

MAG250732

rec'd 9/29/08
ofrawley



IN REPLY REFER TO:

United States Department of the Interior

NATIONAL PARK SERVICE
Lowell National Historical Park
67 Kirk Street
Lowell, Massachusetts 01852-1029

September 29, 2008

Ms. Austine Frawley
Office of Ecosystem Protection(CMU)
Environmental Protection Agency
One Congress Street
Boston, MA 02114-2023

Dear Ms. Frawley:

Attached are the Notice of Intent (NOI) and related materials to renew the Non Contact Cooling Water Permit (MAG250732) to continue operating a canal water pumping stand on the Eastern Canal near Bridge Street which is used for cooling water for the Boott Cotton Mills Museum in order to meet the cooling demands for the building.

Attached are location plans and various pictures, drawings and descriptions which show how this operation is conducted. We have sent a letter on September 22, 2008 to the Fish and Wildlife concerning threatened and endangered species in the vicinity. The design of the cooling water intake structure includes a pump stand on the canal wall and a small trash deflector that is shown in the picture in the package. We have never found any evidence of fish impingement on this setup which we do check during canal drain downs.

Please do not hesitate to contact me if you have any questions, I can be reached at 978/275-1721.

Sincerely,

Edward C Davis

Edward C. Davis
Supervisory Facility Management Specialist
Lowell National Historical Park

Boott Mills Cotton Museum Non Contact Cooling Water Permit

Description of the Existing System:

The existing system has been in place since June of 1992 to provide cooling water for the Boott Mills Cotton Museum a 100,000 square foot mill building located in Lowell between the Eastern Canal and the Merrimack River (See the attached USGS plan). The system includes a pump stand with two pumps and a trash deflector (shown in the attached intake picture). Typically one pump operates at any given time and pumps water from the Eastern Canal to heat exchangers that are located in the basement of the Coal Pocket at the Museum. The system is only operated between the months of April and October and typically the major use is during the heat of the summer from the middle of June through the middle of September- there is no winter time operation.

During the spring and summer of 2008, a cooling tower was installed on the roof of the Boott Connector to supplement the existing system (shown in the attached cooling tower picture). The system without the cooling tower has not been able to provide sufficient cooling for the building particularly when the canal was drained but also when water temperatures in the canal exceeded 78°F. Also, when the canal temperatures exceeded 78° the return water would exceed 83°F which would result in violations of the permit limits. The new system installation is just now nearing completion and has not yet been fully operated. It is anticipated that the under the hybrid system the canal water portion will be operated when the canal temperatures are at or below 78°F and the cooling tower will be operated when the canal temperatures exceed 78°F. There may be times when mechanical problems with the cooling tower or heat exchanger plugging with the canal water system may require changes to this protocol.

Design of the Existing Cooling Water Intake Structure

The existing cooling water intake system was designed in June of 1992 (See the attached drawing pdf). Originally, the system was designed to use water from the Proprietors of Locks and Canals Fire Protection Reservoir. In March of 1992, however, the Proprietors announced that they were abandoning the Reservoir which had fed water to the fire protection systems in all the mills in downtown Lowell. Throughout the City, mill owners including the National Park Service at the Boott Museum had to design new fire protection connections from the City water system and for the Boott Museum a new feed for cooling water was also necessary.

A number of alternatives were studied and the selected design was to pump water from the Eastern Canal with the pumps located on a cantilevered stand off the building wall as shown on the attached print with a small trash deflector placed on the building wall to deflect trees and other waterborne trash that travels down the canal. The trash deflector is located about a foot off the bottom of the canal and no organisms or other items have been observed to accumulate underneath it. Each pump intake is outfitted with a stainless steel screened basket to filter out items that would be otherwise pumped into the piping. Strainers inside the building further filter the water before it enters the heat exchangers. Typically, the canals are drained quarterly and this provides an opportunity to check the pump intakes and trash deflector. During the course of operating the system over the last fifteen years, no fish or wildlife impingements have been observed. The protocol is to check the intakes and trash deflector during each canal drain-down. Under the new hybrid cooling tower/canal water system it is anticipated that the canal water pumping will be limited to approximately half of what was pumped in previous years.

