitations, monitoring requirements, and state permit conditions, and 25 pages in Part II Standard Conditions.

Signed this day of , 2012

Stephen S. Perkins, Director
Office of Ecosystem Protection
Environmental Protection Agency
Boston, MA

David Ferris, Director
Massachusetts Wastewater Management Program
Department of Environmental Protection
Commonwealth of Massachusetts
Boston, MA

PART I

A. EFFLUENT LIMITATIONS AND MONITORING REQUIREMENTS

1. During the period beginning the effective date and lasting through the expiration date, the permittee is authorized to discharge **non-contact cooling water** from **outfall 001** to Dorchester Bay. Such discharge shall be limited and monitored by the permittee as specified below:

Effluent Characteristic	Units	Discharge Limitation			Monitoring Requirement[1,2]	
		Average Monthly	Maximum Daily	Annual Average	Measurement Frequency	Sample Type
Flow Rate	MGD	17.2	18.4	12.9[3]	Continuous	Flow Meter
pH[4]	s.u.	6.5 - 8.5		--	1 / Week	Grab
Effluent Temperature	˚F	Report	80[5] 85[5]	--	Continuous	Meter
Influent Temperature	˚F	Report	Report	--	Continuous	Meter
Rise in Temperature	˚F	--	See Footnote 6	--	3 / day	Calculation

Footnotes

(1) Effluent samples taken in compliance with the monitoring requirements specified above shall be taken at a location that provides a representative sample of the effluent prior to discharge to the receiving water.

(2) All samples shall be tested using the analytical methods found in 40 CFR Section 136 or alternative methods approved by EPA in accordance with the procedures at 40 CFR Section 136.

(3) Annual average flow value shall be reported daily as a rolling annual average based on the previous 365 days.

(4) The pH of the effluent shall be in the range of 6.5 standard units (s.u.) to 8.5 s.u. and not more than 0.2 units outside the natural background range. There shall be no change from natural background conditions that would impair any use assigned to this class.

(5) The maximum daily temperature limit of 80°F shall be based on the mean of the daily temperature over a twenty-four (24) hour period. The maximum daily temperature limit of 85°F is an instantaneous maximum not to be exceeded.

(6) The rise in temperature (calculated as the difference between the effluent temperature and the influent temperature) shall not exceed 10°F at low tide, 11°F at mid-tide, and 12°F at high tide. The permittee shall report the maximum rise in temperature for each tidal height in a 24-hour period. Low and high tide shall be defined by the daily tide prediction at NOAA Boston Station ID Number 8443970. Mid-tide shall be defined as the tidal height approximately three (3) hours after low or high tide.

Part I.A. (continued)

2. Any discharge that causes a violation of water quality standards of the receiving waters, or otherwise interferes with attainment of any designated use of Class SB waters and existing uses of Dorchester Bay, is prohibited.

3. Any discharge of floating solids, visible oil sheen or foam is prohibited.

4. The discharges shall not impart color, taste, turbidity, toxicity, radioactivity or other properties which cause those waters to be unsuitable for the designated uses and characteristics ascribed to their use.

5. The use of biocides or other chemical additives in non-contact cooling water is prohibited.

6. This permit shall be modified, or revoked and reissued to comply with any applicable effluent standard or limitation issued or approved under Sections 301(b)(2)(C) and (D),

304(b)(2), and 307(a)(2) of the Clean Water 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.

7. All existing manufacturing, commercial, mining, and silvicultural dischargers must notify the Director 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 which is not limited in the permit, if that discharge will exceed the highest of the following "notification levels”:

(i) One hundred micrograms per liter (100 µg/l);

(ii) 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

(iii) Any other notification level established by the Director in accordance with 40 CFR §122.44(f) and Massachusetts regulations.

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”:

(i) Five hundred micrograms per liter (500 µg/l);

(ii) One milligram per liter (1 mg/l) for antimony;

(iii) 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

(iv) Any other notification level established by the Director in accordance with 40 CFR §122.44(f) and Massachusetts regulations.

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.

8. Toxics Control

a. The permittee shall not discharge any pollutant or combination of pollutants in toxic amounts.

b. Any toxic components of the effluent shall not result in any demonstrable harm to aquatic life or violate any state or federal water quality standard which has been or may be promulgated. Upon promulgation of any such standard, this permit may be revised or amended in accordance with such standards.

B. UNAUTHORIZED DISCHARGES

This permit authorizes the permittee to discharge only in accordance with the terms and conditions of this permit and only from the outfall listed in Part I A.1. of this permit. Discharges of wastewater from any other point sources which are not authorized by this permit or other NPDES permits shall be reported in accordance with Section D.1.e.(1) of the Standard Conditions of this permit (Twenty-four hour reporting).

C. UNUSUAL IMPINGEMENT EVENT

1. The permittee shall visually inspect the traveling screen at the CWIS once every twenty-four (24) hours for dead and live fish when circulating pumps are in operation. The permittee shall begin the inspection at the start of screen rotation and continue for at least one full rotation of the screen. An "unusual impingement event" (UIE) is defined as any occasion on which the permittee's rotation of one or more traveling screens yields 25 or more total fish (of all species) per hour that were impinged upon the screens.

2. UIEs will be reported to the Regional Administrator and Commissioner no later than twenty-four (24) hours after the permittee is aware of or has reason to believe an UIE has occurred as required in Part II.D.1.e. of this Permit. If the UIE is observed during weekend, holiday or evening periods, the permittee shall notify the EPA and MassDEP on the next business day.

3. The permittee shall prepare and submit a written report regarding such UIE within five (5) business days to EPA and MassDEP at the addresses found in Part I.F.1.c. of this permit. The oral and written reports shall include the following information:

a. An enumeration and recording of all dead fish by species. Report the species, size ranges (maximum and minimum length), and approximate number of organisms involved in the incident. In addition, a representative sample of 25% of fish specimens from each species, up to a maximum of 50 total fish specimens, shall be measured to the nearest centimeter total length.

b. The date and time of occurrence.

c. The determination or opinion of the permittee as to the reason the incident occurred.

4. In addition to EPA and MassDEP, the permittee shall report UIEs to the Massachusetts Division of Marine Fisheries at the following address:

Division of Marine Fisheries
Annisquam Marine Fisheries Station
Attn: Dr. Jack P. Schwartz
30 Emerson Avenue
Gloucester, MA 01930
(978) 282-0308

D. BEST TECHNOLOGY AVAILABLE

1. The location, design, construction, and capacity of the permittee's non-contact cooling water intake structure (CWIS) shall reflect the best technology available (BTA) for minimizing the adverse environmental impacts from impingement of aquatic organisms and entrainment of eggs and larvae. In order to satisfy this BTA requirement, the permittee shall:

   a. Operate variable frequency drives (VFDs) on at least two of the large salt water pumps and operate the VFDs in conjunction with a supplemental cooling tower to:

      (i) Limit the maximum daily intake flow to 18.4 MGD, maximum monthly average flow to 17.2 MGD, and annual average daily flow to 12.9 MGD.

      (ii) Limit the maximum through-screen velocity to no more than 0.5 feet per second.

   b. Rotate the traveling screen continuously, or at the maximum rotation frequency recommended by the manufacturer if continuous rotation is not feasible, but not less than once per day, in order to minimize impingement duration. If the traveling screen is not rotated continuously, the manufacturer's recommended maximum screen rotation frequency shall be cited in the **CWIS Biological Monitoring Report** detailed in Part I.E.3. This requirement shall not apply to any period that the traveling screen is not in working order due to required maintenance.

   c. Install and operate a new fish return trough that transports impinged fish and other aquatic organisms to Dorchester Bay in a separate trough from the non-contact cooling water discharge pipe. The new fish return trough shall avoid vertical drops and sharp turns or angles. The end of the new fish return trough shall be submerged at all stages of tide at a location that minimizes the potential for re-impingement.

2. The permittee shall evaluate the feasibility of operating the supplemental cooling tower year-round. Within three (3) years of the effective date of the permit, the permittee shall submit to EPA and MassDEP a **Cooling Tower Operational Study** that summarizes the results of the evaluation and estimates flow reductions, energy use, and potable water use resulting from increased operation of the cooling tower.

3. Any change in the location, design, or capacity of the intake structure outside of the specifications of this Permit must be approved in advance in writing by the Regional Administrator and Director of the Wastewater Management Program of MassDEP.

4. The permittee shall notify EPA and MassDEP of any change in the location, design, or capacity of the intake structures outside of the specifications of this Permit, as such changes may require a permit modification. The design of the intake structures shall be reviewed for conformity to applicable regulations pursuant to Section 316(b) of the CWA when such regulations are promulgated.

E. BIOLOGICAL SAMPLING

1. The Permittee shall conduct entrainment sampling three (3) times per week between February 15 and July 31st each year. Three entrainment samples shall be collected each week targeting three separate periods of the diurnal cycle (for example, once on Monday morning at 8:00 am, once on Wednesday afternoon at 2:00 pm, and once on Friday night at 8:00 pm). At a minimum, the sampling program shall address the following:

   a. Sampling shall be conducted or supervised on-site by a qualified biologist using a 0.333 millimeter mesh 60-centimeter plankton net. The volume of water sampled shall be measured and equal to approximately 100 cubic meters (m^3). A standard mesh of 0.202 mm shall be required during the period of highest abundance of early stage winter flounder (late March to late April). After each sample, the collection nets shall be washed down and the sample transferred from the net to a jar containing sufficient formalin to produce a 5 to 10% solution.

   b. In the laboratory, all eggs and larvae shall be identified to the lowest practical taxon and counted. Subsampling with a plankton splitter may be used if the count of eggs and larvae in a sample is greater than 400 organisms so that at least 200 eggs and larvae will be present in any subsample.

2. Ichthyoplankton counts shall be converted to densities per 100 m^3 of water based on flow through the sampling net and the data shall be presented in the annual **CWIS Biological Monitoring Report** detailed in Part I.E.3 below. Estimates of total numbers of ichthyoplankton based on facility flow rates shall also be provided. Entrainment losses shall be converted from weekly estimates of density per unit volume, to monthly and annual loss estimates based on the permitted flow. In addition, loss estimates should be converted to adult equivalents for species for which regionally specific larval survival rates are available.

3. Results of the entrainment monitoring shall be reported annually in a **CWIS Biological Monitoring Report**, which shall include monitoring logs and raw data collected in the previous year and summarize the data both graphically, where appropriate, and in text. The monitoring report shall also include the results of all calculations conducted in accordance with Part I.E.2. The **CWIS Biological Monitoring Report** shall be submitted to EPA and MassDEP by December 1st.

4. After two years, the Permittee may submit a written request to the EPA and MassDEP requesting a reduction in the frequency of the required entrainment monitoring requirements. Until written notice is received by certified mail from the EPA indicating that the intake screen monitoring and cleaning frequency has been changed, the Permittee is required to continue monitoring and cleaning at the frequency specified in this permit.

F. MONITORING AND REPORTING

1. **For a period of one year from the effective date of the permit**, the permittee may either submit monitoring data and other reports to EPA in hard copy form or report electronically using NetDMR, a web-based tool that allows permittees to electronically submit discharge monitoring reports (DMRs) and other required reports via a secure internet connection. **Beginning no later than one year after the effective date of the permit**, the permittee shall begin reporting using NetDMR, unless the facility is able to demonstrate a reasonable basis that precludes the use of NetDMR for submitting DMRs and reports. Specific requirements regarding submittal of data and reports in hard copy form and for submittal using NetDMR are described below:

    a. Submittal of Reports Using NetDMR

    NetDMR is accessed from: http://www.epa.gov/netdmr. **Within one year of the effective date of this permit**, the permittee shall begin submitting DMRs and reports required under this permit electronically to EPA using NetDMR, unless the facility is able to demonstrate a reasonable basis, such as technical or administrative infeasibility, that precludes the use of NetDMR for submitting DMRs and reports ("opt-out request").

    DMRs shall be submitted electronically to EPA no later than the 15th day of the month following the completed reporting period. All reports required under the permit shall be submitted to EPA as an electronic attachment to the DMR. Once a permittee begins submitting reports using NetDMR, it will no longer be required to submit hard copies of DMRs or other reports to EPA and will no longer be required to submit hard copies of DMRs to MassDEP. However, permittees shall continue to send hard copies of reports other than DMRs to MassDEP until further notice from MassDEP.

    b. Submittal of NetDMR Opt-Out Requests

    Opt-out requests must be submitted in writing to EPA for written approval at least sixty (60) days prior to the date a facility would be required under this permit to begin using NetDMR. This demonstration shall be valid for twelve (12) months from the date of EPA approval and shall thereupon expire. At such time, DMRs and reports shall be submitted electronically to EPA unless the permittee submits a renewed opt-out request and such request is approved by EPA. All opt-out requests should be sent to the following addresses:

<u>Attn: NetDMR Coordinator</u>
U.S. Environmental Protection Agency, Water Technical Unit
5 Post Office Square, Suite 100 (OES04-4)
Boston, MA 02109-3912

And

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

c. Submittal of Reports in Hard Copy Form

Monitoring results shall be summarized for each calendar month and reported on separate hard copy Discharge Monitoring Report Form(s) (DMRs) postmarked no later than the 15th day of the month following the completed reporting period. All reports required under this permit shall be submitted as an attachment to the DMRs. Signed and dated originals of the DMRs, and all other reports or notifications required herein or in Part II shall be submitted to the Director at the following address:

U.S. Environmental Protection Agency
Water Technical Unit (OES04-SMR)
5 Post Office Square - Suite 100
Boston, MA 02109-3912

Duplicate signed copies of all reports or notifications required above shall be submitted to the State at the following address:

MassDEP – Northeast Region
Bureau of Waste Prevention
205B Lowell Street
Wilmington, MA 01887

Any verbal reports, if required in **Parts I** and/or **II** of this permit, shall be made to both EPA and to MassDEP.

Hard copies of the CWIS Biological Monitoring Report required under Part I.E.3. of this permit and any written reports required under Part I.C. of this permit shall also be submitted to the State at the following address:

MassDEP
Watershed Planning Program
627 Main St, 2^{nd} Floor
Worcester, MA 01608

G. STATE PERMIT CONDITIONS

1. This authorization to discharge includes two separate and independent permit authorizations. The two permit authorizations are (i) a federal National Pollutant Discharge Elimination System permit issued by the U.S. Environmental Protection Agency (EPA) pursuant to the Federal Clean Water Act, 33 U.S.C. §§1251 et seq.; and (ii) an identical state surface water discharge permit issued by the Commissioner of the Massachusetts Department of Environmental Protection (MassDEP) pursuant to the Massachusetts Clean Waters Act, M.G.L. c. 21, §§ 26-53, and 314 C.M.R. 3.00. All of the requirements contained in this authorization, as well as the standard conditions contained in 314 CMR 3.19, are hereby incorporated by reference into this state surface water discharge permit.

2. This authorization also incorporates the state water quality certification issued by MassDEP under § 401(a) of the Federal Clean Water Act, 40 C.F.R. 124.53, M.G.L. c. 21, § 27 and 314 CMR 3.07. All of the requirements (if any) contained in MassDEP's water quality certification for the permit are hereby incorporated by reference into this state surface water discharge permit as special conditions pursuant to 314 CMR 3.11.

3. 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.

4. The permittee shall conduct year-round impingement monitoring three times per week for a minimum of two years, at which time the permittee can request a reduction in monitoring frequency from MassDEP. Each monitoring period shall be initiated at the beginning of screen rotation and extend for a three continuous hours of screen rotation, during which all fish and lobsters impinged shall be collected and counted. Each of the three impingement samples shall target a different periods of the diurnal cycle (for example, once on Monday morning at 8:00 am, once on Wednesday afternoon at 2:00 pm, and once on Friday night at 8:00 pm). Impingement samples shall be separated by a minimum of 24-hours. Impinged organisms shall be collected and kept in an aerated, water-filled container of a large-enough size such that any further harm to impinged

organisms is not unduly increased. A qualified biologist, or individual supervised on-site by a qualified biologist, shall collect the impinged organisms, key them to species, estimate the length of each organism (to the nearest centimeter), record this information in a log book and release the impinged organisms to the fish-return trough. If any organisms are collected that are unfamiliar to the supervising biologist, one or two individuals should be collected, preserved in alcohol or formalin, and sent to a taxonomist for verification. All impingement information collected shall be collated and reported to the agencies in the yearly CWIS Biological Monitoring report.

