UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
NEW ENGLAND - REGION I
ONE CONGRESS STREET
BOSTON, MASSACHUSETTS 02114
FACT SHEET

DRAFT NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM (NPDES) PERMIT TO DISCHARGE TO WATERS OF THE UNITED STATES

NPDES PERMIT NO.: MA0002241

PUBLIC COMMENT PERIOD:

NAME AND ADDRESS OF APPLICANT:

Taunton Municipal Lighting Plant (TMLP)
P.O. Box 870
55 Weir Street
Taunton, MA 02780

NAME AND ADDRESS OF FACILITY WHERE DISCHARGE OCCURS:

Cleary-Flood Generation Station
1314 Somerset Avenue
Taunton, MA 02780

SIC CODE: 4911 **NAICS CODE:** 221112

RECEIVING WATERS: Taunton River and to an Un-named Tidal Creek to the Taunton River, hereinafter referred to as the Discharge Creek (Taunton River Basin - MA62-02)

CLASSIFICATION: Class SB

PROPOSED ACTION: The above named applicant has applied to the U.S. Environmental Protection Agency for reissuance of its NPDES permit to discharge into the designated receiving water. The facility is engaged in generation of electricity by use of fossil fuels. The discharge is associated with the operation of two electrical generation units, 008 and 009.

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1.0 History of Significant NPDES Permit Actions

August 30, 1978	NPDES Permit Issued
September 29, 1983	NPDES Permit Reissued
April 15, 1988	NPDES Permit Reissued
September 12, 1990	Technical Advisory Committee (TAC) meeting at EPA Boston
July 13, 1992	EPA application sent to TMLP
October 1, 1992	Applications 1 and 2F submitted for permit reissuance
November 18, 1992	Application 2C submitted for permit reissuance
June 14, 1993	EPA application complete letter
August 31, 1994	Public notice of draft permit
September 28, 1994	TMLP comments on draft permit
September 30, 1994	NPDES Permit Reissued (withdrawn December 21, 1994)
October 28, 1994	TMLP Request for evidentiary hearing
December 21, 1994	NPDES Permit withdrawn, April 15, 1988 Permit remains in effect
December 5, 1995	TMLP notification of plans to change demineralized water system
April 20, 1999	TMLP NOI accepted for coverage under Multi-Sector Storm Water General Permit No. MAR05B463
December 10, 1999	Pre-permitting meeting at TMLP with EPA and MassDEP
February 10, 2000	EPA letter specifying reapplication materials and Clean Water Act (CWA) §316(a) and (b) information needed
May 22, 2000	Application for permit reissuance received
October 24, 2000	EPA, MassDEP, CZM site visit to TMLP
December 7, 2000	Earth Tech letter to EPA regarding requested information on CWIS
December 8, 2000	EPA application complete letter
January 26, 2001	Notice Of Intent (NOI) submitted for the Storm Water Discharges Associated with Industrial Activity General Permit No. MAR05B919
May 7, 2001	TMLP letter to EPA regarding requested information on bathymetry in Taunton R. near intake structures, with underwater video footage of CWIS
September 6, 2001	CWA §308 letter issued by EPA for supplemental information
December 11, 2001	Meeting at EPA with TMLP, Earth Tech, and MassDEP
December 18, 2001	Due date extension for response to September 6, 2001 CWA §308 letter
January 30, 2002	Earth Tech submits to EPA study plan for 316 (a) and (b) supplemental information request
April 10, 2002	Earth Tech memo to EPA responding to EPA comments on draft study plan
May 17, 2002	MassDEP Classification Determination of Discharge Channel/Tidal Creek
June 20, 2002	EPA letter outlining scope of work for 316(a) demonstration study
November 18, 2002	EPA site visit to TMLP
May 15, 2003	EPA site visit to TMLP
January 30, 2004	Supplemental Information Request, Section 316(a) Demonstration Document prepared by Earth Tech, Inc.
January 30, 2004	TMLP letter to EPA regarding proposed modifications to fish return
September 23, 2004	EPA site visit to TMLP

2.0 Type of Facility and Location

Some portions of the May 22, 2000 application for permit reissuance, the January 2004 CWA Section 316(a) Demonstration Document prepared by Earth Tech, Inc., and supplemental information submitted to EPA may be paraphrased in this document without further reference. Italicized text (unless otherwise identified) is material directly quoted from sources in the administrative record. All documents used in the preparation of the permit and Fact Sheet are part of the administrative record and are retained on file by EPA.

