June 11, 2024

Ref: 11251.00

U.S. EPA, Region 1
NCCW GP Processing
Mail Code: OEP 06-4
5 Post Office Square, Suite 100
Boston, MA 02109-3912

Re: **Request for General Permit Authorization to Discharge Noncontact Cooling Water to be covered by the Noncontact Cooling Water General Permit (NCCWGP) NPDES General Permit No. MAG250977 – Notice of Intent (NOI)**
Union Wharf Condominium Trust
Boston, Massachusetts

To whom it may concern:

On behalf of the Union Wharf Condominium Trust, VHB, Inc. respectfully submits the attached Notice of Intent (NOI) to obtain coverage under the 2024 NCCWGP for the Union Wharf Condominium site located at 343 Commercial Street in Boston, MA. The facility has been previously covered under the 2019 NCCWGP (Permit No. MAG250977).

Should you have any questions concerning this submittal, or require additional information please contact me at 617-607-6310.

Sincerely,

Taylor Donovan

Taylor Donovan
Environmental Scientist

Attachment: Notice of Intent- Request for General Permit Authorization to Discharge Noncontact Cooling Water Notice of Intent (NOI) to be covered by the General Permit (Permit No. MAG250977)

CC: Daniel Flaherty – Property Manager-Barkan Management Company, Inc

Engineers | Scientists | Planners | Designers

101 Walnut Street
PO Box 9151
Watertown, Massachusetts 02471
P 617.924.1770
F 617.924.2286

APPENDIX 5
Suggested Notice of Intent (NOI) Form

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY - REGION 1

Request for General Permit Authorization to Discharge Noncontact Cooling Water to be covered by the Noncontact Cooling Water General Permit (NCCWGP) NPDES General Permits No. MAG250000 and NHG250000

A. Facility Information

1. Indicate applicable General Permit: MAG250000 ☑ NHG250000 ☐

2. Facility Information/Location:
   Facility Name Union Wharf Condominium Trust
   Street/PO Box 343 Commercial Street City Boston
   State Massachusetts Zip Code 02109
   Latitude 42.365329 Longitude -71.050097

   Type of Business Residential Housing
   SIC Code(s) 6722 & 7311

3. Facility Mailing address (if different from Location Address):
   Facility Name _____
   Street/PO Box _____ City _____
   State _____ Zip Code _____

4. Facility Owner:
   Name Union Wharf Condominium Trust
   E-mail dan@unionwharf.net
   Street/PO Box 343 Commercial Street City Boston
   State Massachusetts Zip Code 02109

   Contact Person Dan Flaherty Tel 617-742-1647
   Owner is (check one): Federal ____ State _____ Tribal _____ Private X_____
   Other (describe) _____

5. Facility Operator (if different from above):
   Legal Name _____
   E-mail _____
   Street/PO Box _____ City _____ Zip Code _____
   State _____ Contact _____ Telephone _____

6. Current permit coverage: yes■ no☐

a) Has a prior NPDES permit (individual or general permit coverage) been granted for the discharge that is listed on the NOI? yes■ no☐ If Yes, permit number MAG250977

b) Is the facility covered by an individual NPDES permit for other discharges? yes☐ no■
If yes, Permit Number: _____

c) Is there a pending NPDES application on file with EPA for this discharge? yes☐ no■
If yes, date of submittal: _____ and permit number, if available _____

7. Attach a topographic map indicating the location of the facility and the outfall(s) to the receiving water.

B. Map attached? ▬ **Discharge Information** (attach additional sheets as needed):

1. Name of receiving water into which discharge will occur: Boston Inner Harbor
Freshwater ☐ Marine Water ☐; State Water Quality Classification Class SB
Type of Receiving Water Body (e.g., stream, river, lake, reservoir, estuary, etc.) Marine inner harbor

2. Attach a line drawing or flow schematic showing water flow through the facility including sources of intake water, operations contributing to flow, treatment units, outfalls, and receiving water(s).
Line drawing or flow diagram attached? ▬

3. Describe the discharge activities for which the owner/applicant is seeking coverage (e.g., building cooling, process line cooling, etc.) Building cooling

4. Number of Outfalls 1 Latitude and Longitude to the nearest second for each Outfall. See EPA's siting tool at https://www.epa.gov/toxics-release-inventory-tri-program/tri-data-and-tools. Attach additional pages if necessary.

Outfall # Latitude 42.365647 Longitude -71.049781
Outfall # Latitude _____ Longitude _____
Outfall # Latitude _____ Longitude _____

5. For each Outfall provide the following discharge information:

Outfall # 1 (October 2023)
a) Maximum Daily Flow 0.98 MGD Average Monthly Flow 0.98 MGD
NOTE: EPA will use the flow reported here as the facility's permitted effluent flow limit.
b) Maximum Daily Temperature 64 °F Average Monthly Temperature 61 °F
c) Maximum Monthly pH 7.9 s.u. Minimum Monthly pH 7.8 s.u.
d) Outfall's discharge is: continuous ☐ intermittent ☐ seasonal ▬

Outfall # _____
a) Maximum Daily Flow _____ MGD Average Monthly Flow _____ MGD
NOTE: EPA will use the flow reported here as the facility's permitted effluent flow limit.
b) Maximum Daily Temperature _____ °F Average Monthly Temperature _____ °F
c) Maximum Monthly pH _____ s.u. Minimum Monthly pH _____ s.u.
d) Outfall's discharge is: continuous ☐ intermittent ☐ seasonal ☐

Outfall # _____

a) Maximum Daily Flow _____MGD Average Monthly Flow _____MGD
NOTE: EPA will use the flow reported here as the facility's permitted effluent flow limit.
b) Maximum Daily Temperature _____°F Average Monthly Temperature _____°F
c) Maximum Monthly pH _____s.u. Minimum Monthly pH _____s.u.
d) Outfall's discharge is: continuous ☐ intermittent ☐ seasonal ☐

6. Is the source of the NCCW potable water? yes☐ no■
If yes, EPA will calculate a Total Residual Chlorine effluent limit for your facility.