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
NEW ENGLAND - REGION I
5 POST OFFICE SQUARE, SUITE 100
BOSTON, MASSACHUSETTS 02109-3912

FACT SHEET

DRAFT NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM (NPDES) PERMIT TO DISCHARGE TO WATERS OF THE UNITED STATES PURSUANT TO THE CLEAN WATER ACT (CWA)

NPDES PERMIT NUMBER: MA0040304

PUBLIC NOTICE START AND END DATES: August 22, 2012 – September 20, 2012

NAME AND MAILING ADDRESS OF APPLICANT:

University of Massachusetts Boston
100 Morrissey Boulevard
Boston, MA 02125

NAME AND ADDRESS OF FACILITY WHERE DISCHARGE OCCURS:

University of Massachusetts Boston
100 Morrissey Boulevard
Boston, MA 02125

RECEIVING WATER(S): **Dorchester Bay (MA70-03)**

RECEIVING WATER CLASSIFICATION(S): **SB, CSO**

SIC CODE: 8221

Table of Contents

I. Proposed Action, Type of Facility, and Discharge Location

The above named applicant has applied to the U.S. Environmental Protection Agency (EPA) for issuance of a National Pollutant Discharge Elimination System (NPDES) permit to discharge non-contact cooling water (NCCW) into the designated receiving water. NCCW is water that is used to reduce temperature and that does not come into direct contact with any raw material, intermediate product, waste product (other than heat), or finished product. The University of Massachusetts, Boston (UMB) is a public institute of education which incorporates the use of a non-contact cooling water system to cool campus buildings. Seawater is withdrawn from an intake structure located on the peninsula on Savin Hill Cove and discharged via a single outfall located on the east of the peninsula in Dorchester Bay (see site location in Attachment A). The discharge of NCCW from this facility was previously covered under NCCW General Permit MAG250004, which was issued on April 25, 2000. This General Permit expired on April 25, 2005 and a new NCCW General Permit was issued on July 31, 2008. UMB is not eligible for coverage under the 2008 NCCW General Permit because the permit is limited to facilities with cooling flows less than 1 MGD. UMB applied for an individual permit on October 28, 2008 and the discharge remains covered under the expired General Permit until an individual permit is issued.

II. Description of Discharge

UMB operates a non-contact cooling water system comprised of three separate piping systems using seawater, condenser water, and cooling water to meet the campus's cooling needs. A closed-loop condensing water system transports heat from the chillers in the Utility Plant to the Pump House. Four plate-and-frame heat exchangers located in the pump house use seawater to cool the condenser loop (see Attachment B). In 2007, UMB replaced or rebuilt the mechanical equipment in the Pump House, including the salt water pumps and traveling screen. The heated seawater effluent discharges through a single 42-inch pipe to Dorchester Bay. A quantitative description of the effluent parameters based on recent discharge monitoring reports (DMRs) is shown on Attachment C of this fact sheet.

III. Receiving Water Description

UMB is located on a 175-acre tract on Columbia Point peninsula in Dorchester Bay in Boston, MA (Attachment A). Dorchester Bay (MA70-03) is classified as Class SB, CSO under the Massachusetts Surface Water Quality Standards (WQSs). Title 314 Code of Massachusetts Regulations ("CMR") 4.05(4)(b) states that Class SB waters *"are designated as habitat for fish, other aquatic life and wildlife, including for their reproduction, migration, growth and other critical functions, and for primary and secondary contact recreation. In approved areas they shall be suitable for shellfish harvesting with depuration (Restricted Shellfish Areas). These waters shall have consistently good aesthetic value."*

The water in the vicinity of the facility is a tidal estuarine waterbody that is subject to semi-diurnal tidal flows with a mean tidal range of approximately 9.5 feet. The area in the vicinity of the intake and discharge consists of intertidal shoreline (mainly rip rap), intertidal to shallow subtidal flats, dredged channels, and subtidal substrate. The area provides suitable habitat for common shellfish species, including soft-shelled clam, blue mussel, periwinkle, razor clam, slipper shell, mud dog whelk, and hermit crab. According to Massachusetts Division of Marine Fisheries, shellfishing is currently prohibited in the vicinity of the discharge (Growing Area GBH3: Neponset River and Dorchester Bay).[1]

Section 303(d) of the Federal Clean Water Act (CWA) requires states to identify those waterbodies that are not expected to meet surface WQSs after the implementation of technology-based controls and, as such require the development of total maximum daily loads (TMDL). The Final 2010 303(d) Lists state that Dorchester Bay (MA70-03), from the mouth of the Neponset River to the line between Head Island and the north side of Thompson Island and the line between the south point of Thompson Island and Chapel Rocks (Boston/Quincy), is not attaining WQSs due to priority organics, pathogens, suspended solids, and turbidity. The discharge of NCCW from this facility is not expected to contribute to these impairments.

IV. Permit Basis and Explanation of Effluent Limit Derivations

The effluent limitations, monitoring requirements, and any implementation schedule, if required, may be found in Part 1 (Effluent Limitations and Monitoring Requirements) of the Draft Permit. The permit application and any supplemental information submissions are part of the administrative file.

A. General Requirements

The Clean Water Act (CWA) prohibits the discharge of pollutants to waters of the United States without a NPDES permit unless such a discharge is otherwise authorized by the CWA. The NPDES permit is the mechanism used to implement technology and water quality-based effluent limitations and other requirements including monitoring and reporting. This Draft Permit was developed in accordance with various statutory and regulatory requirements established pursuant to the CWA and applicable State regulations. During development, EPA considered the most recent technology-based treatment requirements, water quality-based requirements, and all limitations and requirements in the current permit. The regulations governing the EPA NPDES permit program are generally found at 40 CFR Parts 122, 124, 125, and 136. The standard conditions of the Draft Permit are based on 40 CFR §122.41 and consist primarily of management requirements common to all permits. The effluent monitoring requirements have been established to yield data representative of the discharge under authority of Section 308(a) of the CWA in accordance with 40 CFR §122.41(j), §122.44(i) and §122.48.

B. Technology-Based Requirements

Subpart A of 40 CFR §125 establishes criteria and standards for the imposition of technology-based treatment requirements in permits under Section 301(b) of the CWA, including the

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1 Massachusetts Division of Marine Fisheries. Designated Shellfish Growing Area Map GHB3: Neponset River and Dorchester Bay. Updated on September 10, 2009. Accessed on November 10, 2011. http://www.mass.gov/dfwele/dmf/programsandprojects/shellfish/gbh/gbh3.pdf

application of EPA promulgated effluent limitations and case-by-case determinations of effluent limitations under Section 402(a)(1) of the CWA.

Technology-based treatment requirements represent the minimum level of control that must be imposed under Sections 301(b) and 402 of the CWA (See 40 CFR §125 Subpart A) to meet best practicable control technology currently available (BPT) for conventional pollutants and some metals, best conventional control technology (BCT) for conventional pollutants, and best available technology economically achievable (BAT) for toxic and non-conventional pollutants. In general, technology-based effluent guidelines for non-POTW facilities must be complied with as expeditiously as practicable but in no case later than three years after the date such limitations are established and in no case later than March 31, 1989 [See 40 CFR §125.3(a)(2)]. Compliance schedules and deadlines not in accordance with the statutory provisions of the CWA cannot be authorized by a NPDES permit.

EPA has not promulgated technology-based National Effluent Guidelines for the discharge of NCCW from colleges or universities (SIC 8221). In the absence of technology-based effluent guidelines, the permit writer is authorized under Section 402(a)(1)(B) of the CWA to establish effluent limitations on a case-by-case basis using Best Professional Judgment (BPJ).

C. Water Quality-Based Requirements

Water quality-based criteria are required in NPDES permits when EPA and the State determine that effluent limits more stringent than technology-based limits are necessary to maintain or achieve state or federal water-quality standards (See Section 301(b) (1)(C) of the CWA). Water quality-based criteria consist of three (3) parts: 1) beneficial designated uses for a water body or a segment of a water body; 2) numeric and/or narrative water quality criteria sufficient to protect the assigned designated use(s) of the water body; and 3) anti-degradation requirements to ensure that once a use is attained it will not be degraded. The Massachusetts State Water Quality Standards, found at 314 CMR 4.00, include these elements. The State Water Quality Regulations limit or prohibit discharges of pollutants to surface waters and thereby assure that the surface water quality standards of the receiving water are protected, maintained, and/or attained. These standards also include requirements for the regulation and control of toxic constituents and require that EPA criteria, established pursuant to Section 304(a) of the CWA, be used unless site-specific criteria are established. EPA regulations pertaining to permit limits based upon water quality standards and state requirements are contained in 40 CFR §122.44(d).

Section 101(a)(3) of the CWA specifically prohibits the discharge of toxic pollutants in toxic amounts. The State of Massachusetts has a similar narrative criteria in their water quality regulations that prohibits such discharges [See Massachusetts 314 CMR 4.05(5)(e)]. The effluent limits established in the Draft Permit assure that the surface water quality standards of the receiving water are protected, maintained, and/or attained.

D. Antibacksliding

EPA’s antibacksliding provision as identified in Section 402(o) of the CWA and at 40 CFR §122.44(l) prohibits the relaxation of permit limits, standards, and conditions unless the circumstances on which the previous permit was based have materially and substantially changed since the time the permit was issued. Antibacksliding provisions apply to effluent limits based on technology, water quality, best professional judgment (BPJ), and State Certification requirements. Relief from antibacksliding provisions can only be granted under one of the defined exceptions [See 40 CFR §122.44(l)(i)].

In this case, UMB was previously covered under the NCCW General Permit issued April 25, 2000 (MAG250004). The pH and mean daily temperature limits in the Draft Permit is as stringent as or more stringent than the 2000 NCCW General Permit. The flow limits in the Draft Permit are less stringent that the NCCW General Permit. EPA considers the increase in flow in the Draft Permit, which is a result of the addition of campus expansion, an exception to antibacksliding because it is based on material and substantial alterations or additions to the permitted facility since permit issuance which would have justified the application of a less stringent effluent limitation (See 40 CFR § 122.44(l)(2)(i)(A)). In addition, the Draft Permit contains a new limitation on the rise in effluent temperature based on a 316(a) variance, which is an allowable exception to antibacksliding at 40 CFR § 122.44(l)(2)(i)(D).

E. Antidegradation

Federal regulations found at 40 CFR § 131.12 require states to develop and adopt a statewide antidegradation policy which maintains and protects existing instream water uses and the level of water quality necessary to protect the existing uses, and maintains the quality of waters which exceed levels necessary to support propagation of fish, shellfish, and wildlife and to support recreation in and on the water. The Massachusetts Antidegradation Regulations are found at 314 CMR § 4.04.

This Draft Permit is being issued with allowable effluent limits established to protect the existing and designated uses of Dorchester Bay. EPA anticipates that MassDEP shall make a determination that there shall be no significant adverse impacts to the receiving waters and no loss of existing uses as a result of the discharge authorized by this permit.

F. CWA § 316(a)

Heat is defined as a pollutant under Section 502(6) of the CWA. 33 U.S.C. § 1362(6). As with other pollutants, discharges of heat (or "thermal discharges") generally must satisfy both technology-based standards (specifically, the BAT standard) and any more stringent water quality-based requirements that may apply. State WQS may include numeric temperature criteria, as well as narrative criteria and designated uses, that apply to particular water body classifications and may necessitate restrictions on thermal discharges.

Section 316(a) of the CWA, 33 U.S.C. § 1326(a), provides, however, that thermal discharge limits less stringent than technology-based and/or water quality-based requirements may be authorized if the biological criteria of Section 316(a) are satisfied. The approval of less stringent thermal discharge limits under CWA § 316(a) is referred to as a "Section 316(a) variance." In addition, Massachusetts WQS provide that "any determinations concerning thermal discharge limitations in accordance with 33 U.S.C. 1251 § 316(a) will be considered site-specific limitations in compliance with 314 CMR 4.00." *See* 4.05(4)(b)(2)(c).

Thermal discharge variances, and the demonstration that an applicant must make to obtain one, are addressed in CWA§ 316(a) and EPA regulations, including those promulgated at 40 CFR § 125, Subpart H. In essence, the applicant must demonstrate that the alternative, less stringent effluent limitations it desires, considering the cumulative impact of its thermal discharge together with all other significant impacts on the species affected, will assure the protection and propagation of a balanced, indigenous population of shellfish, fish, and wildlife in and on the water body receiving the thermal discharge (BIP). See 33 USC § 1326(a); 40 CFR § 125.73(a) and (c)(1)(i). An existing thermal discharger can perform either a predictive or retrospective analysis in an effort to demonstrate that the protection and propagation of the BIP will be assured despite its proposed thermal discharge variance. If the applicant makes this demonstration to the satisfaction of EPA (or, if appropriate, the State), then the permitting authority may issue the permit with the requested alternative, variance-based thermal discharge limits. Conversely, if the demonstration does not adequately support the requested variance-based thermal discharge limits, the permitting authority shall deny the requested variance. In that case, the permitting authority shall either impose limits based on the otherwise applicable technology-based and water quality-based requirements or, at its discretion, impose alternative variance-based limits that the permit record demonstrates will assure the protection and propagation of the BIP.

G. CWA § 316(b)

Technology-based NPDES permit requirements for cooling water intake structures (CWISs) are based on CWA § 316(b), 33 USC § 1326(b), which requires that "the location, design, construction, and capacity of the facility's cooling water intake structure(s) (CWIS) reflect the Best Technology Available (BTA) for minimizing adverse environmental impact." As with effluent discharge limits, CWIS requirements must also comply with any more stringent conditions that might be necessary to achieve compliance with any applicable State WQS. See 40 CFR § 125.84(e).

The operation of CWISs can cause or contribute to a variety of adverse environmental effects, such as (a) killing or injuring tiny aquatic organisms, including but not limited to fish larvae and eggs, by entraining them in the water withdrawn from a waterbody and sent through the cooling system and (b) killing or injuring larger organisms, including but not limited to juvenile and adult fish, by impinging them against the intake structure's screens, racks, or other structures. Section 316(b) applies to discharge permits seeking to withdraw cooling water from a water of the United States.

In this case, CWA § 316(b) applies due to the withdrawal of seawater from Savin Hill Cove for use in UMB's NCCW system. At this time there are no national categorical standards in effect that apply § 316(b) to UMB's CWIS. As a result, EPA developed technology-based requirements for UMB by applying § 316(b) on a site-specific basis using BPJ. A detailed discussion of the requirements pertaining to this regulation is presented in Section VI of this Fact Sheet.

V. Explanation of the Permit's Effluent Limitation(s)

A. Facility Information

Since opening in 1974, UMB has used seawater from Savin Hill Cove to cool its campus buildings via a network of cooling water pipes. The pump house and cooling water intake structure (CWIS) are located on the southern side of Columbia Point peninsula in Savin Hill Cove. The NCCW outfall is a single, 42-inch discharge pipe located on the eastern side of the peninsula in the open water of Dorchester Bay. The pipe is oriented perpendicular to the shoreline and is nearly exposed at low tide.

NCCW is used at UMB to provide climate control in campus buildings. Heat from campus cooling is exchanged between the closed cooling and condenser loops in the utility building. Heat in the closed condenser loop is exchanged with the once-through seawater loop in the pumphouse (See Attachment B).

B. Permitted Outfalls

The permittee discharges heated NCCW from the cooling system to Dorchester Bay via Outfall 001 (See Attachment A). The discharge system consists of a single, 42-inch pipe approximately two meters from the shore in Dorchester Bay. The pipe runs underground from the heat exchangers along the sidewalk at Columbia Point to the discharge location.

C. Derivation of Effluent Limits under the Federal CWA and/or the Commonwealth of Massachusetts' Water Quality Standards

1. Flow

The Draft Permit contains a maximum (instantaneous) daily limit of 18.4 million gallons per day (MGD), a maximum monthly average limit of 17.2 MGD, and an annual average of 12.9 MGD calculated as a rolling average for the previous 365 days. These limits are based upon the projected installation and operation of variable frequency drive (VFD) pumps by the facility at the seawater intake (see Part VI.D of this Fact Sheet).

2. pH

Massachusetts Surface WQSs require the pH of Class SB waters to be within the range of 6.5 to 8.5 standard units (s.u.) and not more than 0.2 s.u. outside of the natural background range. The Draft Permit identifies a pH permit limit range of 6.5 to 8.5 in accordance with the WQSs. The discharge shall not exceed this pH range unless due to natural causes. In addition, there shall be no change from background conditions that would impair any use assigned to the receiving water class.

3. Temperature

In developing temperature limits for the discharge of NCCW from Outfall 001, EPA considered applicable water quality-based requirements, technology-based requirements, and the permittee's request for a CWA § 316(a) variance.