MAG 250732

APPENDIX 5

Form for Notice of Intent (NOI) for the Noncontact Cooling Water General Permit

1. General facility information. Please provide the following information about the facility.

a) Name of Facility: Boot Cotton Mills Museum		Type of Business: Museum
Facility Location Address : 115 John St., Lowell, MA longitude: 71.306226 latitude: 42.646896	Facility SIC codes: 8412	Facility Mailing Address (if not location address) Lowell National Historical Park 67 Kirk Street Lowell, MA 01852
b) Name of facility owner: Lowell National Historical Park		Email address of owner: Superintendent LOWE@nps.gov
Owner's Tel #: 978/275-1700		Owner is (check one): 1. Federal ☒ 2. State ☐ 3. Tribal ☐ 4. Private ☐ 4. Other ☐ (Describe)
Owner's Fax #: 978/275-1762		
Address of owner (if different from facility address)		
Legal name of Operator, if not owner: _____ Operator Contact Name: Edward C. Davis, Facility Manager Operator Tel Number: 978/275-1721 Fax Number: 978/275-1762 Operator's email: Ted_Davis@nps.gov Operator Address (if different from owner): Same		
d) Attach topographic map indicating the locations of the facility and the receiving water; all NCCW discharge points; upstream and downstream monitoring points. Map attached? ☒		
e) Check Yes or No for the following:		
1 Has a prior NPDES permit been granted for the discharge? Yes ☒ No ☐ If Yes, Permit Number: MAG250732		
2 Is the discharge a "new discharge" as defined by 40 CFR Section 122.22? Yes ☐ No ☒		
3 Is the facility covered by an individual NPDES permit? Yes ☐ No ☒ If Yes, Permit Number _____		
4 Is there a pending application on file with EPA for this discharge? Yes ☒ No ☐ If Yes, date of submittal: 9.29.2008		

2. Discharge information. Please provide information about the discharge, (attaching additional sheets as needed)

- a) Name of receiving water into which discharge will occur: Eastern Canal
State Water Quality Classification: _____ Freshwater: ☒ Marine Water: _____
- b) Describe the discharge activities for which the owner/applicant is seeking coverage: Non-contact cooling water which is used for air conditioning the Museum
- c) FOR MASSACHUSETTS FACILITIES ONLY: Engineering Calculations: Submit the completed engineering calculation of the surface water temperature rise as shown in Attachment A of the General Permit. Check if attached: ☒
- d) Number of outfalls 1
- For each outfall:
- e) What is the maximum daily and average monthly flow of the discharge? Note that EPA will use the flow reported here as the facility's permitted effluent flow limit. Max Daily Flow 483,000 GPD Average Flow 383,000 GPD
- f) What is the maximum daily and average monthly temperature of the discharge (in degrees F)? Max Temp. 85°F Average Temp. 82.5°F
- g) What is the maximum and minimum monthly pH of the discharge (in s.u.)? Max pH 7.5 Min pH 6.6
- h) FOR MASSACHUSETTS FACILITIES ONLY: Is the source water of the NCCW potable water? Yes _____ No ☒ If Yes, EPA will calculate the Total Residual Chlorine limit for facilities located in Massachusetts.
- i) Is the discharge continuous? Yes _____ No ☒ If no, is the discharge periodic (P) (occurs regularly, i.e., monthly or seasonally, P but is not continuous all year) or intermittent (I) (occurs sometimes but not regularly) or both (B)
If (P), number of days or months per year of the discharge 180 days max and the specific months of discharge April-October;
If (I), number of days/year there is a discharge _____. We are completing the installation of a new cooling tower system which will reduce the days of discharge largely to shoulder season use.
- j) Latitude and longitude of each discharge within 100 feet: outfall 1: long. 71.306224 lat. 42.646896; outfall 2: long. _____ lat. _____; outfall 3: long. _____ lat. _____ (See http://www.epa.gov/tri/report/siting_tool)
- k) Provide the reported or calculated seven day-ten year low flow (7Q10) of the receiving water 899 cfs
Please attach any calculation sheets used to support stream flow and dilution calculations. See General Permit Attachment B for equations and additional information. See attached calculations sheet.
- MASSACHUSETTS FACILITIES: See Part 3.4 and Appendix 1 of the General Permit for more information on ACEC.
Areas of Critical Environmental Concern (ACEC): Does the discharge occur in an ACEC? Yes _____ No ☒
If yes, provide the name of the ACEC: _____