7. Provide the reported or calculated seven day-ten year low flow (7Q10) of the receiving water N/A* MGD
Attach any calculation sheets used to support stream flow and/or dilution calculations.
*Receiving water is a marine inner harbor.

8. **For facilities that discharge to Massachusetts surface waters:**

a) Submit the completed engineering calculation of the surface water temperature rise as shown in Attachment B of the General Permit. Calculation attached? ☐ N/A: surface water is a marine inner harbor.
b) Does the discharge occur in an Area of Critical Environmental Concern (ACEC)? yes☐ no■
If yes, provide the name of ACEC _____
c) Does the discharge occur to an Outstanding Resource Water (ORW)? yes☐ no■
If yes, enclose antidegradation waiver approval provided by MassDEP.

Note: See Appendix 1 of the General Permit for more information on ACEC.

C. Chemical Additives

1. Are any non-toxic neutralization and/or dechlorination chemicals used in the discharge(s)? yes☐ no■

2. If yes, attach a list of each chemical used and include the chemical name and manufacturer; maximum and average daily quantity used on a monthly basis, as well as the maximum and average daily expected concentrations (mg/L) in the discharge, and the vendor's reported aquatic toxicity (NOAEL and/or LC_{50} in percent for typically acceptable aquatic organism).

3. Was this list submitted with the facility's 2014 NCCWGP NOI? yes☐ no■

D. NCCW Source Water Information

1. State the source of the NCCW (e.g., municipal water supply, private well, surface water withdrawal, etc.).
Source Surface water withdrawal Name of Source Water Boston Inner Harbor

2. Is the source water registered/permitted under MA Water Management Act or NHDES User Registration Rule (ENV WQ 2202)? yes☐ no■ If yes, registration number _____

3. If the source water is groundwater (non-municipal well water), see Appendix 9 of the General Permit and submit effluent (and receiving water hardness) test results, as required in Part 5.4 of the General Permit.
Test results attached? ☐ N/A

4. Does the facility use both a primary and backup source of NCCW? yes☐ no■ If yes, **attach information** that identifies and describes the primary and backup sources of NCCW and how often any backup supply was used in the past five years.

E. Best Technology Available for Cooling Water Intake Structures (CWISs)

If the facility's non-contact cooling water discharge is covered by this General Permit and the facility **withdraws water from a surface water**, it is subject to the BTA requirements at Part 4.2 of the General Permit.

1. Are you subject to the BTA requirements of the General Permit? yes■ no☐
   a) If no, explain_____and skip to F.
   b) If yes, submit a facility-specific BTA description that accurately describes the facility's operations and practices, including, but not limited to, the measures described in Part 5.5 of the General Permit. For additional information and guidance, see Section IV of the Fact Sheet.

Include in your description:
a) Measures to meet the General Permit Part 4.2.1 general BTA requirements, including documentation that describes the facility's monitoring program for impinged fish and/or invertebrates; or the required alternative monitoring plan frequency and/or protocol.
b) The attributes of the current CWIS.
c) The design measures of the CWIS.
d) The operational measures of the CWIS.
e) The historical occurrence of impinged fish for the past five years.
f) If applicable, a demonstration that the facility's intake rate is commensurate with a closed-cycle recirculation system.
g) Other components to reduce impingement and/or entrainment of aquatic life.

2. Provide the following information for each CWIS to support your attached facility-specific BTA description:
   a) The design capacity of the of the CWIS 0.98 MGD
   b) Maximum monthly average intake of the CWIS during the previous five years 0.98 MGD
   c) The month and year in which this flow reported in 2.b. occurred System is designed to restrict intake to 0.98 MGD.
   d) The maximum through-screen design intake velocity 0.27 feet/second (fps)

3. For facilities where the CWIS is located on a freshwater river or stream, provide the following information: N/A
   a) The source water's annual mean flow in MGD as available from USGS or other appropriate source _____MGD
   b) The design intake flow as a % of the source water's annual mean flow _____% Attach calculations if equal to or less than 5% of annual mean flow.
   c) The source water's 7Q10 _____MGD
   d) The design intake flow as a percent of the source water's 7Q10 _____%

4. Provide a map showing the location of each cooling water intake structure; NCCW Outfall(s) and CWIS features referred to in the BTA description. **Map attached?** ■

F. Endangered Species Act Eligibility Information

If your facility is listed in Table A as one of the 37 facilities covered under the 2014 NCCW GP, check this box. ■
Your ESA consultation responsibilities have been satisfied by EPA. Proceed to Part G.

If your facility is not included as one of the 37 facilities covered under the 2014 NCCW GP, complete this Part.

Using the instructions in Appendix 2, Parts B(1) and B(2) of the NCCW GP, which of the following criteria apply to your facility?