Water-Quality Based Limits

The state classification for Dorchester Bay is Class SB. The water quality standards (WQS) at 314 CMR § 4.05(4)(b)(2)(a) require that the instream water temperature shall not exceed a maximum of 85ºF (29.4°C) or a daily mean of 80ºF (26.7°C). In addition, the rise in temperature due to discharge shall not exceed 1.5ºF (0.8°C) during the summer months (July through September) nor 4ºF (2.2°C) during the winter months (October through June). At UMB, temperature is continuously monitored at the intake and discharge by sensors installed during spring 2010. Based on the historical data presented in Attachment B, the thermal discharge from the facility has exceeded the maximum instantaneous daily instream water quality criteria (85°F) on one occasion in September 2010. The Draft Permit includes a water quality-based maximum daily mean temperature limit of 80°F (i.e., a 24-hr. mean of 80°F) and instantaneous maximum daily temperature of 85°F.

CWA Section 316(a) Variance

As part of the requirements of the Draft Permit under Section 316(b) of the CWA, the permittee must reduce the intake volume at the CWIS (see Section VI.E. of this Fact Sheet). The maximum temperature differential (the difference between effluent and influent temperature) due to UMB's operations will increase at lower flows for the same heat load compared to current conditions. UMB has indicated that due to the higher delta T across the heat exchangers, the permittee will not meet the 1.5°F rise in temperature WQS in areas close to the point of discharge. According to CWA Section 316(a), as codified at 40 CFR 125 subpart H, thermal discharge effluent limitations in permits may be less stringent than those required by applicable standards and limitations if the discharger demonstrates that such effluent limitations are more stringent than necessary to assure the protection and propagation of a balanced, indigenous population of shellfish, fish, and wildlife in and on the water body receiving the thermal discharge (BIP). This demonstration must show that the alternative effluent limitation desired by the discharger, considering the cumulative impact of its thermal discharge together with all other significant impacts on the species affected, will assure the protection and propagation of the BIP in and on the body of water into which the discharge is made. UMB requested a 316(a) variance from the 1.5°F rise in temperature (summer months) WQS (Letter from Bethany Eisenberg, April 29, 2011 included at Attachment 14 to the July 2011 permit application). UMB submitted an analysis of the extent of the thermal plume under the proposed conditions using CORMIX.

The habitat at the outfall is intertidal to shallow subtidal mud and sand/shell flat that can be exposed during low tide. The organisms that reside here, including shellfish, polychaete worms, and crustaceans, must be able to withstand periodic exposure to thermal extremes (e.g., when mudflats are exposed or at very shallow water depths). As a result, the resident organisms at the location of the outfall are likely to survive moderate temperature increases (10°F to 12°F) where the daily average temperature remains protective (80°F). EPA is satisfied that the temperature limits in the draft permit will protect the BIP because the mean daily temperature must meet WQS, which will avoid chronic exposure to high temperatures, resident invertebrate species are biologically capable of withstanding temperature extremes, and the rise in temperature will result in thermal plumes that are sufficiently small to allow fish species to avoid exposure. In addition, the rise in temperature limits in the Draft Permit are accompanied by lower limits on maximum daily and annual average daily flows, which will reduce impingement and entrainment losses at the cooling water intake structure. The aquatic community in Dorchester Bay is likely to experience an overall benefit as a result of the flow reduction at the intake, despite any nominal thermal impacts resulting from the discharge of heated effluent.

The permittee used CORMIX to estimate the size of the thermal plume at the estimated temperature differential under worst-case conditions (maximum tide-variable pump rate) and average case conditions (average tide-variable pump rate) (see Table V-1). The model predicts that the thermal discharge at a maximum temperature differential (difference between influent and effluent temperature) will exceed the criteria for rise in temperature during summer over a limited area.

Table V-1. Predicted size of thermal plume at the point where the temperature is equal to a rise in temperature of 1.5°F and the near-field region (NFR) under worst-case and average pump rates.

Tide	Pump Rate (gpm)	Delta T(°F)	Plume Length when temperature = 1.5°F (ft)	Plume half- width when temperature = 1.5°F (ft)	NFR Length (ft)	NFR half-width (ft)
Worst-case Conditions						
High	19,756	12	50.0	6.3	57.3	7.4
Mid	15,656	11	189.0	22.9	1217.3	40.0
Low	11,547	10	842.5	76.6	670.2	20.1
Average-Case Conditions						
High	8,162	6.5	31.5*	7.1*	43.4	6.8
Mid	8,162	6.7	116.7	8.2	416.4	14.6
Low	7,621	7.1	306.0	10.8	370.0	11.9

*The discharge flow will experience instabilities with full vertical mixing in the near-field region. Plume dimensions when the temperature meets water quality standards cannot be accurately predicted.

At high and mid-tide, the predicted plume is expected to meet the 1.5°F rise in temperature within the near-field region of the outfall at both worst- and average-case conditions (see Table V-1). According to CORMIX, the near-field region is a zone of the receiving water with strong initial mixing dominated by the initial jet characteristics of momentum flux, buoyancy flux, and outfall geometry. In this CORMIX simulation, the worst-case pump rates (19,756 gpm and 15,656 gpm at high and mid-tide, respectively) are higher than the maximum daily pump rates allowed in the Draft Permit (12,778 gpm). Therefore, the predicted size of thermal plumes under the modeled worst-case operating conditions is likely conservative compared to permitted operating conditions.

At low-tide, the predicted plume will meet the 1.5°F rise in temperature within the near-field region of the outfall under average-case conditions but not worst-case conditions (see Table V-

1). The worst-case plume dimensions at low-tide, at a maximum pumping rate and delta temperature (11,547 gpm and 10°F), are estimated at 842 ft in length and 153 ft in width. The outfall discharges into open water at the end of the peninsula at Columbia Point (see Attachment A). Because the nearest landmasses (Squantum Point and Thompson Island) are located more than 2,500 ft away, the relatively small plume from UMB is not expected to impair fish movements in the stretch of water between these land masses.

Based on these data, EPA is satisfied that during high, mid and low-tides, UMB has adequately demonstrated that its thermal plume is limited in size and will not impede fish movement or interfere with the designated or existing uses of Dorchester Bay.

At low slack spring tide (the time of the greatest range between high and low tide), the mudflats in front of the discharge southeast of Columbia Point become exposed, leaving a narrow, shallow channel (75 ft wide by 2 ft deep) between the exposed flats and the shoreline. According to the CORMIX simulation, the thermal plume contacts the mudflats before the WQS of a 1.5°F rise in temperature is met. The temperature in the shallow channel is likely to exceed the WQS over the limited slack tide period (approximately 30 minutes). The low slack spring tide scenario likely represents the worst case conditions for the thermal plume. However, the duration of slack tide is short, the spatial extent of the plume is limited to the channel, and the spring tide occurs only twice per lunar cycle (following the new and full moons). Given that the worst-case spring tide conditions are infrequent and last only a short period, the resulting thermal plume is not likely to interfere with the designated or existing uses of Dorchester Bay.

Based on CORMIX modeling and considering the location of the outfall, EPA concludes that the predicted thermal plumes under a range of tides and operating conditions are unlikely to interfere with the migration or movement of aquatic life or create nuisance conditions or otherwise interfere with the designated or existing uses of Dorchester Bay. The Draft Permit limits the rise in temperature at UMB (the difference between the effluent and influent temperature) to 10°F at low tide, 11°F at mid tide, and 12°F at high tide. The relatively small thermal plumes (compared to the size of Dorchester Bay) ensure that fish are able to escape thermal impacts from the heated effluent. In addition, resident invertebrates unable to escape the plume are likely to have high thermal tolerance or otherwise be able to adapt to periodic temperature extremes (e.g., by burrowing), given that the mudflats in the discharge area are generally shallow or exposed during low tides. EPA concludes that the temperature limits in the Draft Permit will assure the protection and propagation of the BIP. In order to ensure compliance with this temperature limit when ambient air temperatures are high, the permittee proposes to install and operate a supplemental closed-cycle cooling system. The permittee estimates that without the supplemental cooling system, the temperature differential could be exceeded about 205 hours per year (ARUP Sea Water Cooling System Summary of Expansion Options, April 13, 2011).

EPA is satisfied that the discharge of NCCW, under the rise in temperature and discharge rate limitations of the Draft Permit (10° to 12°F dependent on tide), will assure the protection and propagation of a balanced, indigenous population of shellfish, fish, and wildlife in Dorchester Bay. Therefore, UMB has been granted a variance from the water quality standards for rise in temperature at the discharge point under Section 316(a) of the CWA. These limits are also consistent with state regulations at 314 CMR § 4.05(4)(b)(2)(c), which state "alternative effluent limitations established in connection with a variance for a thermal discharge issued under 33 USC § 1251 (FWPCA, § 316(a)) and 314 CMR 3.00 are in compliance with 314 CMR 4.00."

Technology-Based Limits

As discussed in Section IV.B of this Fact Sheet, EPA has not promulgated technology-based National Effluent Guidelines for the discharge of NCCW from colleges or universities as of this time. In the absence of applicable ELGs, the permit writer is authorized under Section 402(a)(1)(B) of the CWA and 40 CFR 125.3 to establish technology-based temperature limits by applying the BAT standard on a case-by-case, BPJ basis in consideration of (i) the appropriate technology for the category or class of point sources of which the applicant is a member, based upon all available information; and (ii) any unique factors relating to the applicant (see 40 CFR 125.3(c)(2)).

In this case, replacing the existing seawater cooling system in its entirety with a closed-cycle cooling system would likely eliminate the discharge of NCCW (because the closed-cycle system would operate using fresh water) and, therefore, any potential thermal impacts. However, EPA has concluded, based on CORMIX analysis provided by the permittee and considering the aquatic community present at the discharge location, that the discharge of NCCW at the permitted limits will assure the protection and propagation of a balanced, indigenous population of shellfish, fish, and wildlife in Dorchester Bay. Technology-based temperature limits based on the installation and operation of a full scale closed-cycle cooling system at UMB would be more stringent than necessary for the protection of aquatic life. EPA, therefore, has granted a variance from technology-based temperature limits under Section 316(a) of the CWA. The Draft Permit includes a daily mean temperature limit of 80°F and a maximum daily rise in temperature limit of 10°F to 12°F (dependent on tide) based on a Section 316(a) variance.

VI. Cooling Water Intake Structure, CWA Section 316(b)

With any NPDES permit issuance or reissuance, EPA is required to evaluate or re-evaluate compliance with applicable standards, including the technology standard specified in Section 316(b) of the CWA for cooling water intake structures (CWIS). Section 316(b) requires that:

> [a]ny standard established pursuant to section 301 or section 306 of this Act and applicable to a point source shall 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 operation of CWISs can cause or contribute to a variety of adverse environmental effects, such as killing or injuring fish larvae and eggs entrained in the water withdrawn from a water body and sent through the facility's cooling system, or by killing or injuring fish and other organisms by impinging them against the intake structure's screens. CWA § 316(b) applies if a point source discharger seeks to withdraw cooling water from a water of the United States through a CWIS. CWA § 316(b) applies to this permit due to the presence and operation of a CWIS at UMB.

A. Introduction and Regulatory Background

In the absence of applicable regulations, EPA has made § 316(b) determinations on a case-by-case basis using best professional judgment (BPJ), for both new and existing facilities with regulated CWISs. In December 2001, EPA promulgated new, final § 316(b) regulations that provide specific technology-based requirements for *new* facilities of any kind with a CWIS with an intake flow greater than two (2) MGD. 66 FR 65255 (Dec. 18, 2001) (Phase I rule). The Phase I rule is in effect but does not apply to this permit because UMB is not a new facility.

In July 2004, EPA published final regulations applying § 316(b) to large, *existing* power plants (Phase II rule), defined in 40 CFR § 125.91 as existing point sources employing CWISs that withdraw at least 50 MGD and generate and transmit electric power as their primary activity. Following litigation that resulted in the remand to EPA of many of the rule's provisions, *see Riverkeeper, Inc. v. U.S. EPA*, 475F.3d 83 (2d Cir. 2007); *rev'd in part, Entergy Corp. v. Riverkeeper, Inc.*, ___ U.S. ___, 129 S.Ct. 1498, 1510 (2009), the Agency suspended the Phase II rule in July 2007. 72 FR 37107 (July 9, 2007). The suspension left only 40 CFR § 125.90(b) in effect, which provides that in the absence of applicable categorical standards, BTA determinations are to be made on a case-by-case, BPJ basis.

On June 16, 2006, EPA published the Phase III Rule, which established categorical requirements for new offshore oil and gas extraction facilities that have a design intake flow threshold of greater than 2 MGD, but dictated that the BTA would be determined on a case-by-case, BPJ basis for existing electrical generation facilities with a design intake flow less than 50 MGD and existing manufacturing facilities. 71 FR 35006 (June 16, 2006). In 2009, EPA petitioned the 5th Circuit to remand those provisions of the Phase III Rule that established 316(b) requirements for existing electrical generators with a design intake flow less than 50 MGD and at existing manufacturing facilities on a case-by-case basis using best professional judgment. On July 23, 2010, the United States Court of Appeals for the 5th Circuit issued a decision upholding EPA's rule for new offshore oil and gas extraction facilities. Further, the Court granted the request by EPA and environmental petitioners to remand the existing facility portion of the rule back to the Agency for further rulemaking. *ConocoPhillips Co. v. U.S. Envtl. Prot. Agency*, 612 F.3d 822, 842 (5th Cir. 2010).

On April 20, 2011, EPA published proposed regulations to apply CWA § 316(b) to CWISs at existing power plants and manufacturers, and new units at existing facilities. 76 FR 22174-22288 (April 20, 2011). The proposed rule combines the remanded portions of the Phase II and Phase III rules. This proposed rule, if it were effective, would not apply to this permit because UMB is not a power plant or manufacturing facility.

There are no effective national categorical standards applying § 316(b) to the CWISs at UMB. As a result, EPA has developed technology-based requirements for the facility's CWISs by applying CWA § 316(b) on a BPJ, site-specific basis.

1. Methodology for the BPJ Application of CWA § 316(b)

Neither the CWA nor EPA regulations dictate a specific methodology for developing BPJ-based limits under § 316(b). In the preamble to the proposed regulations for CWISs at existing facilities, EPA indicates that the Agency has broad discretion in determining the "best" available technology for minimizing adverse environmental impact (See 76 FR 22196). EPA has read CWA § 316(b) to intend that entrainment and impingement be regarded as "adverse impacts" that must be minimized by application of the BTA.

EPA has looked by analogy to factors considered in the development of effluent limitations under the CWA and EPA regulations for guidance concerning additional factors to consider in making a BTA determination under CWA § 316(b). In setting effluent limitations on a site-specific BPJ basis, EPA considers a number of factors specified in the statute and regulations. *See, e.g.*, 33 U.S.C. §§ 1311(b)(2)(A) and 1314(b)(2); 40 C.F.R. § 125.3(d)(3).[2] These factors include: (1) the age of the equipment and facilities involved, (2) the process employed, (3) the engineering aspects of applying various control techniques, (4) process changes, (5) cost, and (6) non-water quality environmental impacts (including energy issues). The CWA sets up a loose framework for assessing these statutory factors in setting BAT limits.[3] It does not require their comparison, merely their consideration.[4] [I]n enacting the CWA, Congress did not mandate any particular structure or weight for the many consideration factors. Rather, it left EPA with discretion to decide how to account for the consideration factors, and how much weight to give each factor.[5] In sum, when EPA considers the statutory factors in setting BAT limits, it is governed by a standard of reasonableness.[6] It has "considerable discretion" in evaluating the relevant factors and determining the weight to be accorded to each in reaching its ultimate BAT

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[2] *See also NRDC v. EPA*, 863 F.2d at 1425 ("in issuing permits on a case-by-case basis using its "Best Professional Judgment," EPA does not have unlimited discretion in establishing permit limitations. EPA's own regulations implementing [CWA § 402(a)(1)] enumerate the statutory factors that must be considered in writing permits.").

[3] *BP Exploration & Oil, Inc.*, 66 F.3d at 796; *Weyerhauser v. Costle*, 590 F.2d 1011, 1045 (D.C. Cir. 1978) (citing Senator Muskie's remarks on CWA § 304(b)(1) factors during debate on CWA). *See also EPA v. Nat'l Crushed Stone Ass'n*, 449 U.S. 64, 74, 101 S.Ct. 295, 300, 66 L.Ed.2d 268 (1980) (noting with regard to BPT that "[s]imilar directions are given the Administrator for determining effluent reductions attainable from the BAT except that in assessing BAT total cost is no longer to be considered in comparison to effluent reduction benefits").

[4] *Weyerhauser*, 590 F.2d at 1045 (explaining that CWA § 304(b)(2) lists factors for EPA "consideration" in setting BAT limits, while CWA § 304(b)(1) lists both factors for EPA consideration and factors for EPA "comparison" -- *e.g.*, "total cost versus effluent reduction benefits" -- in setting BPT limits).

[5] *BP Exploration & Oil, Inc.*, 66 F.3d at 796; *Weyerhauser v. Costle*, 590 F.2d at 1045.