On May 22, 2000, Earth Tech, Inc., submitted an application to the U.S. Environmental Protection Agency (EPA) on behalf of the Taunton Municipal Lighting Plant, Cleary-Flood Generation Station (TMLP or Station) for reissuance of TMLP's National Pollutant Discharge Elimination System (NPDES) individual permit.

The Station is a municipally-owned 135 Megawatt steam electric power generating station. It is located at 1314 Somerset Avenue in Taunton, Massachusetts. The Station is engaged in the generation and distribution of electric power. The Station is a "peaking" facility, meaning that it primarily operates during peak electrical demand.

The easterly property boundary of the Station is the shore of the Taunton River. Wetlands, forest and some residences abut the property on the three other sides. The major structures associated with the Station are the main station building, a chemical storage building, a river water withdrawal pumphouse, a fuel oil receiving pumphouse, a fuel oil transfer pumphouse, a cooling tower for Unit 9 and two aboveground storage tanks for fuel oil. [316(a) Demonstration document]

Description of Permitted Discharges From the Station

The permitted discharges include once through condenser cooling water, auxiliary equipment cooling water, gland seal spray chamber water, boiler blowdown, demineralizer regeneration wastes, traveling screen and service water pump strainer backwash, cooling tower blowdown, and screenhouse spray nozzles.

A schematic drawing of the flow of water at the Station and the various discharges from the Station is presented on Fact Sheet Attachment A. An aerial photograph of the site is presented as Fact Sheet Attachment B.

Power Generating Equipment

The Station has two electric power generating units identified as Units 8 and 9. Unit 8 was installed in 1965. It is a Rankine cycle system. The Rankine cycle system uses water that evaporates when heated and expands to turn a turbine, which is connected to a generator to produce electricity.

The exhaust water vapor expelled from the turbine condenses and the water is pumped back to the boiler to repeat the cycle.

Unit 9 was installed in 1975. It is a combined-cycle system. A combined cycle system is an electric generating technology in which electricity is produced both from a combustion turbine and from otherwise lost waste heat exiting from combustion turbines. The exiting heat is routed to a conventional boiler or to a heat recovery steam generator for utilization by a steam turbine in the production of electricity. This process increases the efficiency of the electric generating unit. Unit 9 consists of *a combustion turbine-generator [which] produces approximately 20 Megawatts of electricity. The hot gasses are then routed to Unit 9 boiler where the gas is used as pre-heated combustion air. In the boiler additional fuel is burned. Steam produced by the boiler drives a steam turbine-generator that produces approximately 90 Megawatts of electricity. The Station produces electricity when dispatched by ISO* [Independent System Operator].

The Capacity Utilization Rate (CUR) means the ratio between the average annual net generation of power by a facility in (MWh) and total capability of the facility to generate power (in MW) multiplied by the number of hours during the year. For the year 2002, Unit 8 had a CUR of 3.1% and Unit 9 had a CUR of 21.3%. The highest use occurs during the summer and winter peak demand periods

The Station combusts several types of fuels. Unit 8 operates on No. 6 fuel oil as the primary fuel and No. 2 fuel oil to control emissions within regulatory requirements. Unit 9's combustion turbine operates normally with natural gas. It can also operate with No. 2 fuel oil. Unit 9's boiler operates normally with natural gas, but can also operate with No. 6 fuel oil. The type of fuel used is determined by availability, cost and air permit requirements.

Table Power Generation Equipment Information for C-FS

UNIT NUMBER	DESCRIPTION	CAPACITY	START DATE	FUEL
8	Rankine cycle system Once through cooling water	25 MW	1965	No. 6 fuel oil or No. 2 fuel oil
9	Combustion turbine-generator	20 MW	1975	Natural Gas or No. 2 fuel oil
	Steam boiler turbine-generator Cooling Towers	90 MW	1975	Natural Gas or No. 6 fuel oil

3.0 Receiving Waters

The Cleary-Flood Station is located at a point on the lower Taunton River between the Mill River and the Three Mile River. At the Cleary-Flood Station the Taunton River, although tidal, is channel-like in appearance, approximately 100-150 ft wide, and maintains a fairly uniform cross-section with a maximum mid channel depth of 10 ft at mean low water. The Taunton River is tidally influenced at the Station. The Taunton River is relatively flat throughout its 38-mile course, losing only 21 feet in elevation.