3. NCCW Source Water Information. Please provide information about the NCCW source water, using separate sheets as necessary:

a) Indicate source of the NCCW (i.e., municipal water supply, private well, surface water withdrawal, groundwater): Source: <u>Eastern Canal</u> Name of Source Water: <u>Merrimack River</u> Is the source registered/permitted under MA Water Management Act or NHDES Water User Registration Rule (Env Wq 2202)? Yes <u> </u> No <u>X</u> If yes, registration number: <u> </u>	b) If source water is surface water: i) Is it a freshwater river or stream Yes <u>X</u> No <u> </u> ii) Is it a lake? <u> </u> reservoir? <u> </u> iii) Is it tidal river? <u> </u> estuary? <u> </u> ocean? <u> </u> c) Is the source water groundwater? Yes <u> </u> No <u>X</u> If yes, see Appendix 8 and submit effluent and surface water test results, as required in Part 5.4 of the General Permit. d) Does the facility use both a primary and backup source of noncontact cooling water? Yes <u>X</u> No <u> </u> If yes, attach information that identifies and explains the primary and backup sources of noncontact cooling water for and how often the backup supply was used in last three years.
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4 Best Technology Available for CWIS

Are you subject to BTA requirements at Part 4.2 of the General Permit? (Facility's discharge is covered by this General Permit and the facility withdraws noncontact cooling water from surface source water). Yes X No If No, explain:

If YES, attach the facility-specific BTA description as required in Part 4.3 of the General Permit. For additional information and guidance, see Questions 13-23 of the NCCW Fact Sheet, posted at <http://www.epa.gov/region1/npdes/nccwgp.html>. Provide a map showing the location of each CWIS intake structure; NCCW outfall(s) and any CWIS feature referred to in the BTA description. See attached description.

Include in your description:

- Measures to meet the General Permit Part 4.3.a general BTA requirements, including documentation that describes the facility's monitoring program for impinged fish and/or invertebrate; or the required alternative monitoring plan frequency and/or protocol
- A characterization of the source water body's aquatic life habitat in the vicinity of each CWIS during the seasons when the CWIS may be in use
- The attributes of the current CWIS
- Design measures of the CWIS
- Operation measures of the CWIS
- Historical occurrence of impinged fish for the past five years
- If applicable, a demonstration that the facility's intake rate is commensurate with a closed-cycle recirculation system
- Other components to reduce impingement and/or entrainment of aquatic life

4. BTA FOR CWIS CONTINUED:

Provide the following information for each CWIS to support your attached facility-specific BTA description.

Design capacity of the of the CWIS .5 MGD

Maximum monthly average intake of the CWIS during the previous five years: 15,308,000 gallons (.483 MGD); Month in which this flow occurred July 2007

Maximum through-screen design intake velocity 6.1 feet/second (fps)

For facilities where the CWIS is located on a freshwater river or stream, provide the following information:

The source water's annual mean flow 3578.9 cubic feet/second (cfs) USGS web site #01100000 for Merrimack River below Concord less mean Concord flow

The design intake flow as a % of the source water's annual mean flow .02%. See Attached calculations.