[6] *BP Exploration & Oil*, 66 F.3d at 796; *Am. Iron & Steel Inst. v. EPA*, 526 F.2d 1027, 1051 (1975), *modified in other part*, 560 F.2d 589 (3d Cir. 1977), *cert. denied*, 435 U.S. 914 (1978).

determination.[7] One court has succinctly summarized the standard for judging EPA's consideration of the statutory factors in setting BAT effluent limits: [s]o long as the required technology reduces the discharge of pollutants, our inquiry will be limited to whether the Agency considered the cost of technology, along with other statutory factors, and whether its conclusion is reasonable.[8]

Thus, in determining the BTA for this permit, EPA has the discretion to consider the above-listed factors and to decide how to consider and weigh them in making its decision. Again, the factors from the effluent limitation development process are not strictly applicable as a matter of law to a BTA determination under § 316(b) because they are not specified in § 316(b). Nevertheless, EPA has looked to the effluent limitation development process for guidance and will consider these factors, and perhaps other factors, to the extent the Agency deems them relevant to its determination of the BTA. Ultimately, EPA's determination of the BTA must be reasonable.

According to 40 C.F.R. § 125.3(c)(2), a BPJ-based BAT analysis also should consider the "appropriate technology for the category of point sources of which the applicant is a member, based on all available information," and "any unique factors relating to the applicant." UMB is unique in that does not employ a cooling water intake system associated with power generating like a steam electric power plant or a manufacturing plant, which are the most common types of regulated individual facilities with case-by-case determination of 316(b) requirements in Region 1. UMB has no capacity for electrical generation, but rather utilizes seawater water to satisfy the cooling needs of the campus chiller system. As such, the appropriate technology for this facility may not be comparable to the operation of CWISs at steam electric power plants and manufacturing facilities.

Because a BPJ-based application of CWA § 316(b)'s BTA standard is conducted on a case-by-case, site-specific basis, EPA must evaluate whether the technologies under consideration are practicable (or feasible) for use at UMB. In other words, although a technology works at one facility, it might not actually be feasible at another due to site-specific issues (*e.g.,* space limitations). Thus, a technology that works at another facility but is not feasible at UMB would not be the BTA for this permit. Conversely, a feasible technology for UMB might not be feasible for another facility.

Finally, as also indicated above, the United States Supreme Court recently held that EPA is

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[7] *Texas Oil & Gas Ass'n*, 161 F.3d at 928; *NRDC v. EPA*, 863 F.2d at 1426. *See also Weyerhauser*, 590 F.2d at 1045 (discussing EPA's discretion in assessing BAT factors, court noted that "[s]o long as EPA pays some attention to the congressionally specified factors, the section [304(b)(2)] on its face lets EPA relate the various factors as it deems necessary").

[8] *Assn of Pacific Fisheries v. EPA*, 615 F.2d 794, 818 (9th Cir. 1980) (industry challenge to BAT limitations for seafood processing industry). *See also Chemical Manufacturers Assn (CMA) v. EPA*, 870 F.2d 177, 250 n.320 (5th Cir. 1989), *citing* Congressional Research Service, *A Legislative History of the Water Pollution Control Act Amendments of 1972* at 170 (1973) (hereinafter "*1972 Legislative History*") (in determining BAT, "[t]he Administrator will be bound by a test of reasonableness."); *NRDC v. EPA*, 863 F.2d at 1426 (same); *American Iron & Steel Inst.*, 526 F.2d at 1051 (same).

authorized, though not statutorily required, to consider a comparative assessment of an option's costs and benefits in determining the BTA under CWA § 316(b). *Entergy,* 129 S.Ct. 1498, 1508-1510, *rev'g in part, Riverkeeper*, 475F.3d 83. As the Supreme Court explained, in its determination, "EPA sought only to avoid extreme disparities between costs and benefits." *Entergy*, 129 S.Ct. at 1509. As the Court also explained, EPA had for decades engaged in this type of cost/benefit comparison using a "wholly disproportionate test" to ensure that costs were not unreasonable when considered in light of environmental benefits.[9] *Id.* at 1509 (citing *In re Public Service Co. of New Hampshire*, 1 E. A. D. 332, 340 (1977); *In re Central Hudson Gas and Electric Corp.*, EPA Decision of the General Counsel, NPDES Permits, No. 63, pp. 371, 381 (July 29, 1977)). In *Public Service*, EPA's Administrator stated that "I do not believe that it is reasonable to interpret Section 316(b) as requiring the use of technology whose cost is wholly disproportionate to the environmental benefit to be gained." In *Central Hudson, id.*, EPA's then General Counsel stated that:

> ... EPA must ultimately 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 estimated environmental gains (including attainment of the objectives of the Act and § 316(b)) to be derived from the modifications.

The relevant "objectives of the Act and § 316(b)" include the minimization of adverse environmental impacts from cooling water intake structures, restoring and maintaining the physical and biological integrity of the Nation's waters, and achieving, wherever attainable, water quality providing for the protection and propagation of fish, shellfish and wildlife, and providing for recreation, in and on the water. 33 U.S.C. §§ 1251(a)(1) and (2), 1326(b).

2. State Water Quality Standards

In addition to satisfying technology-based requirements, NPDES permit limits for CWISs must also satisfy any more stringent provisions of state water quality standards (WQS) or other state legal requirements that may apply, as well as any applicable conditions of a state certification under CWA § 401. *See* CWA §§ 301(b)(1)(C), 401(a)(1), 401(d), 510; 40 C.F.R. §§ 122.4(d), 122.44(d). *See also* 40 C.F.R. § 125.84(e). This means that permit conditions for CWISs must satisfy numeric and narrative water quality criteria and protect designated uses that may apply from the state's WQS.

The CWA authorizes states to apply their WQS to the effects of CWISs and to impose more stringent water pollution control standards than those dictated by federal technology standards.[10]

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[9] As the Court described, in developing the Phase II Rule, EPA had (for the first time) used a "significantly greater than test." The Court also indicated that either test was permissible under the statute. 129 S.Ct. at 1509.

[10] The regulation governing the development of WQS notes that "[a]s recognized by section 510 of the Clean Water Act, States may develop water quality standards more stringent than required by this regulation." 40 C.F.R. § 131.4(a). The Supreme Court has cited this regulation in support of the view that states could adopt water quality requirements more stringent than federal requirements. *PUD No. 1*

The United States Supreme Court has held that once the CWA § 401 state certification process has been triggered by the existence of a discharge, then the certification may impose conditions and limitations on the activity as a whole – not merely on the discharge – to the extent that such conditions are needed to ensure compliance with state WQS or other applicable requirements of state law.[11]

With respect to cooling water withdrawals, both sections 301(b)(1)(C) and 401 authorize the Region to ensure that such withdrawals are consistent with state WQS, because the permit must assure that the overall "activity" associated with a discharge will not violate applicable WQS. *See PUD No. 1*, 511 U.S. at 711-12 (Section 401 certification); *Riverkeeper I*, 358 F.3d at 200-202; *In re Dominion Energy Brayton Point, LLC*, 12 E.A.D. 490, 619-41 (EAB 2006). Therefore, in EPA-issued NPDES permits, limits addressing CWISs must satisfy: (1) the BTA standard of CWA § 316(b); (2) applicable state water quality requirements; and (3) any applicable conditions of a state certification under CWA § 401. The standards that are most stringent ultimately determine the Final Permit limits.

The Massachusetts Department of Environmental Protection (MassDEP) has designated Dorchester Bay a Class SB Water. Though the standard for Class SB waters does not include any specific numeric criteria that apply to cooling water intakes, it is nevertheless clear that MassDEP must impose the conditions it concludes are necessary to protect the designated uses of the channel, including that it provide good quality habitat for fish and other aquatic life and a recreational fishing resource. See 314 CMR 4.05(4)(b). In addition, 314 CMR 4.05(1) of the Massachusetts WQS provides that each water classification "is identified by the most sensitive, and therefore governing, water uses to be achieved and protected." This means that where a classification lists several uses, permit requirements must be sufficient to protect the most sensitive use. Finally, 314 CMR 4.05(4)(b)(2)(d) for Class SB waters states "in the case of a cooling water intake structure (CWIS) regulated by EPA under 33 USC § 1251 (FWPCA, §316(b)), the Department has the authority under 33 USC § 1251 (FWPCA, §401), M.G.L. c. 21, §§ 26 through 53 and 314 CMR 3.00 to condition the CWIS to assure compliance of the withdrawal activity with 314 CMR 4.00, including, but not limited to, compliance with narrative and numerical criteria and protection of existing and designated uses."

In summary, the Massachusetts WQSs apply to CWISs and UMB's permit requirements must be sufficient to ensure that the facility's CWIS neither causes nor contributes to violations of the

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of Jefferson County v. Wash. Dep't of Ecology, 511 U.S. 700, 705 (1994). *See also* 33 U.S.C. § 1370; 40 C.F.R. § 125.80(d). *See also* 40 C.F.R. § 125.80(d); *Riverkeeper, Inc. v. U.S. Environmental Protection Agency*, 358 F.3d 174, 200-201 (2d Cir. 2004) ("*Riverkeeper I"*).

[11] *PUD No. 1*, 511 U.S. at 711-12. holds that "in setting discharge conditions to achieve WQS, a state can and should take account of the effects of other aspects of the activity that may affect the discharge conditions that will be needed to attain WQS. The text [of CWA § 401d)] refers to the compliance of the applicant, not the discharge. Section 401(d) thus allows the State to impose "other limitations" on the project in general to assure compliance with various provisions of the Clean Water Act and with "any other appropriate requirement of State law." For example, a state could impose certification conditions related to CWISs on a permit for a facility with a discharge, if those conditions were necessary to assure compliance with a requirement of state law, such as to protect a designated use under state WQS. *See id.* at 713 (holding that § 401 certification may impose conditions necessary to comply with designated uses).

WQS and satisfy the terms of the state's water quality certification under CWA § 401. EPA anticipates that the MassDEP will provide this certification before the issuance of the Final Permit.

B. Effects of Cooling Water Intake Structures

Section 316(b) of the CWA addresses the adverse environmental impact of cooling water intake structures (CWIS) at facilities requiring NPDES permits. The principal adverse environmental impacts typically associated with CWISs evaluated by EPA are the *entrainment* of fish eggs, larvae, and other small forms of aquatic life through the plant's cooling system, and the *impingement* of fish and other larger forms of aquatic life on the intake screens.

Entrainment of organisms occurs when a facility withdraws water into the CWIS from an adjacent water body. Fish eggs, larvae, and other planktonic organisms in the water are typically small enough to pass through intake screens and become entrained along with the cooling water within the facility (See 76 FR 22197). As a result, the organisms are subjected to death or damage due to high velocity and pressure, increased temperature, and chemical anti-biofouling agents.[12] The number of organisms entrained is dependent upon the volume and velocity of cooling water flow through the plant and the concentration of organisms in the source water body that are small enough to pass through the screens of CWIS. The extent of entrainment can be affected by the intake structure's location, the biological community in the water body, the characteristics of any intake screening system or other entrainment reduction equipment used by the facility, and by season.

Impingement of organisms occurs when a facility draws water through its CWIS and organisms too large to pass through the screens, and unable to swim away, become trapped against the screens and other parts of the intake structure (See 76 FR 22197). Impinged organisms may be killed, injured or weakened, depending on the nature and capacity of the plant's filter screen configuration, cleaning and backwashing operations, and fish return system used to return organisms back to the source water.[12] In some cases, contact with screens or other equipment can cause an organism to lose its protective slime and/or scales, or suffer other injuries, which may result in delayed mortality. The quantity of organisms impinged is a function of the intake structure's location and depth, the velocity of water drawn to the entrance of the intake structure (approach velocity) and through the screens (through-screen velocity), the seasonal abundance of various species of fish, and the size of various fish relative to the size of the mesh in any intake barrier system (e.g., screens). For resident fish in Savin Cove, the CWISs pose multiple threats to single populations in that organisms are exposed to entrainment mortality as eggs and larvae and impingement mortality as juveniles and adults. It should be noted that this discussion focuses on fish because more information is available on CWIS impacts to fish, but CWISs can also harm other types of organisms (*e.g.*, shellfish).

The most direct impact of impingement and entrainment mortality is the loss of large numbers of aquatic organisms, including fish, benthic invertebrates, phytoplankton, fish eggs and larvae, and other susceptible organisms. EPA believes that reducing impingement and entrainment mortality

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[12] EPA 2011. Environmental and Economic Benefits Analysis of the Proposed Section 316(b) Existing Facilities Regulation: Section 2.3 CWIS Impacts to Aquatic Ecosystems. EPA. March 28, 2011.

will contribute to the health and sustainability of fish populations by lowering the total mortality rate for these populations. For many species, these losses may not lead to measurable reductions in adult populations; however, these losses can contribute to impacts to threatened and endangered species, indigenous populations, and a reduction in ecologically critical aquatic organisms, including important elements of an ecosystem's food chain. For instance, because predation rates are often linked to concentration of prey, reductions in a prey fish from impingement and entrainment mortality may indirectly result in reductions to predator species or increases to species in apparent competition. In addition, impingement and entrainment mortality can diminish a population's compensatory reserve, which is the capacity of a species to increase survival, growth, or reproduction rates in response to environmental variability, including temperature extremes, heavy predation, disease, or years of low recruitment.[13]

For commercially and recreationally important stocks, impingement and entrainment mortality represent an additional source of mortality to populations being harvested at unsustainable levels. Although reductions in impingement and entrainment mortality may be small in magnitude compared to fishing pressure and often difficult to measure due to the low statistical power of fisheries surveys, a reduction in mortality rates on overfished populations is likely to increase the rate of stock recovery. Thus, reducing impingement and entrainment mortality may lead to more rapid stock recovery, a long-term increase in commercial fish catches, increased population stability following periods of poor recruitment, and, as a consequence of increased resource utilization, an increased ability to minimize the invasion of exotic species. Finally, fish and other species affected directly and indirectly by CWISs can provide other valuable ecosystem goods and services, including nutrient cycling and ecosystem stability. [13]

C. Impingement and Entrainment at UMB

At the request of EPA and MassDEP, UMB conducted an impingement sampling study from April through July 2010. Impingement samples were collected from the traveling screen during a 15-minute screen rotation following an 8-hour cycle under varying tidal conditions. Sampling was conducted weekly during April, twice per week during May, and three times per week during June and July. UMB estimated that a total of 1,197 individuals of four species (Atlantic tomcod, cunner, longhorn sculpin, and winter flounder) were impinged during the study. Winter flounder were the most abundant individuals impinged (78% of total) and impingement was most frequent in July, with approximately 68% of total impingement occurring during this month.

As requested by EPA and MassDEP as part of the permit application, UMB also conducted a site-specific entrainment study from May through July of 2010. Entrainment samples were collected three times per week (non-consecutive samples) beginning on May 11 through July 30. Eggs and larvae were collected using a 0.333 mm plankton net to filter 100 m^3 samples of seawater pumped from the chamber of the pumphouse after passing through the traveling screen but prior to the heat exchangers.

During the 2010 entrainment study, UMB collected eggs from 9 taxa (in many cases eggs from several species were indistinguishable and grouped into a single taxa, for instance,

[13] EPA. Environmental and Economic Benefits Analysis for Proposed Section 316(b) Existing Facilities Rule. March 28, 2011. EPA 821-R-11-002.

cunner/tautog) and larvae from 13 species. Of the estimated 15 million eggs and larvae entrained during the study period, eggs comprised 83.5% of the total sample compared to 16.4% larvae. The total sample was dominated by cunner-tautog eggs (nearly 76.7%), followed by silverside larvae (10.6%), wrasse eggs (2.7%), rockling-hake-butterfish eggs (2.5%), river herring-rainbow smelt larvae (1.8%), fourspot-windowpane eggs (1.2%), and stage 2 rainbow smelt larvae (1.1%).

In response to a request by MassDEP, UMB performed an adult equivalent analysis and foregone production analysis based on existing entrainment data for winter flounder, American lobster, rainbow smelt, and river herring (May 18, 2011 Memo: Biological Analysis Request Response). Adult equivalent analysis is a method for expressing entrainment (or impingement) losses as an equivalent number of individuals at one life stage, in this case, age-1 (Goodyear 1978).[14] During the 2010 entrainment study (actual daily pumping rates based on operation from May through July) the permittee estimates a loss of approximately 1,295 age-1 equivalents of the four requested species, including about 126 age-1 winter flounder and 1,168 age-1 rainbow smelt.

Production forgone is the expected total amount of biomass, in pounds, that would have been produced had individuals not been entrained (Rago 1984).[15] According to the May 18, 2011 Biological Analysis Request Response Memo, the permittee estimates total forgone production for winter flounder, rainbow smelt, and river herring under 2010 actual operating conditions was 1,007 pounds.