The Station discharges into a un-named tidal creek that TMLP has referred to as the "Discharge Channel." The creek, hereinafter referred to as the "Discharge Creek," is approximately 1,700 feet in length from the point of discharge for Outfalls 001 and 002 (next to the station) to the confluence with the Taunton River. The Discharge Creek is a water of the United States. The Taunton River and Discharge Creek have been classified as Class SB waters by the Massachusetts Department of Environmental Protection (MassDEP). The Massachusetts Surface Water Quality Standards, 314 Code of Massachusetts Regulations (CMR) 4.05(4)(b), state that Class SB waters have the following designated uses*: These waters are designated as habitat for fish, other aquatic wildlife and wildlife 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 salinity of the Taunton River as measured at the cooling water intake is dominated by fresh water. The highest salinity is found in the salt wedge at the river bottom. The salinity as measured on July 30, 1991 was 1 part per thousand (based on conductivity equivalence). Estuarine waters at or above 1 part per thousand are classified as salt water under the Massachusetts Water Quality Classification system (*see* 316(a) Demonstration Document, Page 4.5).

Section 303(d) of the Federal Clean Water Act (CWA) requires states to identify those water bodies that are not expected to meet surface water quality standards after the implementation of technology-based controls and, as such, require the development of total maximum daily loads (TMDLs). The Massachusetts 2002 Integrated List of Waters, Combined CWA Section 305(b) and 303(d) Report, which details the quality of waters in Massachusetts, includes the Taunton River and the Discharge Creek. This report indicates that the river segment receiving TMLP's discharges, *Segment MA62-02, Route 24 Bridge, Taunton to Berkley Bridge, Dighton/Berkley (Miles 21.2-13.0),* is not attaining water quality standards for pathogens.

There are currently 23 NPDES permitted dischargers on the Taunton River. Seven of these are municipal wastewater treatment plants.

Critical River flow

Water quality-based limitations are established with the use of a calculated available dilution. Title 314 CMR 4.03(3)(a) requires that the effluent dilution be calculated based on the receiving water's 7Q10 flow.

The 7Q10 is the lowest observed mean river flow for 7 consecutive days, recorded over a 10 year recurrence interval. The Section 316(a) Demonstration Document, Page 4.4, establishes the Taunton River 7Q10 flow as 37.7 cubic feet per second (cfs) (24.4 MGD) using methods consistent with State approved practices. The Discharge Creek is tidally influenced, consisting mostly of TMLP discharge water at low tide.

4.0 Basis of Permit Limits and Conditions

4.1 Permit Limits, Generally

The Clean Water Act (CWA) prohibits the discharge of pollutants from point sources to waters of the United States without authorization from a National Pollutant Discharge Elimination System (NPDES) permit, unless the CWA specifically exempts a particular type of point source discharge from requiring a permit. The NPDES permit is the mechanism used to apply the CWA's pollution control standards and monitoring and reporting requirements directly to particular facilities. This draft NPDES permit was developed in accordance with the CWA, EPA regulations promulgated thereunder, and any other applicable federal and state legal requirements. The regulations governing the EPA NPDES permit program are generally found at 40 CFR Parts 122, 124, 125, and 136.

When developing permit limits, EPA must apply both technology-based and water quality-based requirements. To the extent that both may apply, whichever is more stringent governs the permit limits. Criteria and standards for the imposition of technology-based treatment requirements in permits under Section 301(b) of the CWA, including the application of EPA-promulgated effluent limitations and case-by-case determinations of effluent limitations under Section 402(a)(1) of the CWA, are set out in 40 CFR Part 125, Subpart A. Development of water quality-based permit limits is addressed in, among other provisions, CWA §§ 301(b)(1)(C) and 401, as well as 40 C.F.R. §§ 122.4, 122.44, 124.53 and 124.55.

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 conventional control technology (BCT) for conventional pollutants and best available technology economically achievable (BAT) for toxic and non-conventional pollutants. Effluent limitation guidelines for the Steam Electric Power Generating Point Source Category are found at 40 CFR Part 423.

In general, for facilities like TMLP, technology-based effluent limitations must be complied with as expeditiously as practicable, but in no case later than either three years after the date such limitations were established or March 31, 1989, whichever comes first. *See* 40 CFR §125.3(a)(2). Since the statutory deadline for meeting any applicable technology-based effluent limitations has already passed, NPDES permits must require immediate compliance with any such effluent limitations.