The source water's 7Q10: .899 cfs. See Attachment B of the General Permit for more information on 7Q10 determinations.

The design intake flow as a percent of the source water's 7Q10: .086%

5 Contaminant Information

If applicable, attach a listing of all non-toxic pH neutralization and/or dechlorination chemicals used, including chemical name and manufacturer; maximum and average daily quantity used as well as the maximum and average daily expected concentrations (mg/l) in the NCCW discharge, and the vendor's reported aquatic toxicity (NOAEL and/or LC50 in percent for aquatic organism(s)). Not applicable.

6. Determination of Endangered Species Act Eligibility: Provide documentation of ESA eligibility as required at Part 3.4 and Appendix 2, Part C, Step 4, of the General Permit. In addition, respond to the following questions.

- a) Are any listed threatened or endangered species, or designated critical habitat, in proximity to the discharge? Yes ___ No X
- b) Has any consultation with the federal services been completed? Yes X No ___ in prior years
- c) Is consultation underway? Yes X No ___ formal letter sent 9/22/08 regarding this permit
- d) What were the results of the consultation with the U.S. Fish and Wildlife Service and/or NOAA Fisheries Service (check one):
a "no jeopardy" opinion ___ or written concurrence ___ on a finding that the discharges are not likely to adversely affect any endangered species or
- e) Which of the five eligibility criteria listed in Appendix 2, Section B (A,B,C,D or E) have you met? _____
- f) Attach a copy of the most current federal listing of endangered and threatened species from the USF&W web site listed in Appendices 2, 2.1 and 4

7. Documentation of National Historic Preservation Act requirements: Please respond to the following questions:

- a) 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 X No ___
- b) Have any State or Tribal historic preservation officers been consulted in this determination? Yes ___ or No X If yes, attach the results of the consultation(s).
- c) Which of the three National Historic Preservation Act requirements listed in Appendix 3, Section C (1,2, 3) have you met? All

8 Supplemental Information: Please provide any supplemental information. Attach any analytical data used to support the application. Attach any certification(s) required by the general permit

9 Signature Requirements: The Notice of Intent must be signed by the operator in accordance with the signatory requirements of 40 CFR Section 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 information submitted. 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

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 fine and imprisonment for knowing violations.

Facility Name: Lowell National Historical Park
Operator signature: *Edward C Davis*
Title: Supervisory Facility Management Specialist
Date: 9/29/2008

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.



U.S. Fish & Wildlife Service

Threatened & Endangered Species System

Massachusetts

Notes:

- This report shows the species listed in this state according to the Federal Register listing description.
- This list does not include experimental populations and similarity of appearance listings.
- This list includes species or populations under the sole jurisdiction of the National Marine Fisheries Service.
- Click on the highlighted scientific names below to view a Species Profile for each listing.