D. Assessment of Cooling Water Intake Structure Technologies

The design, location, construction and capacity of UMB’s CWIS must reflect BTA for minimizing adverse impacts from impingement and entrainment, as required by CWA § 316(b). The location of a CWIS in the waterbody is an important factor in minimizing its adverse environmental impacts. EPA evaluated the location of the CWIS in the waterbody, the type of waterbody, and the depth of the intake structure to determine how to best minimize adverse environmental impacts under CWA § 316(b). The design, construction, and operation of a CWIS are additional important factors in minimizing its adverse biological impacts. Fish protection technologies, including physical exclusion systems such as barrier nets or screens, may reduce impingement and entrainment impacts if properly designed, installed, and maintained. Capacity (the quantity of seawater being withdrawn) is another important factor that can minimize the adverse environmental impacts of a CWIS. Reducing capacity results in a corresponding reduction in the number of organisms entrained, thereby reducing entrainment mortality. A reduction in flow can be achieved through implementation of a closed-cycle cooling system (e.g., cooling towers), by using an alternative source of cooling water (e.g., storm water), or by using a variable frequency drive (VFD) to adjust pump capacity to meet cooling water demand. EPA assumes a reduction in flow is proportional to the reduction in entrainment mortality because fewer organisms are subject to CWIS impacts. In addition, a capacity reduction can minimize impingement if the maximum pumping volume results in a through-screen intake velocity (TSV)

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[14] Goodyear, C. P. 1978. Entrainment impact estimates using the equivalent adult approach. United States Fish and Wildlife Service, FWS/OBS-78/65, Ann Arbor, MI.
[15] Rago, P. J. 1984. Production forgone: An alternative method for assessing the consequences of fish entrainment and impingement losses at power plants and other water intakes. Ecol. Model. 24:789−111.

no greater than 0.5 fps.

1. Existing Cooling Water Intake Structure Technology

The facility withdraws water from Savin Hill Cove to use as once-through NCCW in its cooling systems in campus buildings. The pumphouse and intake structure are located on the southern side of Columbia Point peninsula in Savin Hill Cove. A schematic of the intake structure is included in Attachment D. The intake structure chamber is approximately 10 feet deep and 7 feet-2 inches wide. The intake is fully submerged even at MLLW. According to the permittee, existing CWIS withdrawals range from approximately 0.34% of the volume of the tidal flow at a pumping rate of 3,750 gpm (typical of winter operations) to 1.34% at a pumping rate of 15,000 gpm (the 2010 maximum rate). At the design capacity, the intake withdraws 2.34% of the tidal volume. No chemicals are added to the seawater at any point in the process, and the seawater does not combine with any other process flows or potable water before being discharged to Dorchester Bay.

An intake tunnel approximately 87 ft long and 10 ft deep extends from a 5 ft fiberglass intake baffle to the traveling screen in the pumphouse basin chamber (see Attachment D). The intake baffle prevents larger, benthic organisms from entering the vault, while a 6-inch “stop log” trash rack prevents larger debris from entering the intake tunnel. The pumphouse basin is a rectangular chamber 32 feet deep oriented perpendicular to shore. A new, 7-ft wide, 3/8-inch mesh traveling screen, which encompasses the width and depth of the pumphouse basin chamber, was installed in 2007. A separate 1/8-inch strainer filters seawater prior to entering the pumphouse heat exchangers. The traveling screen is currently rotated for approximately 15 minutes once every 8 hours. During the 15-minute cleaning cycle, a pressurized spraywash rinses debris and any impinged organisms are transported to Dorchester Bay through a 10-inch fiberglass fish return pipe, which combines with heated NCCW before being discharged via Outfall 001.

The pumphouse is equipped with one small (3,750 gpm) and three large (7,500 gpm) single-speed pumps. The total design capacity of the system is 26,250 gpm, or 37.8 MGD. Each pump has a fixed rate, and operators change the combination of operating pumps to vary the pumping rate. The intake structure operates 24 hours a day, 365 days a year, with a typical operating range of 3,750 to 11,250 gpm (5.4 to 16.2 MGD). In winter, when cooling water needs are low, UMB only operates the small pump (5.4 MGD) and in spring and fall, UMB activates one of the large pumps (10.8 MGD). In summer, when cooling needs are greatest, UMB operates both the small pump and one of the large pumps (16.2 MGD). According to the permittee, the maximum pump rate (September 2000 to December 2010) was met by running two large pumps at a total capacity of 15,000 gpm (21.6 MGD).

The velocity of water entering a CWIS, or intake velocity, exerts a direct physical force against which fish and other organisms must act to avoid impingement. As intake velocity increases at a CWIS, so does the potential for impingement. EPA considers intake velocity to be one important factor that can be controlled to minimize adverse environmental impacts from impingement at CWISs. See 65 FR 49060, 49087 (Aug. 10, 2000). EPA has identified a “through screen” velocity (TSV) threshold of 0.5 feet per second (fps) as protective to minimize impingement of most species of adult and juvenile fish. This determination is fully discussed at 65 FR 49060, 49087-88. According to ERM's Best Technology Available Assessment Report (submitted with the permit application dated December 2010), the maximum TSV of the traveling screen at UMB between 2000 and 2010 (at 15,000 gpm) was 0.5 fps at mean low tide and 0.3 fps at mean high tide, which is consistent with the protective velocity for impingement. In the Sea Water Intake Velocity and Temperature Analysis submitted with the supplemental permit application material in July 2011, the permittee estimates that the TSV could exceed 0.5 fps approximately 19.8% of the year at current cooling water loads and pump technology.

The existing technology is not BTA for impingement based on infrequent screen rotation, an inadequate fish return system, and TSV. The screen is rotated once every 8 hours, which could lead to extended impingement duration (more than 7 hours) if an organism becomes impinged shortly after rotation completion. During laboratory studies, longer durations of impingement tended to result in higher mortality, injury, and scale loss (EPRI 2006).[16] Decreasing the impingement duration by rotating traveling screen continuously (or, at a minimum, as frequently as feasible based on manufacturer's recommendations) may improve survival of impinged organisms. In addition, the TSV exceeds the recommended level for avoidance of fish nearly 20% of the time on an annual basis, and the fish return system discharges live organisms and debris into the same pipe as the heated effluent from the heat exchangers. The existing technology is not BTA for entrainment because the traveling screen mesh size (3/8-inch) is too large to block small eggs and larvae from becoming entrained through the system.

As part of campus expansion under its 25-year Master Plan, UMB is proposing construction of an Integrated Science Complex and General Academic Building in the next 5 years, both of which UMB proposes connecting to the existing NCCW system. The additional buildings (minus the old Science Building) will nearly double cooling demand compared to current conditions. If this demand is fulfilled by the NCCW seawater system, the volume of seawater withdrawals would increase over existing levels. UMB projects that the additional load could be met by running three large single-speed pumps simultaneously with a total capacity of 22,500 gpm (7,500 gpm more than current cooling flow rates). At this pump rate, the TSV could increase to 0.82 fps at mean low tide, would exceed 0.5 fps more than 26% of the time on an annual basis, and the percent of tidal flow withdrawn would increase to 2%. The increase in water withdrawals and higher TSV would likely result in greater losses due to entrainment and impingement. Based on data collected in 2010, EPA estimates that entrainment under future cooling demands could result in the loss of an average of 35 million eggs and larvae during the peak entrainment season (May to July), with a potential for the loss of 52 million organisms in a season characterized by high densities of eggs and larvae in Savin Hill Cove (see Attachment E).

In summary, several components of the existing technology (frequency of screen rotation, fish return, and TSV) are not consistent with the BTA to minimize impingement and entrainment losses. Further, anticipated increases in future seawater withdrawals with the construction of two new academic buildings will likely increase entrainment and impingement compared to current levels. The following section discusses potentially available technological alternatives for ensuring that the location, design, construction, and capacity of UMB's CWIS reflect the BTA

[16] EPRI 2006. Laboratory Evaluation of Modified Ristroph Traveling Screens for Protecting Fish at Cooling Water Intakes. EPRI, Palo Alto, CA: 2006. 1013238.

for minimizing impingement and entrainment based on BPJ. EPA considered engineering, environmental, economic, and other issues for each technology to evaluate its availability and determine BTA to minimize adverse environmental impacts from the CWIS at UMB. For this analysis, EPA considered the permit applications from August 2009, December 2010, and July 2011 and supplemental information, including the Best Technology Available Assessment Report, Supplemental Impingement and Entrainment Study, and analysis of seawater cooling expansion, among others.

2. Location

The CWIS is located in Savin Hill Cove along the southern shoreline of the UMB peninsula approximately 3,500 feet across from the mouth of the Neponset River. The depth of water above the top of the seawater intake screen is dependent on tide condition and surface water elevation but the CWIS is fully submerged at all tide levels. At low low tide, the depth of water above the CWIS is 1.1 feet.

The cove in front of the intake structure has been dredged to allow clear passage of flows. Immediately adjacent to the intake, the channel is 19 feet deep at MLLW, but quickly rises to zero depth outside of the dredged portion. A 5-ft fiberglass baffle wall discourages benthic organisms from entering the intake tunnel. The depth of water in the channel at low low tide is 12.5 feet. The intake channel extends from the CWIS to a dredged navigational channel providing access to UMB and the Savin Hill Yacht Club. This channel was last dredged in 2006. With the exception of the dredged channels, the majority of Savin Hill Cove consists of intertidal to shallow subtidal mudflats that are exposed at low tide.

EPA has determined that no alternative CWIS location is available that would better minimize adverse impacts over the existing CWIS location. Savin Hill Cove is generally shallow, and constructing a new CWIS in another location would likely require extensive dredging and construction activities, which would result in substantial habitat disturbance.

3. Design

Physical Exclusion Systems

UMB evaluated the technical feasibility of several physical exclusion technologies for reducing entrainment mortality, including fine mesh wedgewire screens, aquatic filter barriers, and traveling screens (BAT Report ERM 2010). In principal, all of these technologies minimize entrainment by using mesh sizes small enough to exclude entrainable aquatic organisms (such as eggs and larvae). Wedgewire screens also engage hydrodynamic factors (such as the water velocity past the structure) to prevent organisms from being entrained. Physical exclusion systems can be designed to maintain a through-screen velocity (TSV) of 0.5 fps or less to minimize impingement.

The CWIS is located in an area of shallow mudflats that are exposed at low tide, except for a narrow channel dredged to a depth of 12.5 feet at low low tide. The CWIS is located across from the Savin Hill Yacht Club and near the Dorchester Yacht Club in an area that experiences heavy recreational boating use. The limited area and depth of the dredged intake channel is not adequate to accommodate a wedgewire screen or aquatic filter barrier large enough for the required cooling water volume at an appropriate TSV. In addition, both technologies could interfere with navigation of boats in Savin Hill Cove. Therefore, due to engineering aspects related to the limited width and depth of the intake channel, and non-water quality boat navigation impacts, neither wedgewire screens nor an aquatic filter barrier were considered available technologies at UMB to minimize entrainment.

It is technically feasible to install and operate fine mesh traveling screens at UMB with a mesh size of 0.5 mm, which would be necessary to prevent entrainment of eggs and larvae present in Savin Hill Cove. However, in order to maintain a protective TSV, the surface area of the fine-mesh screens must be substantially increased. According to UMB, accommodating multiple fine mesh screens would require extensive expansion of the existing pump house and CWIS as well as the intake channel. The expansion of the associated structures would result in substantial disturbance to the aquatic environment during construction and possible habitat loss. Moreover, it is not clear if this technology will effectively reduce mortality of eggs and larvae. Eggs and larvae that would otherwise have become entrained will be excluded by the 0.5 mm mesh size, but are likely to become impinged on the screen, rinsed into a trough, and transported to the receiving water through the fish return system. To date, little research has been conducted on whether the fragile eggs and larvae that would have been lost to entrainment survive impingement on the screens. If survival is low, then the resulting loss of eggs and larvae due to the CWIS is not reduced. Due to the limitations associated with the size of the intake channel and the existing pump house, and the environmental impacts of expanding the channel and pump house, combined with uncertainty regarding the effectiveness of the technology to reduce mortality of eggs and larvae, EPA had determined that fine mesh traveling screens are not available UMB to minimize entrainment.

4. Capacity

Alternate Sources of Cooling Water

The use of alternative sources of water, such as storm water, for cooling purposes could reduce the volume of seawater needed for cooling and subsequently would reduce impingement and entrainment. According to UMB, approximately 50,000 gpd of grey water would be available to be collected and treated by 2035 (May 2010 Arup Energy and Utility Master Plan). This volume represents only 0.3% of current cooling water needs.

Based on the minimal volume of stormwater currently collected from facility, EPA has concluded that the existing stormwater collection system to supplement NCCW needs would be unlikely to contribute a substantial percentage of cooling water flow and is not required at this time. EPA has concluded that re-using alternative sources of water to supplement NCCW volume should be considered in the future if the opportunity arises, but alternative water sources are not available as the BTA at UMB at this time.

Closed-Cycle Cooling

Closed-cycle cooling (CCC) recirculates cooling water and can reduce cooling water intake volumes 94 percent or better, in turn directly reducing the number of organisms entrained in the CWIS (76 FR 22200). To date, CCC is one of the most effective means of reducing entrainment and impingement because it dramatically reduces the volume of cooling water required (76 FR 22207).

UMB evaluated the feasibility of retrofitting the NCCW system with a full-scale, 100% CCC system to reduce entrainment and impingement. A complete conversion of the existing open-cycle system would require 7 mechanical draft freshwater cooling tower cells with a footprint of 60 feet wide by 120 feet long by 28 feet tall. The existing chiller system uses freshwater in the condenser loop. Therefore, potable water would be used in the wet mechanical draft cooling towers, which would result in a 100% reduction in seawater withdrawals at the CWIS and would eliminate impingement and entrainment.

Converting to a CCC system would consume 13.4 million kilowatt hours of electricity and 45.4 million gallons of potable water per year (ARUP Sea Water Cooling System Summary of Expansion Request, July 2011). In comparison, the entire campus's current potable water consumption is 15.2 million gallons per year (based on 2010 data). Among the available options, CCC has the highest capital ($5.6 million) and annual operations and maintenance costs ($125,000). The cooling towers would be located near the chiller plant, in close proximity to the library and academic buildings. A 28-foot high industrial complex next to the HarborWalk is inapposite to the campus master plan, which emphasizes opening view corridors from the interior campus to the bay. The increased noise from cooling towers may be disruptive for the nearby library and surrounding academic buildings. According to analysis provided by ARUP (June 28, 2011, permit application attachment 19), at worst case octave band analysis, a conversion to CCC would result in noise levels outside the library between 70 and 75 dB(A), equivalent to a loud radio in a typical domestic room.

Installing and operating a CCC system is technically feasible from an engineering and process perspective. CCC will eliminate the need to withdraw seawater from Savin Hill Cove, and thus the impingement and entrainment of aquatic species associated with the CWIS. However, energy and water consumption and carbon emissions from CCC conflicts with a 2007 mandate (Executive Order 484) that directs state facilities to reduce "energy consumption derived from fossil fuels and emissions associated with such consumption" with goals of a 25% reduction in greenhouse gas emissions (from 2002 baseline), a 20% reduction in energy consumption (from 2004 baseline), and a 10% reduction in potable water consumption (from 2006 baseline) by 2012. While CCC is technically feasible to install and operate at UMB, converting to a freshwater CCC system is the most costly option, and will result in non-water quality impacts, including negative impacts to aesthetics, increased noise levels near the library, and substantial increases in energy use, water use, and carbon emissions.

Variable Frequency Drive

A variable frequency drive (VFD) will allow the permittee to adjust the pumping frequency of an existing single-speed pump. Currently UMB's pumping rate is controlled by running a combination of single-speed pumps. While this allows the permittee to pump less than the design capacity at any given time, the pump rate can only be adjusted on a coarse scale, with pumping rates at 3,750 gpm, 7,500 gpm, 11,250 gpm, 15,000 gpm, or 22,500 gpm. By installing and operating VFDs on some or all of the existing single-speed pumps, UMB would be able to finely adjust the pumping rate according to the actual cooling needs of the facility. By more finely controlling the volume of water being withdrawn to meet cooling needs, UMB can reduce the overall volume of water withdrawn, and therefore, reduce adverse impacts due to impingement and entrainment.