United States Fish and Wildlife Service (USFWS) Criteria: A ☐ B ☐ C ☐

National Oceanic and Atmospheric Administration Fisheries Service (NOAA Fisheries) Criteria: A☐ B☐ C☐

1. If you selected USFWS criterion B, has consultation with the USFWS been completed? yes☐ no☐
   If you selected NOAA Fisheries criterion B, has consultation with NOAA Fisheries been completed?
   yes☐ no☐

2. If consultation with USFWS and/or NOAA Fisheries Service was completed, was a written concurrence finding that the discharge is "not likely to adversely affect" listed species or critical habitat received?
   USFWS yes☐ no☐ N/A☐ NOAA Fisheries yes☐ no☐ N/A☐

3. Attach documentation of ESA eligibility for USFWS and NOAA Fisheries as required at Appendix 2, Part C. of the General Permit. **Documentation attached?** USFWS☐ NOAA Fisheries ☐

4. Please indicate if your facility **directly intakes water for non-contact cooling from, or discharges any NCCW effluent to,** any of the following waterbodies:

   ☐ Merrimack River
   ☐ Connecticut River
   ☐ Westfield River
   ☐ Deerfield River
   ☐ Piscataqua River
   ☐ Salmon Falls River
   ☐ Cocheco River
   ☐ Taunton River

   EPA will consult with NOAA Fisheries on any cooling water intakes or discharges covered under this permit in areas (in the above waterbodies) that overlap with the presence of shortnose sturgeon (endangered) and Atlantic sturgeon (threatened/endangered).

   Please indicate if your facility **directly intakes water for non-contact cooling** from, **or discharges non-contact cooling water effluent to**, the Connecticut River Watershed. EPA will consult with the U.S Fish and Wildlife Service on cooling water intakes and discharges covered under this permit in areas of the Connecticut River Watershed that overlap with the presence of the dwarf wedgemussel (endangered).
   yes☐ no☐

G. National Historic Properties Act Eligibility

1. Are any historic properties listed or eligible for listing on the National Register of Historic Places located on the facility site or in proximity to the discharge? yes■ no☐

2. Have any State or Tribal Historic Preservation Officers been consulted in this determination? yes■ no☐
   If yes, attach the results of the consultation(s).

3. Which of the three National Historic Preservation Act scenarios listed in Appendix 3, Section C has the facility met?
   ☐ 1 ▣ 2 ☐ 3

H. Supplemental Information

Please provide any supplemental information, including antidegradation review information applicable to new or increased discharges. Attach any analytical data used to support the application. Attach any certification(s) required by the General Permit.

I. Signature Requirements

The NOI must be signed by the operator in accordance with the signatory requirements of 40 CFR§ 122.22 (see below) including the following certification:

> I certify under penalty of law that (1) no biocides or other chemical additives except for those used for pH adjustment and/or dechlorination are used in the noncontact cooling water (NCCW) system; (2) the discharge consists solely of NCCW (to reduce temperature) and authorized pH adjustment and/or dechlorination chemicals; (3) the discharge does not come in contact with any raw materials, intermediate product, water product (other than heat) or finished product; (4) if the discharge of noncontact cooling water subsequently mixes with other wastewater (i.e. stormwater) prior to discharging to the receiving water, any monitoring provided under this permit will be only for noncontact cooling water; (5) where applicable, the facility has complied with the requirements of this permit specific to the Endangered Species Act and National Historic Preservation Act; and (6) this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted.
>
> Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, I certify that the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I certify that I am aware that there are significant penalties for submitting false information, including the possibility of fines and imprisonment for knowing violations.

Signature _____ Date 6-11-24

Printed Name and Title MARSHALL MACDONELL TRUSTEE/CHAIR

Federal regulations require this application to be signed as follows:

1. For a corporation, by a principal executive officer of at least the level of vice president;
2. For a partnership or sole proprietorship, by a general partner or the proprietor, respectively, or,
3. For a municipality, State, Federal or other public facility, by either a principal executive officer or ranking elected official.

Figure 1: USGS Site Location
Union Wharf Condominium Trust
Boston, MA

Path: \\azrgisds\gisshare\gis3\arcgissystem\arcgisinput\NOIFigures\NOIExportMap.GPServer\extracted\p30\noi_template\NOI_Template.aprx (gmsaGIS$, 5/1/2024)

Sources: VHB, MassGIS

Figure 2: Aerial Overview
Union Wharf Condominium Trust
Boston, MA

Project Alignment

Sources: VHB, MassGIS

Path: \\azrgisds\gisshare\gis3\arcgissystem\arcgisinput\NOIFigures\NOIExportMap.GPServer\extracted\p30\noi_template\NOI_Template.aprx (gmsaGIS$, 5/1/2024)