Listed species (based on published population data) -- 27 listings

Animals -- 22

<u>Status</u>	<u>Species/Listing Name</u>
E	Beetle, American burying (<i>Nicrophorus americanus</i>)
E	Butterfly, Karner blue (<i>Lycaeides melissa samuelis</i>)
E	Curlew, Eskimo (<i>Numenius borealis</i>)
T	Plover, piping except Great Lakes watershed (<i>Charadrius melodus</i>)
E	Plymouth Red-Bellied Turtle (<i>Pseudemys rubriventris bangsi</i>)
E	Puma (=cougar), eastern (<i>Puma (=Felis) concolor cougar</i>)
E	Sea turtle, hawksbill (<i>Eretmochelys imbricata</i>)
E	Sea turtle, Kemp's ridley (<i>Lepidochelys kempii</i>)
E	Sea turtle, leatherback (<i>Dermochelys coriacea</i>)
T	Sea turtle, loggerhead (<i>Caretta caretta</i>)
E	Sturgeon, shortnose (<i>Acipenser brevirostrum</i>)
E	Tern, roseate northeast U.S. nesting pop. (<i>Sterna dougallii dougallii</i>)
T	Tiger beetle, northeastern beach (<i>Cicindela dorsalis dorsalis</i>)
T	Tiger beetle, Puritan (<i>Cicindela puritana</i>)
T	Turtle, bog (=Muhlenberg) northern (<i>Clemmys muhlenbergii</i>)
E	Wedgemussel, dwarf (<i>Alasmodonta heterodon</i>)
E	Whale, blue (<i>Balaenoptera musculus</i>)
E	Whale, finback (<i>Balaenoptera physalus</i>)
E	Whale, humpback (<i>Megaptera novaeangliae</i>)
E	Whale, right (<i>Balaena glacialis (incl. australis)</i>)
E	Whale, Sei (<i>Balaenoptera borealis</i>)
E	Wolf, gray Lower 48 States, except where delisted and where EXPN. Mexico. (<i>Canis lupus</i>)



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E	Puma (=cougar), eastern (<i>Puma (=Felis) concolor cougar</i>)
E	Sea turtle, hawksbill (<i>Eretmochelys imbricata</i>)
E	Sea turtle, Kemp's ridley (<i>Lepidochelys kempii</i>)
E	Sea turtle, leatherback (<i>Dermochelys coriacea</i>)
T	Sea turtle, loggerhead (<i>Caretta caretta</i>)
E	Sturgeon, shortnose (<i>Acipenser brevirostrum</i>)
E	Tern, roseate northeast U.S. nesting pop. (<i>Sterna dougallii dougallii</i>)
T	Tiger beetle, northeastern beach (<i>Cicindela dorsalis dorsalis</i>)
T	Tiger beetle, Puritan (<i>Cicindela puritana</i>)
T	Turtle, bog (=Muhlenberg) northern (<i>Clemmys muhlenbergii</i>)
E	Wedgemussel, dwarf (<i>Alasmidonta heterodon</i>)
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E	Whale, Sei (<i>Balaenoptera borealis</i>)
E	Wolf, gray Lower 48 States, except where delisted and where EXPN. Mexico. (<i>Canis lupus</i>)

Design flow as percentage of Merrimack Average Mean Flow= $.775 / 3341.35 = .000232$

convert to % x 100= .0232%

Design flow as percentage of Merrimack 7Q10= $.775 / (580 \times 1.55) = .000862$

convert to % x 100= .086 %

Sample Calculation Sheets for Boott Cotton Mills Museum Non Contact Cooling Water Permit

Receiving Water Temperature Calculation

$$Q_p = C_{pmp} \Delta T_p$$

$$Q_r = C_{pmr} \Delta T_r$$

$$C_{pmp} \Delta T_p = C_{pmr} \Delta T_r$$

$$\Delta T_r = m_p / m_r \times \Delta T_p$$

Where Q_p = heat discharged from plant

m_p = mass of effluent from plant (gal or cubic feet per second if volume is used)

ΔT_p = change in temp effluent-influent

m_r = mass of River, lbs (gal or cubic feet per second if volume is used)

ΔT_r = change in river temperature, °F

Maximum permitted $\Delta T_p = 83^\circ \text{F} - 78^\circ \text{F} = 5^\circ \text{F}$

$$\Delta T_r = (m_p / m_r) \times 5^\circ \text{F} = (.5 \text{MGD} / 580 \text{MGD}) \times 5^\circ \text{F} =$$

$$\Delta T_r = .0043 \text{ } ^\circ \text{F}$$

Dilution Factor Calculation

$$Q_r = 580 \text{ MGD}$$

$$Q_p = .5 \text{ MGD}$$

$$\text{Dilution factor in cfs} = \frac{Q_r + (Q_p \times 1.55)}{(Q_p \times 1.55)} = \frac{(580 \times 1.55) + (.5 \times 1.55)}{(.5 \times 1.55)} = 899.775 / .775 = 1161$$