UMB has proposed retrofitting the existing sea water pumps with VFDs in order to better match water withdrawals with cooling water demand. The permittee estimated the cost of the retro fit would be $20,000 for the small pump and $40,000 for each large pump. UMB has proposed the use of VFDs to 1) reduce seawater withdrawals, and therefore, entrainment, from existing levels even as cooling demand increases following construction of the Integrated Science Complex and General Academic Building; and 2) maintain a maximum through-screen velocity (TSV) of 0.5 fps at the intake screen to minimize impingement. UMB estimated at a worst-case pump rate of 19,756 gpm at high tide the intake velocity, both through the intake screen and at the inlet to the intake tunnel (at the baffle wall), would be about 0.5 fps. UMB proposed operating VFDs at the existing sea water pumps at a maximum rate of 13,541 gpm (19.5 MGD) and an average daily rate of 9,097 gpm (13.1 MGD). Combining a supplemental cooling tower to offset heat loads on days with high ambient temperature (see discussion in Section V.C.3) would further reduce sea water withdrawals to a maximum daily rate of 12,778 gpm (18.4 MGD) and average daily rate of 8,958 gpm (12.9 MGD). EPA has determined that VFDs are an available technology to minimize entrainment at UMB.

5. Summary

Unlike traditional manufacturing or electrical generating facility subject to CWA 316(b) requirements, which use cooling water to extract heat generated in industrial processes, in the production of electricity, or to cool raw or processed material, UMB uses its cooling water to extract heat generated from its campus heating and air conditioning needs. EPA evaluated several potential technologies to minimize adverse environmental impacts resulting from entrainment and impingement at UMB, including physical exclusion technologies, alternative water sources, closed-cycle cooling (CCC), and variable frequency drives (VFDs). The resulting BTA determination was made on a case-by-case, BPJ basis in part informed by the six statutory factors used in setting BAT effluent limitations under 40 CFR §125.3(d)(3). In addition to these factors, EPA also considers whether a technology is feasible for a facility, a comparative assessment of costs and benefits, and unique factors related to applicant.

Regarding the location of the CWIS, its location in an estuary is not ideal due to the presence of early life stages of fish and other aquatic organisms. However, an alternative location that would minimize impingement and entrainment is not available at this time.

Physical exclusion systems such as fine mesh wedgewire screens, aquatic filter barriers, and traveling screens were determined to be unavailable at UMB due the limited size and depth of the intake canal and/or pump house and potential interference with navigation in Savin Hill Cove, which are related to engineering and non-water quality impacts of the technology. An alternative source of cooling water (e.g., stormwater) sufficient to meet existing and future demand is also unavailable at this time. There are two potentially available technological options to minimize adverse impacts from impingement and entrainment at UMB: CCC and VFDs.

Impingement

Installation and operation of either CCC or VFDs will likely reduce impingement of adult and juvenile fish at UMB. Converting to a freshwater CCC system will eliminate impingement by eliminating the intake of seawater. Alternatively, operating VFDs to maintain a TSV of 0.5 fps or less, which is consistent with the recommended TSV for protection of adult and juvenile fish from impingement, will likely allow most fish to avoid becoming impinged. In addition, combining the operation of VFDs with improvements to the existing traveling screen and fish return will further reduce impingement mortality. Rotating the screen more frequently to reduce impingement duration and establishing a new, dedicated fish return system to transport impinged organisms from the traveling screen back to the receiving water will also likely improve survival of impinged organisms.

Entrainment

Converting the existing NCCW system to a CCC system is feasible based on consideration of the cooling process, process changes, and engineering aspects involved in retrofitting mechanical draft cooling towers. On the other hand, CCC is the most expensive technology and would result in non-water quality impacts (in particular, increased noise), as well as greater carbon emissions, potable water consumption, and energy use. Compared to VFDs, CCC would increase carbon emissions and energy use by 44%, and nearly triple freshwater consumption compared to 2010 campus use. In determining if CCC is BTA for UMB, EPA considered whether the loss of eggs and larvae warrant the expenditure and increase in non-water quality impacts associated with CCC.

In 2010, UMB conducted a 12-week study to estimate entrainment losses due to the intake of seawater for cooling. Based on the data, UMB estimated a loss of 15 million eggs and larvae between May and July at actual pump rates. EPA analyzed the 2010 data using a bootstrap statistical method to approximate mean entrainment (as summarized in Attachment E). This analysis suggested that UMB likely entrained between 10.6 and 25.3 million (median of 16.8 million) eggs and larvae between May and July 2010. During the 2010 study, UMB entrained a number of rainbow smelt and river herring larvae. These two species are of particular concern because both are experiencing population declines (e.g., rainbow smelt was listed as a federal Species of Concern in 2004 and a petition to list river herring under the Endangered Species Act is currently being reviewed [76 Federal Register 67652, November 2, 2011]). However, the limited dataset precludes EPA from determining if the observed entrainment rates for these species are representative of CWIS impacts at UMB. While preliminary data suggests that UMB's CWIS may cause adverse impacts due to entrainment, additional biological monitoring is necessary to adequately characterize the levels of entrainment for this facility.

Ichthyoplankton density is highly variable over both short (hourly) and long (seasonally or annually) time periods and the limited duration of the available study is not sufficient to characterize the variability to make an accurate assessment of entrainment. The statistical bootstrap procedure EPA used to produce a mean and range for entrainment is useful for comparing entrainment under different pump scenarios for the study period, but is not sufficiently robust to precisely estimate entrainment losses. More than one year of data is preferred in a determination of BTA to minimize adverse impacts due to entrainment. Adverse impacts from heated effluent is sometimes considered in conjunction with entrainment and impingement losses when determining if CCC is warranted.[17] In this case, EPA has determined that UMB's thermal effluent is protective of the biological community in Dorchester Bay (see Section V.C.3 of this Fact Sheet). At this time, EPA concludes that, based on the current knowledge of entrainment impacts at UMB, the cumulative costs of CCC are not warranted (including consideration of capital, operation, and maintenance costs, in addition to the environmental costs of increased energy use, carbon emissions, and potable water consumption). Therefore, CCC is not required at this time; however, if UMB were to install CCC, the technology would eliminate the need for sea water withdrawal and, therefore, would satisfy Section 316(b) of the CWA.

Reducing entrainment mortality through the use of VFDs to minimize sea water withdrawal is an available BTA at UMB. The permittee has proposed to install and operate VFDs on the existing pumps to adjust sea water withdrawals to meet cooling water demands and to maintain a TSV no greater than 0.5 fps at the intake screen and inlet to the intake tunnel. Reducing the intake volume will cause the temperature of the effluent to increase moderately, but EPA and MassDEP concluded that the permitted rise in temperature (10°F to 12°F dependent on tide) will continue to provide for the protection and propagation of a balanced, indigenous population of fish, shellfish, and wildlife in Dorchester Bay (see Section V.C.3 of this Fact Sheet). UMB has also proposed operation of a supplemental cooling tower located on the roof of the new science complex in order to meet the rise in temperature limit in the draft permit and ensure that a TSV of less than 0.5 fps is maintained to minimize impingement. The supplemental cooling tower would be operated when ambient air temperature is high.

VFDs, plus a supplemental cooling tower (proposed BTA), will reduce seawater withdrawals compared to existing cooling demands, and will substantially reduce sea water withdrawals in the future after the science complex and academic building are added (Table VI-1). The proposed BTA will reduce annual average sea water withdrawal by 18% compared to existing conditions and 24% compared to projected future conditions. Corresponding reductions in entrainment may be proportionally greater than withdrawals suggest because the time period

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[17] For example, see the analysis in the *Clean Water Act NPDES Permitting Determinations for Thermal Discharge and Cooling Water Intake Structures* for Brayton Point Station (MA0003654) (available at http://www.epa.gov/region1/braytonpoint/index.html) and Merrimack Station (NH0001465) available at http://www.epa.gov/region1/npdes/merrimackstation/pdfs/MerrimackStationAttachD.pdf.

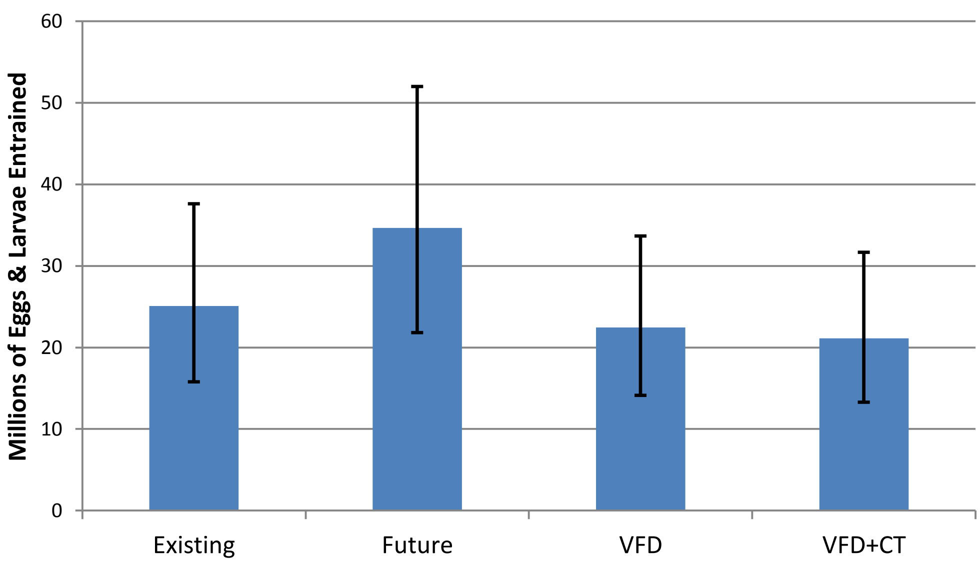
Table VI-1. Estimated annual withdrawal and pump rate under three operating scenarios.

	Existing Cooling Needs	Future Cooling Needs	VFDs + Suppl. Cooling Tower
Annual Volume (MG)	5,756	6,524	4,725
Max Pump Rate (MGD)	21.6	32.4	18.4
Annual Average Daily Pump Rate (MGD)	15.8	17.1	12.9

when densities of eggs and larvae tend to be greatest (spring), corresponds to the period when average and maximum daily pump rates are substantially lower with VFDs compared to the existing technology.

The proposed BTA will reduce entrainment compared to current levels even as future cooling demands increase with the addition of the science complex and academic building. EPA calculated a range for potential entrainment under proposed pump rates (ARUP Sea Water Intake Volume and Temperature, July 2011 Permit Application Attachment 20) at the CWIS for existing conditions, existing technology with future load, VFDs, and VFDs plus a supplemental cooling tower (Figure VI-1) (See Attachment E for explanation of bootstrap analysis).

Figure VI-1. Estimated entrainment (May through July) under four proposed pumping scenarios: existing, future, VFD, and VFD plus a supplemental cooling tower (VFD+CT). Error bars represent minimum and maximum mean value (mean range) of bootstrap sample estimates. (See Attachment E).



VFDs will enable UMB to reduce sea water withdrawals commensurate with cooling demand. Compared to the existing technology, withdrawal of sea water during the warmest period (May through September) will be substantially lower with VFDs. As cooling demand rises beyond the capacity of the existing small pump (5.4 MGD), UMB must currently operate a large pump (10.8 MGD), which automatically doubles the intake volume. With VFDs, the pump rate can be adjusted more finely between 5.4 MGD and 10.8 MGD. Control over pump speed becomes more significant as cooling demands increase with expansion of the campus and more pumps have to operate to meet demand. Based on analysis of estimated pump rates and 2010 entrainment data, VFDs will likely result in substantial reductions in entrainment with limited construction impacts and at a reasonable cost. Compared to estimated future pump rate, the proposed BTA (VFD+CT) would potentially reduce entrainment by 43%. During a year characterized by relatively high densities of eggs and larvae (based on 2010 data), the proposed BTA could save more than 20 million eggs and larvae between May and July. EPA has determined that, at this time, VFDs plus a supplemental cooling tower, as proposed by UMB, is BTA to reduce entrainment for this facility.

As illustrated in Figure VI-1, the cooling tower reduces entrainment more than VFDs alone, but because its operation is limited to the warmest days of the year, the resulting flow reductions are limited. As a supplement to the BTA requirements in the Draft Permit, EPA requires UMB to evaluate the feasibility of operating the cooling tower year-round and estimate the potential additional reductions in flow and entrainment that would result from increased operation of the cooling tower.

E. BTA Determination

Based on current CWIS operations, information available at this time, and the location, design, capacity and construction of the CWIS, EPA has determined that UMB's CWIS has the potential to cause adverse environmental impacts due to impingement and entrainment. In order to minimize adverse environmental impacts, EPA is requiring the following as BTA in Part I.D. of the Draft Permit:

(1) The permittee shall install variable frequency drives (VFDs) on at least two of the large salt water pumps and operate the VFDs in conjunction with a supplemental cooling tower to:

- Limit the maximum daily intake flow to 18.4 MGD, maximum monthly average flow to 17.2 MGD, and annual average daily flow to 12.9 MGD.
- Limit the maximum through-screen velocity to no more than 0.5 feet per second.

(2) The permittee shall rotate the traveling screen continuously, or the maximum rotation frequency recommended by the manufacturer if continuous rotation is not feasible, in order to minimize impingement duration.

(3) The permittee shall install and operate a new fish return trough that transports impinged fish and other aquatic organisms to Dorchester Bay in a separate trough from the non-contact cooling water discharge pipe. The new fish return trough shall avoid vertical drops and sharp turns or angles. The end of the new fish return trough shall be submerged at all stages of tide at a location that minimizes the potential for re-impingement.

EPA has determined that the anticipated environmental improvements to Savin Hill Cove and Dorchester Bay from these steps warrant the expenditure that would be required of the permittee. In addition, the Draft Permit requires that the permittee conduct entrainment sampling three times per week from February 15th to July 31st for the duration of the permit. EPA recognizes that intensive biological sampling can be costly. However, given the uncertainty of the magnitude of entrainment impacts and the status of several key species, EPA determined that a comprehensive biological monitoring program is necessary to characterize the entrainment impact and to determine if the BTA requirements in the Draft Permit successfully reduce entrainment losses. Finally, the Draft Permit requires the permittee to evaluate the feasibility of operating the proposed supplemental cooling tower year-round and to submit to EPA and MassDEP a *Cooling Tower Operational Study* that summarizes the results of the evaluation and estimates flow reductions, energy use, and potable water use resulting from increased operation of the cooling tower. If the permittee were to install and operate a freshwater CCC system, the need to withdraw seawater (and thus, entrainment) would be eliminated and no biological monitoring would be necessary.

VII. Essential Fish Habitat

Under the 1996 Amendments (PL 104-267) to the Magnuson-Stevens Fishery Conservation and Management Act (16 U.S.C. § 1801 et seq. (1998)), EPA is required to consult with the National Marine Fisheries Services (NMFS) if EPA's action or proposed actions that it funds, permits, or undertakes, may adversely impact any essential fish habitat such as: waters and substrate necessary to fish for spawning, breeding, feeding, or growth to maturity (16 U.S.C. § 1802 (10)). Adversely impact means any impact which reduces the quality and/or quantity of EFH (50 C.F.R. § 600.910 (a)). Adverse effects may include direct (e.g., contamination or physical disruption), indirect (e.g., loss of prey, reduction in species' fecundity), site-specific or habitat-wide impacts, including individual, cumulative, or synergistic consequences of actions.

Essential fish habitat is only designated for species for which federal fisheries management plans exist (16 U.S.C. § 1855(b) (1) (A)). EFH designations for New England were approved by the U.S. Department of Commerce on March 3, 1999. Table 2 includes a list of the EFH species and applicable life stage(s) for Dorchester Bay:

Species	Eggs	Larvae	Juveniles	Adults
Atlantic cod *(Gadus morhua)*	X	X	X	X
haddock *(Melanogrammus aeglefinus)*	X	X		
pollock *(Pollachius virens)*	X	X	X	X
whiting *(Merluccius bilinearis)*	X	X	X	X
red hake *(Urophycis chuss)*	X	X	X	X
white hake *(Urophycis tenuis)*	X	X	X	X

winter flounder *(Pseudopleuronectes americanus)*	X	X	X	X
yellowtail flounder *(Limanda ferruginea)*	X	X	X	X
windowpane flounder *(Scophthalmus aquosus)*	X	X	X	X
American plaice *(Hippoglossoides platessoides)*	X	X	X	X
ocean pout *(Macrozoarces americanus)*	X	X	X	X
Atlantic halibut *(Hippoglossus hippoglossus)*	X	X	X	X
Atlantic sea scallop *(Placopecten magellanicus)*	X	X	X	X
Atlantic sea herring *(Clupea harengus)*		X	X	X
bluefish *(Pomatomus saltatrix)*			X	X
long finned squid *(Loligo pealeii)*	n/a	n/a	X	X
short finned squid *(Illex illecebrosus)*	n/a	n/a	X	X
Atlantic butterfish *(Peprilus triacanthus)*	X	X	X	X
Atlantic mackerel *(Scomber scombrus)*	X	X	X	X
summer flounder *(Paralichthys dentatus)*				X
scup *(Stenotomus chrysops)*	n/a	n/a	X	X
black sea bass *(Centropristis striata)*	n/a		X	X
surf clam *(Spisula solidissima)*	n/a	n/a	X	X
bluefin tuna *(Thunnus thynnus)*			X	X
Little skate (			X	X
Thorny skate			X	
Winter skate			X	

The once-through cooling system utilized by the facility has the potential to impact the EFH species and other aquatic resources in three major ways: (1) by entrainment of small organisms into and through the CWIS; (2) by impingement of juvenile and adult organisms on the intake screen; and (3) by discharging heated effluent to the receiving waters. A review of UMB's entrainment study indicates that, of the EFH species in Table 2, early life stages of hake, butterfish, yellowtail, and windowpane, as well as all stages of winter flounder are likely present in Savin Hill Cove. Additional species that are present in the vicinity of the facility, but not identified as EFH species, may be selected as prey by EFH species, such as cunner and bay anchovy. If these prey species are affected by UMB's CWIS or thermal discharge, it may indirectly affect EFH species through loss of prey. Therefore, EPA recognizes that this facility's operation has the potential to cause adverse effects to EFH species.