Figure 3: Intake and Discharge Pipes on Union Wharf Seawall

Figure 4: Existing CWIS

Figure 5 – Beach Area and Pile Field

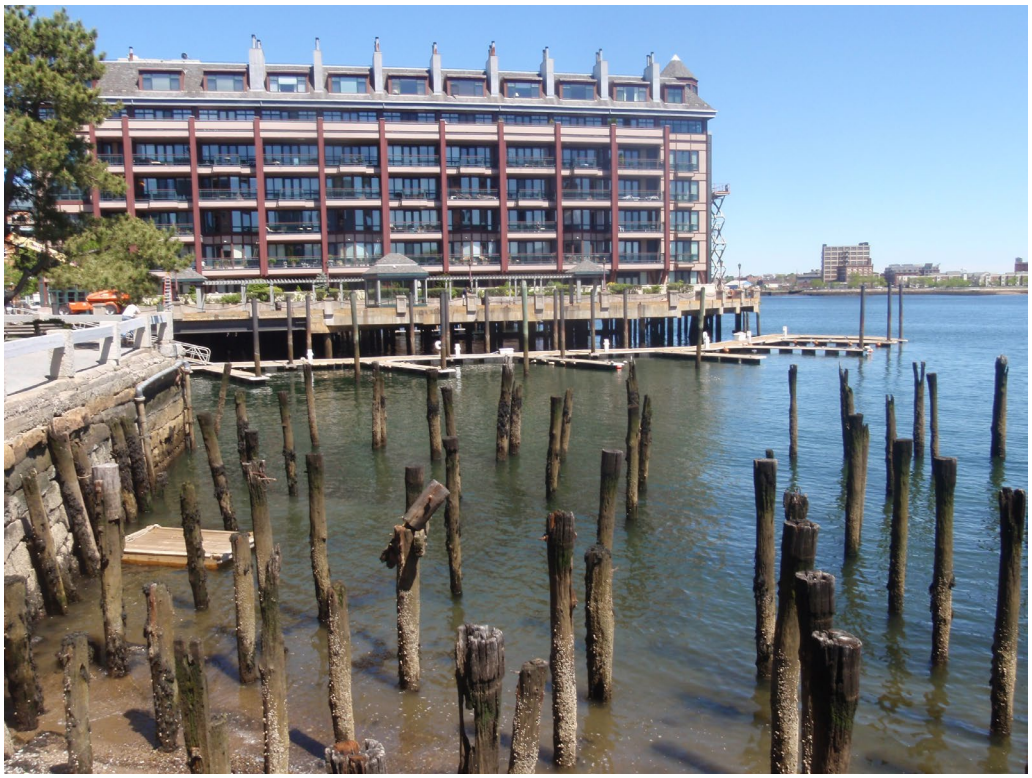

Figure 6 – Subtidal Environment off CWIS

Union Wharf CWIS Best Technology Available Report

(NPDES Permit MAG250977)

Boston, Massachusetts

PREPARED FOR

Union Wharf Condominium Trust
343 Commercial Street
Boston, MA 02109
617.742.1647

PREPARED BY

260 Arsenal Place #2
Watertown, MA 02471
617.924.1770

June 2024

Table of Contents

1

Introduction

On behalf of the Union Wharf Condominium Trust (Union Wharf), Vanasse Hangen Brustlin, Inc. (VHB) has conducted a technical and regulatory assessment of the Union Wharf non-contact cooling water (NCCW) system in Boston, Massachusetts. The Union Wharf Condominium is a residential and commercial complex located in the North End of Boston, Massachusetts (see Figures 1 and 2). The cooling water system has been in operation since 1996 under the provisions of a National Pollutant Discharge Elimination System (NPDES) General Permit, pursuant to Section 316b of the Clean Water Act. The Cooling Water Intake System (CWIS) is only used during warmer weather to facilitate air conditioning of the facility.

Non-Contact Cooling Water System Operations

Union Wharf Condominium Trust operates a NCCW system for cooling water used to help regulate building temperatures. The NCCW system is utilized seasonally, between May and November, in conjunction with the facility's cooling needs.

NCCW/CWIS Design

The Union Wharf Condominium NCCW system is an open-loop design consisting of an intake structure, pump, heat exchanger loop and discharge pipe, using 6-inch diameter PVC pipe. The pumps and heat exchanger are in a concrete vault located near the edge of the seawall, at the end of the northern wharf. The intake and discharge pipes are enclosed in a screen cover and attached to the seawall at the northeast corner of the northern wharf (Figure 3). The intake structure is a 36-inch section of 6-inch PVC pipe perforated with 866 holes ranging in size from 3/16-inch to 7/16-inch in diameter (Figure 4). The intake is affixed vertically to the Union Wharf seawall, with the intake set below extreme low water. There are two intakes and pumps for duplication that alternate operation; both pumps never operate together. Typically, the pumps are cycled on a weekly basis to balance wear and tear on the equipment and increase system reliability. The use of two alternating pumps also allows for maintenance on one pump without interrupting system operation. The single discharge pipe is approximately 25 feet south of the intake pipes and has a 90-degree elbow to direct the discharged flow away from the system intakes to reduce "short circuiting".

System Pumping Rate

The existing system pumps generally operate from May until October and utilize variable speed drive (VSDs) to minimize excessive source water pumping. The VSDs are installed on the two pumps on the sea water side of the heat exchanger. The VSDs control the amount of sea water flow through the heat exchanger based on the load in the building, rather than maintain a constant flow. The maximum pumping rate of each pump is 1,100 gallons per minute (GPM) or 1.58 million gallons per day (MGD). However, the variable head created by the tidal cycle varies the effective pumping rate, so the maximum achievable daily pumping rate is only 1.2 MGD.

Although the system is capable of pumping at a maximum daily rate of 1.2 MGD, the NCCW system has been calibrated not to exceed an average of 980,000 GPD (0.98 MGD) by utilizing adjustable valves downstream of the pumps to alter the flow rate. These valves have been adjusted to reduce the volume of water that is pumped through the system and are affixed to set the pumping rate to an average of 680 GPM or 980,000 GPD, putting the system daily pumping rate below the General Permit threshold of 1.0 MGD. The heat exchange system will continue to function efficiently over the long term at this reduced flow rate.

Additionally, the flow rate from the pumps is 0.98 MGD when the VSDs are operating at 100%. When the system starts up each May, the pumps typically run at 75% until some point in late July, when they are then adjusted to run at 100% to meet the facility's needs. The VSDs usually then operate at 100% until mid-September. Although an exact/measured flow rate for the reduced operation is not currently available, it is likely around 0.75 MGD when the pumps are operated at 75%. The average annual flow rate for the pumps is therefore less than 0.98 MGD.