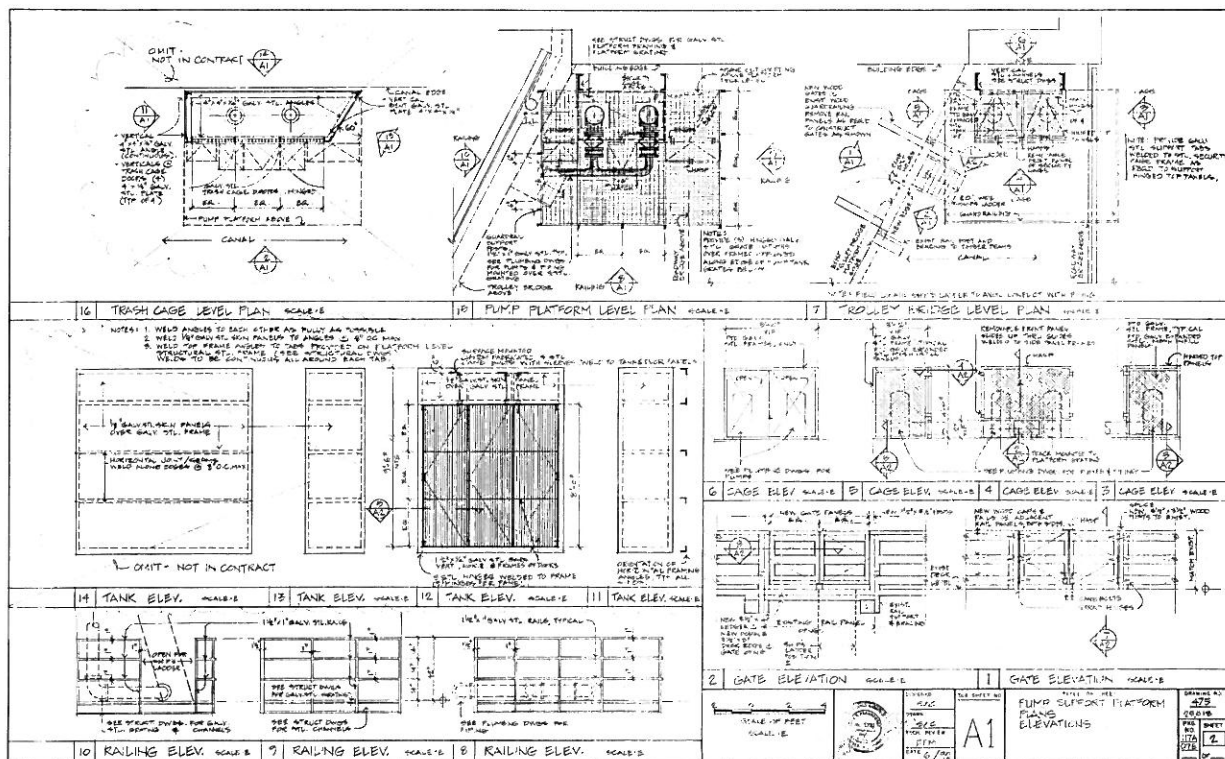
Annual Mean Merrimack River Flow

Q Mean flow calculated from Merrimack = 3992.5 cfs (website for #01100000 below Concord River confluence) for June to Sept

Q Mean flow calculated from Concord = 651.15 cfs (website for Concord River #0109950)