EPA has concluded that the limits and conditions in the Draft Permit minimize adverse effects to EFH for the following reasons:

- The Draft Permit prohibits the discharge from causing violations of the state water quality standards in the receiving water.
- The Draft Permit requires the permittee to meet the state water quality standard for mean daily temperature (80°F) and limits the rise in effluent temperature to 10°F to 12°F (dependent on tide). EPA and MassDEP are satisfied that the permitted rise in temperature will ensure the protection and propagation of a balanced, indigenous population of fish, shellfish, and wildlife in Dorchester Bay.
- As BTA for entrainment, the Draft Permit requires that the permittee install and operate variable frequency drives (VFDs) in conjunction with a supplemental cooling tower to reduce flows from existing levels to a the maximum daily limit to 18.4 MGD, maximum monthly average limit to 17.2 MGD, and an annual average to 12.9 MGD. This BTA will also minimize impingement by reducing the through-screen velocity at the intake to no greater than 0.5 fps.
- As BTA for impingement, the Draft Permit requires the permittee to make significant upgrades to the existing fish return system in order to minimize impingement mortality, including more frequent screen rotation and a new fish return trough.

Based on these requirements, EPA has determined that the Draft Permit ensures that the proposed discharge will not adversely impact EFH and that no consultation with NMFS is required. If adverse impacts to EFH do occur as a result of this permit action, or if new information becomes available that changes the basis for this determination, then NMFS will be notified and consultation will be promptly initiated. During the public comment period, EPA has provided a copy of the Draft Permit and Fact Sheet to NMFS.

VIII. Endangered Species Act

Section 7(a) of the Endangered Species Act of 1973, as amended (ESA) grants authority to and imposes requirements upon Federal agencies regarding endangered or threatened species of fish, wildlife, or plants ("listed species") and habitat of such species that has been designated as critical (a "critical habitat"). The ESA requires every Federal agency, in consultation with and with the assistance of the Secretary of Interior, to insure that any action it authorizes, funds, or carries out, in the United States or upon the high seas, is not likely to jeopardize the continued existence of any listed species or result in the destruction or adverse modification of critical habitat. The United States Fish and Wildlife Service (USFWS) administers Section 7 consultations for freshwater species. The National Marine Fisheries Service (NMFS) administers Section 7 consultations for marine species and anadromous fish.

EPA has reviewed the federal endangered or threatened species of fish, wildlife, and plants to see if any such listed species might potentially be impacted by the re-issuance of this NPDES permit. Upon review of the current endangered and threatened species in the area, EPA has determined that, at this time, there are no federally threatened or endangered species present in the vicinity of the outfalls from this facility. Furthermore, effluent limitations and other permit conditions (e.g., CWIS BTA requirements) which are in place in this Draft Permit should preclude any adverse effects should there be any incidental contact with listed species either in Dorchester Bay or Savin Hill Cove.

EPA is coordinating a review of this finding with NMFS through the Draft Permit and Fact Sheet; however, further consultation under Section 7 of the ESA is not required. If adverse impacts to ESA do occur as a result of this permit action, or if new information becomes available that changes the basis for this determination, then NMFS will be notified and consultation will be promptly initiated. During the public comment period, EPA has provided a copy of the Draft Permit and Fact Sheet to both NMFS and USFWS.

IX. Monitoring

The effluent monitoring requirements have been established to yield data representative of the discharge under authority of Section 308 (a) of the CWA in accordance with 40 CFR §§122.41(j), 122.44(l), and 122.48.

The Draft Permit includes new provisions related to Discharge Monitoring Report (DMR) submittals to EPA and the State. The Draft Permit requires that, no later than one year after the effective date of the permit, the permittee submit all monitoring data and other reports required by the permit to EPA using NetDMR, unless the permittee is able to demonstrate a reasonable basis, such as technical or administrative infeasibility, that precludes the use of NetDMR for submitting DMRs and reports ("opt out request").

In the interim (until one year from the effective date of the permit), the permittee may either submit monitoring data and other reports to EPA in hard copy form, or report electronically using NetDMR.

NetDMR is a national web-based tool for regulated Clean Water Act permittees to submit discharge monitoring reports (DMRs) electronically via a secure Internet application to U.S. EPA through the Environmental Information Exchange Network. NetDMR allows participants to discontinue mailing in hard copy forms under 40 CFR § 122.41 and § 403.12. NetDMR is accessed from the following url: http://www.epa.gov/netdmr Further information about NetDMR, including contacts for EPA Region 1, is provided on this website.

EPA currently conducts free training on the use of NetDMR, and anticipates that the availability of this training will continue to assist permittees with the transition to use of NetDMR. To participate in upcoming trainings, visit http://www.epa.gov/netdmr for contact information for Massachusetts.

The Draft Permit requires the permittee to report monitoring results obtained during each calendar month using NetDMR no later than the 15th day of the month following the completed reporting period. All reports required under the permit shall be submitted to EPA as an electronic attachment to the DMR. Once a permittee begins submitting reports using NetDMR, it will no longer be required to submit hard copies of DMRs or other reports to EPA and will no longer be required to submit hard copies of DMRs to MassDEP. However, permittees must continue to send hard copies of reports other than DMRs to MassDEP until further notice from MassDEP.

The Draft Permit also includes an "opt out" request process. Permittees who believe they can not use NetDMR due to technical or administrative infeasibilities, or other logical reasons, must demonstrate the reasonable basis that precludes the use of NetDMR. These permittees must submit the justification, in writing, to EPA at least sixty (60) days prior to the date the facility would otherwise be required to begin using NetDMR. Opt outs become effective upon the date of written approval by EPA and are valid for twelve (12) months from the date of EPA approval. The opt-outs expire at the end of this twelve (12) month period. Upon expiration, the permittee must submit DMRs and reports to EPA using NetDMR, unless the permittee submits a renewed opt out request sixty (60) days prior to expiration of its opt out, and such a request is approved by EPA.

Until electronic reporting using NetDMR begins, or for those permittees that receive written approval from EPA to continue to submit hard copies of DMRs, the Draft Permit requires that submittal of DMRs and other reports required by the permit continue in hard copy format.

X. State Certification Requirements

EPA may not issue a permit unless the MassDEP either certifies that the effluent limitations contained in this permit are stringent enough to assure that the discharge will not cause the receiving water to violate State Water Quality Standards or waives its right to such certification. EPA has requested that MassDEP certify the permit. Under Section 401 of the CWA, EPA is required to obtain certification from the state in which the discharge is located which determines that all water quality standards, in accordance with Section 301(b)(1)(C) of the CWA, will be satisfied. Regulations governing state certification are set forth in 40 CFR §124.53 and §124.55. EPA regulations pertaining to permit limits based upon water quality standards and state requirements are contained in 40 CFR §122.44(d). EPA expects that the permit will be certified.

XI. Comment Period, Hearing Requests, and Procedures for Final Decisions

All persons, including applicants, who believe any condition of the Draft Permit is inappropriate, including the variance granted under Section 316(a) of the CWA for alternative effluent limitations for temperature, must raise all issues and submit all available arguments and all supporting material for their arguments in full by the close of the public comment period, to the U.S. EPA, Office of Ecosystem Protection Attn: Danielle Gaito, 5 Post Office Square, Suite 100 (OEP06-4), Boston, Massachusetts 02109-3912. Any person, prior to such date, may submit a request in writing for a public hearing to consider the Draft Permit to EPA and the State Agency. Such requests shall state the nature of the issues proposed to be raised in the hearing. A public meeting may be held if the criteria stated in 40 C.F.R. § 124.12 are satisfied. In reaching a final decision on the Draft Permit, the EPA will respond to all significant comments and make these responses available to the public at EPA's Boston office.

Following the close of the comment period, and after any public hearings, if such hearings are held, the EPA will issue a Final Permit decision and forward a copy of the final decision to the applicant and each person who has submitted written comments or requested notice. Within 30 days following the notice of the Final Permit decision, any interested person may submit a petition for review of the permit to EPA's Environmental Appeals Board consistent with 40 C.F.R. § 124.19.

XII. EPA and MassDEP Contacts

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email: catherine.vakalopolous@state.ma.us

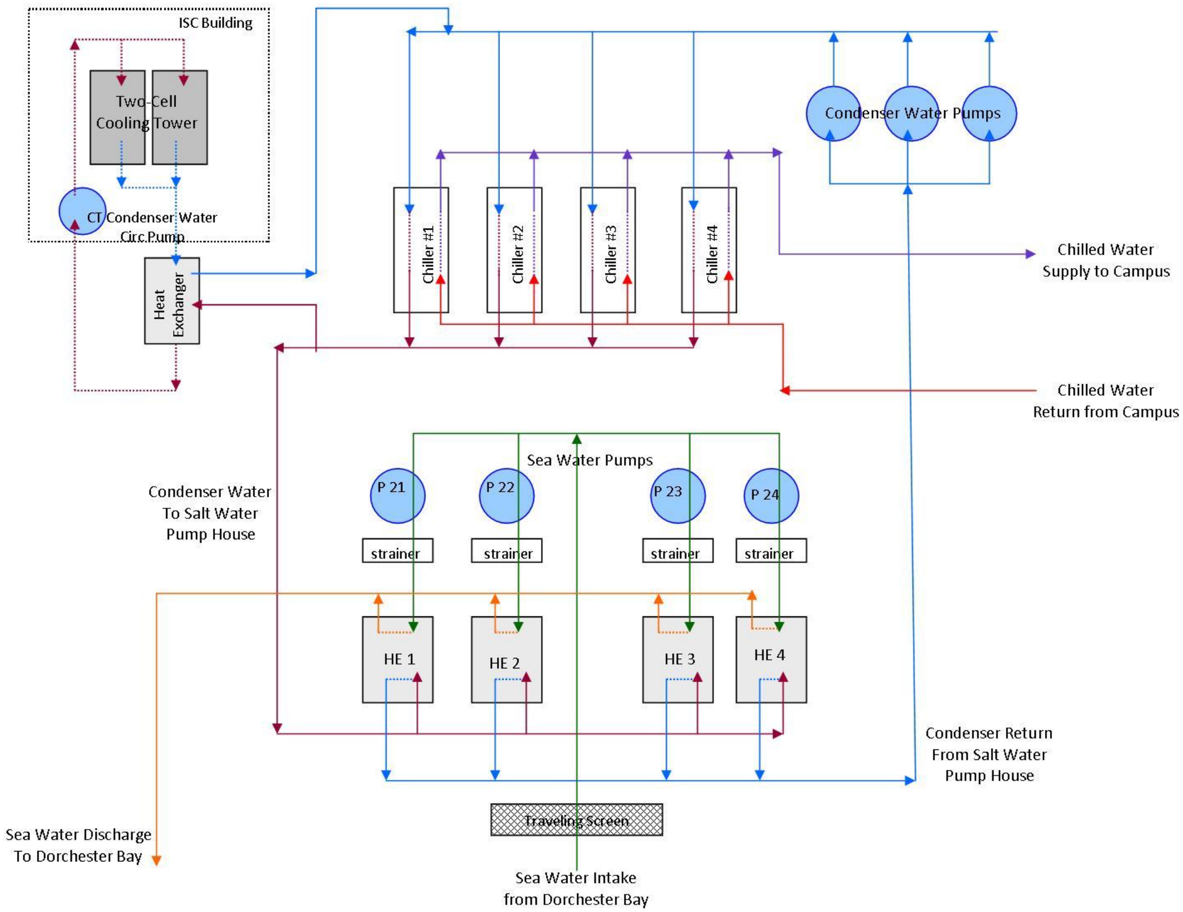
Date: ________________

Stephen S. Perkins, Director
Office of Ecosystem Protection
U.S. Environmental Protection Agency

Attachment A
Site Location

Source: MassGIS

Attachment B
Flow Diagram



Attachment C
Discharge Monitoring Report Summary
January 2002 through July 2011

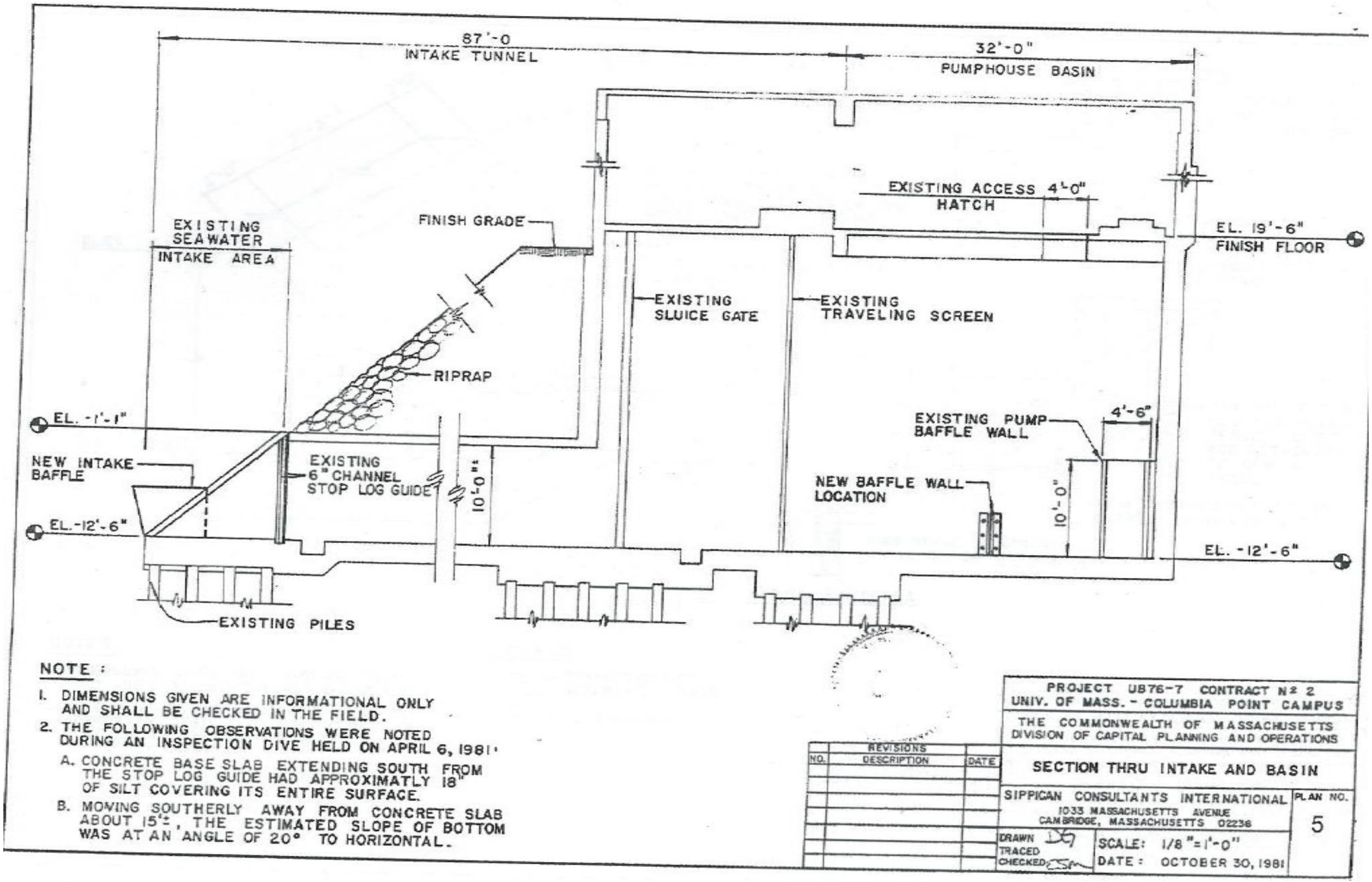
	Flow (MGD)	PH (s.u.)		Temperature (°F)	
	Daily Max	Daily Min	Daily Max	Avg Mo	Daily Max
01/31/2002	5.4	7.1	7.1	38.	41.
02/28/2002	5.4	7.1	7.2	41.	42.
03/31/2002	5.4	7.2	7.3	44.	46.
04/30/2002	10.8	7.3	7.4	46.	47.
05/31/2002	10.8	7.3	7.3	47.	50.
06/30/2002	10.8	7.3	7.3	50.	53.
07/31/2002	16.2	7.3	7.3	51.	53.
08/31/2002	16.2	7.3	7.3	52.	53.
09/30/2002	16.2	7.3	7.3	53.	56.
10/31/2002	10.8	7.3	7.3	49.	52.
11/30/2002	10.8	7.3	7.3	46.	50.
12/31/2002	10.8	7.3	7.3	44.	48.
01/31/2003	5.4	7.1	7.1	42.	44.
02/28/2003	5.4	7.1	7.2	42.	44.
03/31/2003	5.4	7.2	7.3	44.	48.
04/30/2003	10.8	7.3	7.4	46.	48.
05/31/2003	10.8	7.3	7.3	47.	50.
06/30/2003	10.8	7.3	7.3	49.	53.
07/31/2003	16.2	7.3	7.3	51.	56.
08/31/2003	16.2	7.2	7.3	52.	56.
09/30/2003	16.2	7.3	7.3	52.	55.
10/31/2003	10.8	7.3	7.3	49.	52.
11/30/2003	10.8	7.3	7.3	48.	50.
12/31/2003	10.8	7.3	7.3	44.	48.
01/31/2004	5.4	7.1	7.1	42.	45.
02/29/2004	5.4	7.1	7.2	42.	45.
03/31/2004	5.4	7.2	7.3	46.	48.
04/30/2004	10.8	7.3	7.4	46.	48.
05/31/2004	10.8	7.3	7.3	48.	51.
06/30/2004					
07/31/2004	16.2	7.3	7.3	51.	55.
08/31/2004	16.2	7.2	7.3	52.	58.
09/30/2004	16.2	7.3	7.3	52.	55.
10/31/2004	10.8	7.3	7.3	49.	53.
11/30/2004	10.8	7.3	7.3	46.	51.
12/31/2004	10.8	7.3	7.3	44.	46.
01/31/2005	5.4	7.1	7.1	40.	44.
02/28/2005	5.4	7.1	7.2	40.	42.
03/31/2005	5.4	7.2	7.3	45.	47.
04/30/2005	10.8	7.3	7.4	47.	49.
05/31/2005	10.8	7.3	7.3	47.	50.
06/30/2005	10.8	7.3	7.3	49.	52.