System Intake Velocity

As noted above, the intake structure is a linear 3-foot section of 6-inch PVC pipe suspended vertically adjacent to the Union Wharf seawall, and is enclosed within a screen cover to prevent impingement. The pipe section is perforated with 866 holes varying in size from 3/16 to 7/16 inches in diameter. The surface area of the openings is 0.60 square feet and at an average flow rate of 680 GPM, the velocity of flow at the intake structure is 2.53 feet per second (FPS). This intake velocity exceeds the maximum 0.5 FPS allowable under the NPDES General Permit. Modifications to reduce the velocity of flow at the surface of the intake structures includes the installation of a screen cover around the intake structures. The mesh used to create the cover has an opening size of 0.057".

Best Technology Available Requirements

Because the facility has discharges covered by the NCCW General Permit (GP) and withdraws water from a surface water for use as NCCW, Union Wharf must comply with the requirements of Section 4.2 (BTA Requirements to Minimize the Adverse Environmental Effects of a CWIS) of the NCCW GP. The following sections review compliance with Section 4.2 of the GP.

General BTA Requirements:

To satisfy the § 316(b) BTA requirements of this General Permit, a facility that operates a cooling water intake structure to withdraw cooling water from waters of the United States must:

a. Operate a physical exclusion technology that either a) has an actual velocity of no greater than 0.5 foot per second (fps) measured at the opening of the intake structure; or b) returns all impinged aquatic life to the source waterbody in a manner that maximizes survival.

The velocity of flow at the intake structure is 2.53 feet per second (FPS), and the existing system does not experience measurable fish impingement. The configuration and design of the CWIS is such that it excludes fish from the NCCW system. The CWIS consists of duplicate 36-inch sections of 6-inch PVC pipe perforated with 866 holes ranging in size from 3/16-inch to 7/16-inch in diameter, enclosed within a stainless-steel screen cover further reduce the potential for fish impingement and to reduce intake velocities. The mesh used for the cover has an opening size of 0.057".

No fouling of the intake structure from impinged fish has been experienced by the facility in the past. Only one intake pipe and pump operate at any one time, and the intakes are submerged and appear to be adequately screened to preclude fish impingement.

b. Minimize the amount of cooling water withdrawn.

Under existing conditions, the NCCW system only operates between May and November, in conjunction with the facility's cooling needs. By utilizing the system seasonally, a reduction of pumping on the order of 177 million gallons of sea water per year is achieved (as compared to year-round pumping).

Additionally, source water pumping minimization has been achieved through the installation of variable speed drives (VSD) on the two pumps on the sea water side of the heat exchanger. The VSDs control the amount of sea water flow through the heat exchanger based on the load in the building, rather than maintain a constant flow.

c. Ensure that any spraying to remove impinged fish or invertebrates from a CWIS uses no chlorinated water and is a low-pressure spray, having a rating of 20 pounds per square inch (psi) or less.

The existing NCCW system is a closed system with no water spray or traveling screens. As such, sprayed water is not used to remove impinged fish or invertebrates from the CWIS. When noticeable algae growth on the screen becomes significant, a power washer is used to clean the screen covers at low tide. Given the minimal opening size of the mesh screen cover (0.057") and the lack of previous impingement events, this method is not believed to impact any organisms.

d. Submit an impingement monitoring program with the NOI tailored to the facility's CWIS to regularly monitor for impinged fish and impinged invertebrates. This program shall be conducted beginning sixty (60) days after the effective date of permit coverage and end no earlier than three (3) years after the effective date of permit coverage. The results of this monitoring shall be retained on-site for inspection by or submission to EPA for at least five years from the date of the monitoring event. If practicable, this program shall include inspections of all locations where impingement may occur, at a minimum frequency of three Non-Contact Cooling Water General Permit MAG250000 and NHG250000 2024 Final General Permit Page 22 of 33 times a week at varying times of day, operating conditions, and source water conditions. All inspections must be recorded in writing, and this inspection record shall include the date, time, presence or absence of impinged organisms, and the name of the inspector. If organisms are observed, the permittee must record the following information: the number, species and length of the impinged fish; the condition of the fish (dead or alive); and any actions taken by the facility (e.g. fish returned to river, fish collected, cooling water

intake flow reduced). If the permittee determines that this monitoring program frequency and/or protocol are not practicable, the permittee shall provide in its NOI an explanation of this determination, an alternate frequency and/or protocol, and an explanation of why the alternative frequency and/or protocol are adequate to determine the number of impinged fish and invertebrates on the facility's CWIS.

Under existing conditions, the CWIS is not known to impinge fish or invertebrates. Union Wharf conducts an annual inspection of the CWIS to ensure that it is free of debris and functioning properly. Union Wharf has not observed impinged fish or invertebrates during these inspections. As such, Union Wharf will continue to conduct annual inspections of the CWIS; however, an impingement monitoring program is not appropriate for the Union Wharf NCCW system.

e. If the permittee observes fifty (50) or more fish on the CWIS during any one of the following activities or situations, this would qualify as an unusual impingement event (UIE), requiring notification as described below: 1) during a regular impingement monitoring program observation event, 2) at any time during the inspection of a CWIS, or 3) when the cumulative number of individual fish observed on the CWIS totals fifty (50) or more based on multiple observations over the course of any 4-hour period. The permittee shall report such a UIE to the EPA and particular State as required in Part 6.1.3 of this Permit within 24 hours by telephone. A written confirmation report shall be included as an attachment with the next monthly discharge monitoring report (DMR) report that is due to be submitted through NetDMR. These oral and written reports shall include the following information: the date and time of the unusual impingement event; the number, species and length of the impinged fish; the condition of the fish (dead or alive); and any actions taken by the facility (e.g. fish returned to river, fish collected, cooling water intake flow reduced).