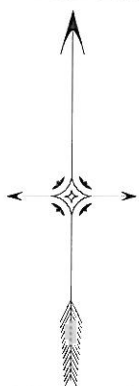
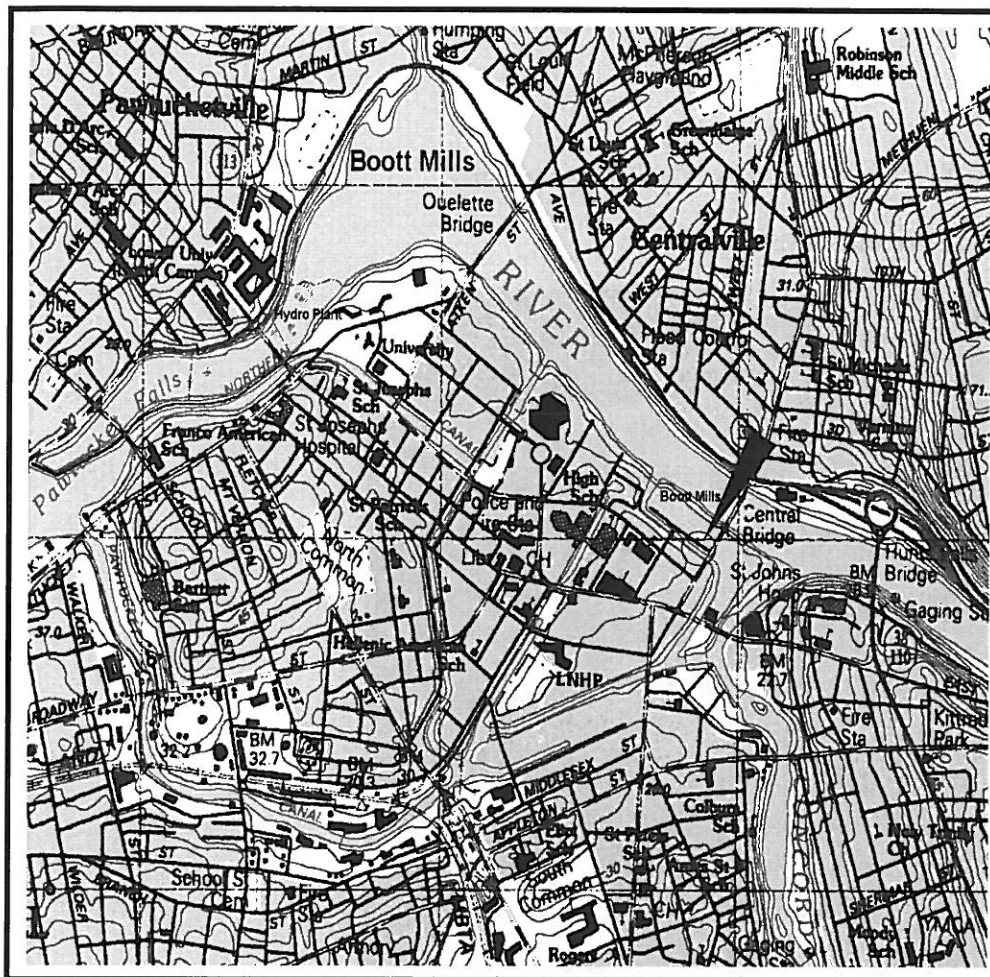
Q Mean flow for Merrimack above confluence with Concord = 3992.5 - 651.15 = 3341.35 cfs

Design flow = .5mgd converting mgd to cfs multiply x 1.55 = .775 cfs



Newly Installed Cooling Tower on the Roof of the Boott
Connector Building to serve Boott Cotton Mills Museum





Site Location Map- Noncontact Cooling Water Permit
Boott Mills Cotton Museum

Lat: 42.646896

Long: 71.306226

Outfall Location: Eastern Canal under Coal Pocket Bridge

Intake Location: Pump Stand off Bridge Street

0 4000
2000

Map Source: Lowell Quadrangle

Boott Cotton Mills Museum Location Map
Lowell National Historical Park

Date: 09/08/08

Drawn: E. C. Davis

Boott Cotton Mills Museum- Non Contact Cooling Water Pump

Intake with Trash Screen off the Eastern Canal