07/31/2005	16.2	7.3	7.3	51.	53.
08/31/2005	16.2	7.2	7.3	52.	55.
09/30/2005	16.2	7.3	7.3	54.	58.
10/31/2005					
11/30/2005	10.8	7.3	7.3	48.	50.
12/31/2005	10.8	7.3	7.3	44.	48.
01/31/2006	5.4	7.1	7.1	40.	41.
02/28/2006	5.4	7.2	7.2	41.	42.
03/31/2006	5.4	7.2	7.3	43.	47.
04/30/2006	10.8	7.3	7.4	45.	47.
05/31/2006	10.8	7.3	7.3	48.	53.
06/30/2006	10.8	7.3	7.3	53.	55.
07/31/2006	16.2	7.3	7.3	61.	65.
08/31/2006	16.2	7.2	7.3	52.	56.
09/30/2006	16.2	7.3	7.3	53.	55.
10/31/2006	10.8	7.3	7.3	48.	52.
11/30/2006	10.8	7.3	7.3	48.	50.
12/31/2006	10.8	7.3	7.3	44.	46.
01/31/2007					
02/28/2007					
03/31/2007					
04/30/2007					
05/31/2007					
06/30/2007					
07/31/2007					
08/31/2007					
09/30/2007					
10/31/2007					
11/30/2007					
12/31/2007					
01/31/2008					
02/29/2008					
03/31/2008					
04/30/2008					
05/31/2008	10.8	7.1	7.3	46.	50.
06/30/2008	10.8	7.	7.4	51.	59.
07/31/2008	16.2	7.3	7.3	55.	57.
08/31/2008	16.2	7.1	7.3	57.	60.
09/30/2008	16.2	7.	7.4	57.	62.
10/31/2008	10.8	7.2	7.4	55.	58.
11/30/2008	10.8	7.2	7.4	52.	55.
12/31/2008	10.8	7.4	7.4	47.	50.
01/31/2009	5.4	7.1	7.1	42.	45.
02/28/2009	5.4	7.1	7.2	42.	45.
03/31/2009	5.4	7.1	7.2	46.	48.
04/30/2009	10.8	7.3	7.4	46.	48.
05/31/2009	10.8	7.3	7.4	48.	51.
06/30/2009	10.8	7.3	7.3	49.	53.

07/31/2009	16.2	7.3	7.3	51.	51.
08/31/2009	16.2	7.5	7.8	55.	58.
09/30/2009	16.2	7.3	7.6	56.	61.
10/31/2009	10.8	7.	7.5	48.	54.
11/30/2009	10.8	7.	7.6	46.	49.
12/31/2009	10.8	6.8	7.5	44.	45.
01/31/2010	5.4	7.1	7.4	40.	41.
02/28/2010	5.4	7.1	7.2	40.	42.
03/31/2010	5.4	7.2	7.3	43.	45.
04/30/2010	5.4	7.2	7.3	48.	52.
05/31/2010	10.2	7.3	7.3	56.	61.
06/30/2010	21.6	7.3	7.3	60.	66.
07/31/2010	21.6	7.3	7.3	67.	79.
08/31/2010	16.2	7.2	7.3	73.	83.
09/30/2010	16.2	7.3	7.3	72.	91.
10/31/2010	16.2	7.3	7.3	62.	79.
11/30/2010	16.2	7.3	7.3	49.	59.
12/31/2010	10.8	7.3	7.3	42.	50.
01/31/2011	10.8	7.	7.3	36.	39.
02/28/2011	10.8	6.8	7.3	36.	40.
03/31/2011	10.8	6.8	7.5	41.	45.
04/30/2011	10.8	7.1	7.5	49.	58.
05/31/2011	10.8	6.9	7.6	58.	68.
Min	**5.4**	**6.8**	**7.1**	**36.0**	**39.0**
Max	**21.6**	**7.5**	**7.8**	**73.0**	**91.0**
Average	**11.2**	**7.2**	**7.3**	**48.5**	**52.3**

*Missing data indicates no data reported in DMR for that period.

Attachment D
Cooling Water Intake Structure



Attachment E
Bootstrap Analysis of UMB Entrainment Data

UMass Boston (UMB) estimated entrainment from the 2010 study data using a relatively straightforward method in which the number of organisms per taxonomic group per sample volume was extrapolated over the total seawater intake during the study period. This method assumes a constant catch rate between sampling events. For example, a single sampling event on May 28 entrained 27 stage 2 rainbow smelt larvae; UMB then assumed that 27 stage 2 rainbow smelt larvae were caught in every 100 m^3 volume withdrawn until the next sampling event on June 1. Then the June 1 sample density was extrapolated for the volume withdrawn until the next sample, and so on. Using this method, UMB estimated a total of 15,063,438 eggs and larvae were entrained during the 2010 study. While this method may be appropriate to calculate a coarse estimate for entrainment during the 2010 study, the method does not capture the variability that is inherent in this type of biological data. For example, entrainment is likely underestimated when no organisms are captured in a given sample and overestimated when a many organisms are captured. Additionally, a single year of 36 sampling events is not sufficient to accurately determine a mean and range representative of entrainment at UMB. For this dataset, the mean is 384.7 organisms per 100 m^3, but the standard deviation is 545.1 organisms. A high deviation is characteristic of skewed biological data with many low density samples and few high density samples.

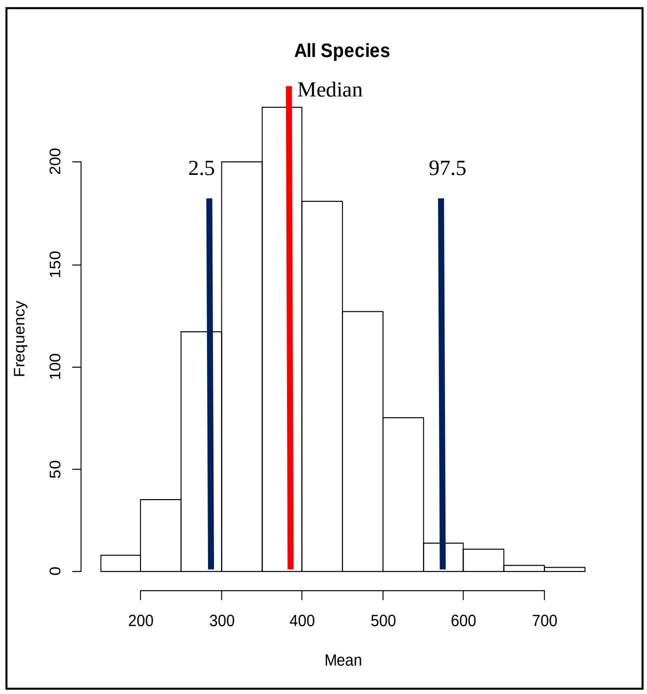


Figure 1. Frequency of n=1,000 bootstrap

If we could approximate a mean number of organisms captured per sampling volume for the study period and characterize the variability around that mean, we may establish a more accurate baseline. This baseline can then be used to compare entrainment among available entrainment technologies. Bootstrapping is a mathematical resampling method in which the variability of a statistic (here, the mean) can be estimated by measuring its properties when sampling from an approximate distribution. Using R (The R Foundation for Statistical Computing), EPA randomly resampled (with replacement) the empirical dataset of 36 sampling events for each taxonomic group 1,000 times and calculated the mean of each bootstrap sample. In this way, the 2010 study was essentially "repeated" 1,000 times using the data from 2010. "With replacement" describes the method of randomly choosing a value from the entire dataset (n=36) for each new event in a bootstrap sample.

EPA then examined the distribution of the means (n=1,000), which approximates a normal distribution (Figure 1). Considering the entire dataset of 1,000 bootstrap means, the median approximates an average year, the 25th value (i.e., 2.5%) represents a low year, and the 975th value (i.e., 97.5%) represents a high year (Table E-1). Mean values on either tail (less than 2.5% and greater than 97.5%) are considered rare events (probability of occurrence is 1:20). In comparison to UMB's estimate of 15.1 million organisms entrained during the 2010 study, values from the bootstrap analysis indicate that total entrainment was likely between 10.6 and 25.3 million organisms with a median of 16.8 million organisms.[1]

EPA used the median and 95% range to assess entrainment at proposed pump rates (existing pump rate, future pump rate, variable frequency drive, and variable frequency drive plus supplemental cooling tower) (Table E-2). The analysis and discussion of entrainment BTA is presented in Section VI of the Fact Sheet.

Table E-1. Median and range representing 95% of the dataset for bootstrap means.

	Organisms per 100 m^3
Median (of means)	378.6
2.5% Value (of means)	238.6
97.5% Value (of means)	568.4

Table E-2. Entrainment (May – July) for each proposed pump rate at median and 95% values.

	Existing	Future	VFD	VFD + CT
Median	25,071,786	34,649,827	22,440,053	21,107,968
2.5%	15,804,974	21,842,864	14,145,959	13,306,227
97.5%	37,644,105	52,025,083	33,692,682	31,692,618,

[1] Total entrainment in 2010 was calculated by multiplying median, 2.5%, and 97.5% bootstrap mean values by the actual 2010 daily pump volume and summing daily values over the study period. Similarly, total entrainment was calculated in Table E-2 using the estimated daily pump volumes under each of the four scenarios and summing over the study period. The values presented for 2010 entrainment and in Table E-2 are estimates of entrainment from May 11 to July 30 only, not annual estimates.

MASSACHUSETTS DEPARTMENT OF
ENVIRONMENTAL PROTECTION
COMMONWEALTH OF MASSACHUSETTS
1 WINTER STREET
BOSTON, MASSACHUSETTS 02108

UNITED STATES ENVIRONMENTAL
PROTECTION AGENCY
OFFICE OF ECOSYSTEM PROTECTION
REGION I
BOSTON, MASSACHUSETTS 02109

JOINT PUBLIC NOTICE OF A DRAFT NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM (NPDES) PERMIT TO DISCHARGE INTO THE WATERS OF THE UNITED STATES UNDER SECTION 301, 316(A), AND 402 OF THE CLEAN WATER ACT, AS AMENDED, AND UNDER SECTIONS 27 AND 43 OF THE MASSACHUSETTS CLEAN WATERS ACT, AS AMENDED, AND REQUEST FOR STATE CERTIFICATION UNDER SECTION 401 OF THE CLEAN WATER ACT.

DATE OF NOTICE: August 22, 2012

PERMIT NUMBER: **MA0040304**

PUBLIC NOTICE NUMBER: MA-018-12

NAME AND MAILING ADDRESS OF APPLICANT:

Ms. Zehra Schneider Graham
Deputy Director of Environmental Health and Safety
University of Massachusetts, Boston
100 Morrissey Boulevard
Boston, MA 02125

NAME AND ADDRESS OF THE FACILITY WHERE DISCHARGE OCCURS:

University of Massachusetts, Boston
100 Morrissey Boulevard
Boston, MA 02125

RECEIVING WATER(S): Dorchester Bay

RECEIVING WATER(S) CLASSIFICATION(S): Class SB

PREPARATION OF THE DRAFT PERMIT:

The U.S. Environmental Protection Agency (EPA) and the Massachusetts Department of Environmental Protection (MassDEP) have cooperated in the development of a draft permit for the above identified facility. The effluent limits and permit conditions imposed have been drafted to assure compliance with the Clean Water Act, 33 U.S.C. sections 1251 et seq.,, the Massachusetts Clean Waters Act, G.L. c. 21, §§ 26-53, 314 CMR 3.00 and State Surface Water Quality Standards at 314 CMR 4.00. In addition, the draft permit includes effluent limitations for rise in temperature less stringent than surface water quality standards at 314 CMR 4.05(4)(b)(2)(a), but which EPA and MassDEP have determined will assure the protection and propagation of a balanced, indigenous population of shellfish, fish, and wildlife in and on the water body receiving the thermal discharge as requested by the permittee consistent with Section 316(a) of the Clean Water Act. EPA has formally requested that the State certify this draft permit pursuant to Section 401 of the Clean Water Act and expects that the draft permit will be certified.

INFORMATION ABOUT THE DRAFT PERMIT:

A fact sheet (describing the type of facility; type and quantities of wastes; a brief summary of the basis for the draft permit conditions; and significant factual, legal and policy questions considered in preparing this draft permit) and the draft permit may be obtained at no cost at http://www.epa.gov/region1/npdes/draft_permits_listing_ma.html or by writing or calling EPA's contact person named below:

Danielle Gaito
U.S. Environmental Protection Agency – Region 1
5 Post Office Square, Suite 100 (OEP06-4)
Boston, MA 02109-3912
Telephone: (617) 918-1297

The administrative record containing all documents relating to this draft permit is on file and may be inspected at the EPA Boston office mentioned above between 9:00 a.m. and 5:00 p.m., Monday through Friday, except holidays.

PUBLIC COMMENT AND REQUEST FOR PUBLIC HEARING:

All persons, including applicants, who believe any condition of this draft permit is inappropriate, must raise all issues and submit all available arguments and all supporting material for their arguments in full by **September 20, 2012**, to the U.S. EPA, 5 Post Office Square, Boston, Massachusetts 02109-3912. Any person, prior to such date, may submit a request in writing to EPA and the State Agency for a public hearing to consider this draft permit. Such requests shall state the nature of the issues proposed to be raised in the hearing. A public hearing may be held after at least thirty days public notice whenever the Regional Administrator finds that response to this notice indicates significant public interest. In reaching a final decision on this draft permit, the Regional Administrator will respond to all significant comments and make the responses available to the public at EPA's Boston office.

FINAL PERMIT DECISION:

Following the close of the comment period, and after a public hearing, if such hearing is held, the Regional Administrator will issue a final permit decision and forward a copy of the final decision to the applicant and each person who has submitted written comments or requested notice.

DAVID FERRIS, DIRECTOR
MASSACHUSETTS WASTE WATER PROGRAM
DEPARTMENT OF ENVIRONMENTAL PROTECTION

STEPHEN S. PERKINS, DIRECTOR
OFFICE OF ECOSYSTEM PROTECTION
ENVIRONMENTAL PROTECTION AGENCY – REGION 1