Fish impingement is not known to occur at the Union Wharf CWIS. However, should Union Wharf discover fish impingement during annual inspection of the CWIS, EPA will be notified accordingly.

Facility-Specific BTA Requirements:

In addition to the requirements of Part 4.2.1 of the General Permit outlined above, Facility-Specific BTA Requirements must also be evaluated under Part 4.2.2. The following sections of this narrative include text from a BTA description previously filed with the EPA, most recently under the 2019 NCCWGP. The description includes a regulatory compliance assessment, a marine habitat assessment, results of an impingement study and entrainment sampling, and an assessment of technology.

Regulatory Compliance Assessment

In compliance with the Section 4.2.3 requirement for implementation of facility-specific BTAs, a combination of BTAs were examined for the Union Wharf system, including changes to the current CWIS, design modification measures, and operational measures. After a comprehensive examination of suitable BTAs, including those components suggested in Attachment C of the NCCW General Permit, a preferred combination of facility-specific BTAs was selected.

BTA appropriateness was evaluated based on the habitat characterization, impingement and entrainment studies, engineering calculations, existing system configuration, physical location of the system and cost. Based on the aforementioned factors, appropriate BTAs for the Union Wharf

NCCW system include a combination of design measures and operational measures. Specifically, the most feasible facility-specific BTAs are the installation of variable speed drives and intake pipe screen cover.

Marine Habitat Assessment

As part of the Facility-Specific BTA requirements, an assessment of the habitat and aquatic life of the source water body is required. This section presents the results of the marine habitat assessment studies conducted in the vicinity of the CWIS at the Union Wharf Condominium in May 2010.

Marine Habitat

As shown in Figure 2, the non-contact cooling water intake and discharge are located on the west side of the Boston Inner Harbor. Boston Harbor is a busy marine port that has been highly modified historically to facilitate maritime shipping, fishing and other commercial operations. Numerous solid fill and pile supported wharfs extend into the harbor, leaving no natural shoreline. In the vicinity of the site the shoreline is predominately characterized as vertical granite block seawalls. A small intertidal beach area is within the study area that was once covered by a wharf, as evidenced by the remaining deteriorated pile field (Figure 5). Exposed beach area at low tide is approximately 60 feet wide at its greatest width and completely submerged at high tide.

According to records maintained by the National Oceanic and Atmospheric Administration (NOAA), Inner Boston Harbor is a mesotidal embayment (spring tidal range of 11.07 feet). Tidal currents in the inner harbor are generally weak and variable, but can range from 0.2 to 0.6 feet per second[1].

Immediately offshore of the intake/discharge site, Boston Harbor has been historically dredged and used as a boat basin and marina. A marina continues to operate north of the site, adjacent to another condominium complex (Figure 6). Water depth off the seawall increases quickly to 20 feet within 40 feet of the wall.

The marine habitat at the site was characterized through a review of relevant data and observations/measurements made during low tidal conditions. The results of these efforts, including a description of intertidal and subtidal environments, are presented below.

Intertidal Zone

The intertidal zone includes the tidal range between low tide and high tide and includes the vertical granite block seawalls (Figure 3) and the beach area (Figure 5) on the north side of Union Wharf (near the intake and discharge pipes).

The intertidal zone at Union Wharf is relatively sheltered within the inner Boston Harbor and along the western shoreline where numerous solid fill piers surrounded by granite block walls extend into the harbor. Energy from storm generated waves and tidal currents within the inner harbor and along the irregular man-made shoreline are diminished, providing a relatively stable environment. However, the area is exposed to smaller waves from storms and waves from passing boat wakes. The intertidal zone at the granite seawalls provides solid support and habitat

[1] NOAA 2010 Tidal Current Predictions. NOAA Tides and Currents - http://tidesandcurrents.noaa.gov/currents10/tab2ac2.html#11

for sessile and attached marine organisms including barnacles (*Balanus sp.*), blue mussels (*Mytilus edulis*) and periwinkle snails (*Littorina littorea*). Algae colonizing the intertidal zone include rockweeds (*Fucus vesiculosus* and *Ascophyllum nodusum*), Irish moss (*Chondrus crispus*) and green algae (*Ulva sp*).

Adjacent to the site is a small beach area. The beach is protected behind the Union Wharf extension. The beach area is characterized by large granite blocks, cobbles and stones in the upper half and scattered rocks, coarse gravel and coarse sand in the lower portion. The presence of coarse sand indicates the beach receives enough wave action to carry off fine sands and silts, leaving the coarse grain size sands and gravels. Throughout the beach area are standing deteriorated piles that formerly supported a timber wharf. The piles are not connected, and many are severely deteriorated. The rocks and piles in the beach area support a community of dense barnacles, mussels and periwinkles along with rockweed and Irish moss. In addition, numerous Pacific grapsid shore crabs (*Hemigrapsus sanguineus*) were noted under rocks and in crevices on the beach area and a single starfish (*Asterias forbesii*) was observed within the shoreline rocks. A qualitative sample of the sand and gravel from the lower beach area was collected and sieved through a one-millimeter stainless steel sieve to concentrate any invertebrates. No small crustaceans such as amphipods, shrimp or isopods were observed. Numerous annelids were collected including many Oligochaetes, a single Capitellidae polycheate and a single small (1.8 cm) soft shell clam (*Mya arenaria*).

The intertidal area appeared to be healthy and but supported a poor diversity of invertebrates. The coarse sands indicate a higher energy environment which may have contributed to the low invertebrate diversity. Numerous species of red, green and brown algae were observed within the intertidal zone and the adjacent subtidal waters.

Subtidal Zone

The subtidal Boston Harbor habitat extends to the seawall at the CWIS location (Figure 6) and supports deep water and a portion of the deteriorated pile field. Approximately 40 feet off the granite seawall from the CWIS intake and discharge, water depths are approximately 20 feet deep. A petite ponar grab was used to collect a sample of the bottom (benthic) sediments. Benthic sediments consist of fine-grained sands and silts with a one-centimeter layer of brown oxidized sediments over black anoxic sediments. Numerous mussel shell fragments were embedded in the sediments and one of the two grabs recovered a single large blue mussel. The sediments collected off Union Wharf appear to be typical of inner harbor areas where fine grained sediments settle in the deep portions of the embayment and usually become anoxic beneath a thin oxidized layer.

The collected grab samples were sieved in a one-millimeter stainless steel sieve to remove the fine-grained sediments. The collected material was examined under a binocular microscope to separate and identify the macroinvertebrates collected in the grab samples. Table 1 lists the species and relative dominance of each species collected off the CWIS.

Table 1: Union Wharf Benthic Invertebrates

Species Type	Scientific Name	Common Name	Relative Dominance
Round Worm	Nematoda	Nematoda	Dominant
Annelida	Oligochaeta	None	Dominant

Annelida	*Harmothoe imbricata*	Scale worm	Common
Annelida	*Streblospio benedicti*	Spionid worm	Present
Annelida	*Polydora caeca*	Spionid worn	Present
Annelida	*Exogone* sp.	Syllid worm	Scarce
Annelida	*Eteone lactea*	Phyllodocid worm	Scarce
Annelida	*Armandia agilis*	Opheliid worm	Scarce
Gastropoda	*Crepidula fornicata*	Slipper shell	Scarce
Gastropoda	*Nassarius trivittatus*	NE dog whelk	Present
Bivalvia	*Mytilus edulis*	Blue mussel	Scarce
Bivalvia	*Yoldia sapotilla*	Short yoldia	Scarce
Decopoda	*Pagurus longicarpus*	Hermit crab	Scarce
Amphipoda	*Ampelisca abdita*	None	Scarce

Source: Vanasse Hangen Brustlin, Inc.

The results of the subtidal survey indicate typical inner harbor fine grained marine sediments that are anoxic below a thin oxidized layer. The invertebrates found in the sediment are typical for these habitats but the low number individuals and species diversity indicates a stressed environment, likely resulting from runoff pollutants. A chemical analysis of the sediments was not conducted for this analysis.

Impingement Study Results

An impingement study for the Union Wharf CWIS could not be conducted because of the intake design. The perforated pipe intake is suspended off the Union Wharf seawall and does not use traveling screens, sprays or other mechanical methods to remove fish or debris. On an annual basis, a diver cleans the CWIS intakes and adjacent seawall of algae and encrusting invertebrates that may interfere with the operation of the intake. If needed, the intake pipes can be detached from the seawall and removed from the water for maintenance, although this is rarely needed.

Although no study of fish and invertebrate impingement was conducted, the system operator is unaware of any impingement issues that may currently occur with the CWIS. Blockage of the intake structure would reduce the incurrent flow and cause cavitation of the pumps. Cavitation has not been a problem with the system except on one event when a plastic bag floating in the harbor became intermittently trapped on the intakes and reduced flows.

Entrainment Study Results

A single entrainment collection was conducted on May 18, 2010. Collection consisted of connecting a 3-inch hose to the existing NCCW system piping, after the pump and before the heat exchanger, and discharged the water to a 0.336 mm plankton net suspended vertically within a 55-gallon plastic barrel. The 3-inch hose drew off some of the pumped water from the NCCW system and the rate of flow through the 3-inch hose was calculated to provide 165 GPM, requiring 2 hours and 40 minutes to filter 100 cubic meters (26,417 gallons) of seawater. The plankton net was suspended in the water-filled 55-gallon plastic barrel to reduce the physical damage to the biological sample as it was collected. A 1-1/2-inch discharge at the bottom of the barrel released some of the inflow water; excess water was allowed to overflow the barrel and return to Boston Harbor.

The collected sample from the plankton net was placed in a 16 oz. glass jar and preserved with 10 percent buffered formalin. The preserved sample was delivered to Normandeau Associates in Falmouth, Massachusetts for analysis. Using a Massachusetts Department of Environmental Protection (DEP) ichthyoplankton entrainment analysis protocol, fish egg and fish larval stages observed within the collected plankton sample were identified and counted. The results of the analysis are provided in Table 2.

Table 2: Union Wharf Ichythyoplankton Sample

Taxa	Common Name	Life Stage	Count*	Total Length (mm)
Enchelyopus-Urophycis-Peprilus	rockling-hake-butterfish	Egg	10	-
Enchelyopus cimbrius	fourbeard rockling	Egg	2	-
Labrid-Limanda	tautog-cunner-yellowtail	Egg	23	-
Labridae	tautog-cunner	Egg	1	-
Paralichthys-Scophthalmus	fourspot flounder-windowpane	Egg	4	-
Pseudopleuronectes americanus	winter flounder	Stg 2	1	3.6
Damaged, unkown		Larvae	1	-

*per 100 cubic meters of seawater (26,417 gallons)
Source: Normandeau Associates, Inc., May 2010

Technology Assessment

VHB evaluated the feasibility of the BTA components suggested in Attachment C of the NCCW General Permit. A determination of feasibility for each of the components was based on the habitat characterization, impingement and entrainment studies, engineering calculations, system configuration, physical location of the system and cost. The following BTA components were considered, per the suggestions contained in Attachment C of the NCCW General Permit.

Use of a closed-cycle cooling system or withdrawing cooling water at a rate commensurate with a closed-cycle cooling system.

A dry closed-cycle cooling system utilizes radiation and convection as the means to emit heat from the steam cycle. This type of system requires significant solar-influenced surface area for construction, which is not available on a space-limited, downtown Boston wharf.

A wet closed-cycle cooling system relies on a combination of heat rejection and sensible heat transfer as the mechanism for cooling. Due to the heavily developed urban residential environment surrounding Union Wharf, construction of a mechanical or natural draft cooling tower is not considered a feasible alternative to the continued operation of the existing NCCW system.

Prior to construction of the NCCW system in 1996, Union Wharf operated a cooling tower on the north side of the building, immediately adjoining the old (and at the time vacant) MBTA power plant located between Union and Battery Wharves. The former MBTA power plant building was later converted to residential use. The City of Boston subsequently received numerous complaints from residents regarding excess noise stemming from operation of the cooling tower. The existing NCCW system was constructed in response to repeated noise citations issued by the City of Boston.

Operation of variable speed pumps to minimize the amount of cooling water withdrawn, to the extent practical.

Cooling water withdrawal minimization has been achieved through the installation of variable speed drives on the two pumps on the sea water side of the heat exchanger. The VSDs control the amount of sea water flow through the heat exchanger based on the load in the building, rather than maintain a constant flow.

Use of alternative sources of cooling water to the maximum extent practical.

In light of the physical location of Union Wharf and surrounding land use, utilizing an alternative source of cooling water is not a practicable BTA for the Union Wharf NCCW facility.

Steps to minimize intake velocity.

The system intake velocity has been minimized through the installation of a screen cover over the intake structures. The previous CWIS intake velocity was 2.53 FPS, and installation of a semi-circular stainless steel mesh screen with a 60 percent openness area was predicted to reduce the flow velocity at the screen surface to 0.27 FPS. The stainless-steel mesh selected for use in the screen cover has an opening on 73 percent openness. Though not measured in the field, the installation of the screen cover is expected to have minimized the intake velocity, thereby lessening the likelihood of system impingement and entrainment.

Steps to minimize cooling water.

Under existing conditions, Union Wharf's NCCW system is not in operation between November and May. Operating the system for only six months of the year provides a significant minimization of cooling water needs.

When the system is operating, cooling water pumping is minimized through the use of VSDs. VSDs allow Union Wharf to better tailor their water usage to best suit facility's cooling needs.

Use of rotating screens and automatic fish return system or similar system to increase the likelihood that fish impinged upon intake structures will be returned to the source water with minimal stress.

The Union Wharf NCCW system is an open system in which the incoming seawater is piped into an adjacent below ground vault and heat exchanger system, and then quickly returned to the harbor. The existing system configuration does not have a physical location where it would be appropriate to incorporate a rotating screen system.

Further, fish impingement is not known to occur in conjunction with operation of Union Wharf's NCCW system. The existing graduated perforation intake structure configuration has not caused fish impingement as fouling of the CWIS has not occurred since construction of the facility in 1996.

Locate the CWIS in, or relocate the CWIS to, an area where impingement and/or entrainment will be minimized.

Based on an entrainment study, inspection of the CWIS and information provided by facility staff, the existing CWIS location appears to be resulting in minimal organism entrainment and no fish impingement (refer to previous sections). Therefore, relocating the CWIS would not be a productive BTA for the Union Wharf system.

Use of low pressure spray (30 psi or less) rather than high pressure spray to remove impinged organisms from screens.

The Union Wharf NCCW system is an open system in which the incoming seawater is piped into an adjacent below ground vault and heat exchanger system, and then quickly returned to the harbor. The existing system configuration uses a submerged pipe intake and does not have a physical location where it would be appropriate to incorporate a low-pressure spray.

Further, fish impingement is not known to occur in conjunction with operation of Union Wharf's NCCW system. The existing graduated perforation intake structure configuration has not caused fish impingement as fouling of the CWIS has not occurred since construction of the facility in 1996. When noticeable algae growth on the screen becomes significant, a power washer is used to clean the screen covers at low tide. Given the minimal opening size of the mesh screen cover (0.057") and the lack of previous impingement events, this method is not believed to impact any organisms.

Maintenance of CWIS bottom sills or dredging to minimize the influence of the intake velocity on impingement and/or entrainment of benthic or near benthic organisms.

Under existing conditions, the intake pipes are affixed to the adjacent Union Wharf seawall and are not in contact with the harbor floor. This configuration prevents the intake of bottom sediment as well as minimizes the influence of the system intake velocity on benthic and near benthic organisms. Additionally, the installation of the intake screen cover further minimizes intake velocity and the potential impact the system might have on benthic and near benthic organisms in the vicinity of the CWIS.

Maintenance of fine screen mesh or fish exclusion devices such as louvers or other modification of the CWIS to reduce mortality, impingement and/or entrainment.

The existing CWIS results in minimal entrainment and no fish impingement. In addition, the installation of the intake pipe screen cover reduces the system intake velocity, further minimizing the likelihood of fish impingement.