In the absence of published technology-based effluent guidelines, the permit writer is authorized under Section 402(a)(1)(B) of the CWA to establish appropriate technology-based effluent limitations (*e.g.*, BAT limits) on a case-by-case basis using best professional judgement (BPJ). 40 CFR § 125.3.

Water-quality based limitations 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. CWA §§ 301(b)(1)(C), 401. State water quality standards provide a classification for all the water bodies in the state and specify the "designated uses" and numeric and narrative water quality criteria that water bodies in each classification should be able to achieve. For example, a water body might be given the "SA" classification and the designated uses and numeric and narrative criteria for SA waters might include things like providing high quality fish habitat (a designated use), maintaining natural diurnal variations in water temperature (a narrative criterion), and not raising ambient water temperatures more than 4°C (a numeric criterion). State water quality standards also contain antidegradation requirements to ensure that once a use is attained it will not be degraded. Permit limits must then be devised so that discharges and cooling water withdrawals do not cause violations of these water quality standards.

The permit must limit any pollutant or pollutant parameter (conventional, non-conventional, toxic and whole effluent toxicity) that is or may be discharged at a level that causes, or has the "reasonable potential" to cause or contribute to, an excursion above any water-quality criterion. *See* CFR § 122.44(d)(1). An excursion would occur if the projected or actual in-stream concentration exceeds the applicable criterion. In determining "reasonable potential," EPA considers: (1) existing controls on point and non-point sources of pollution; (2) pollutant concentrations and variability in the effluent and receiving water as determined from the permit application, the permittee's monthly Discharge Monitoring Reports (DMRs) and State and Federal Water Quality Reports; (3) the sensitivity of the species to toxicity testing; (4) the known water quality impacts of processes on wastewater; and, where appropriate, (5) the dilution of the effluent that would be provided by the receiving water.

When using chemical-specific numeric criteria to develop permit limits, both the acute and chronic aquatic-life criteria, expressed in terms of maximum allowable in-stream pollutant concentrations, are used. Acute aquatic-life criteria are considered applicable to daily time periods (maximum daily limit) and chronic aquatic-life criteria are considered applicable to monthly time periods (average monthly limit). Chemical-specific limits are allowed under 40 CFR § 122.44(d)(1) and are implemented under 40 CFR § 122.45(d). In this Draft Permit for TMLP, the Region has established, pursuant to 40 CFR § 122.45 (d)(2), maximum daily and average monthly discharge limits for specific chemical pollutants to satisfy water quality standards.

The facility's design flow is used when deriving constituent limits for daily and monthly time periods, as well as weekly periods where appropriate. Also, the dilution provided by the receiving water is factored into this process.

Narrative criteria from the state's water-quality standards often provide a basis for limiting toxicity in discharges where: (1) a specific pollutant can be identified as causing or contributing to the toxicity but the state has no numeric standard; or (2) toxicity cannot be traced to a specific pollutant. 40 CFR § 122.44(d)(1).

Under CWA § 401, EPA may not issue an NPDES permit unless it first obtains a certification from the state confirming that all water-quality standards will be satisfied or the state waives its certification rights. If the state issues a certification with conditions, then the permit must conform to the conditions. 40 CFR §§ 124.53 and 124.55.

As stated above, water quality standards include: (1) designated uses for a water-body or a segment of a water-body; (2) numeric and/or narrative water quality criteria to protect the designated use(s); and (3) antidegradation requirements to ensure that once a use is attained it will not be degraded. The Massachusetts Surface Water Quality Standards, found at 314 CMR 4.00, include these elements. The State will limit or prohibit discharges of pollutants and associated cooling water withdrawals to assure that the applicable Water Quality Standards for the receiving waters are satisfied. These standards also include requirements for the control of toxic constituents and require that EPA criteria, established pursuant to Section 304(a) of the CWA, shall be used unless site-specific criteria are established. EPA has determined that the conditions of the proposed Draft Permit will satisfy Water Quality Standards.

The Draft Permit's effluent monitoring requirements have been established under the authority of CWA §§ 308(a) and 402(a)(2) and in accordance with 40 C.F.R. §§ 122.41(j), 122.44(i) and 122.48. The monitoring program in the permit specifies routine sampling and analysis which will provide continuous, representative information on the levels of regulated materials in the waste water discharge streams. The analytical procedures to be followed are those in 40 CFR Part 136, unless other procedures are explicitly required in the permit.

The CWA's anti-backsliding requirements prohibit an NPDES permit from being renewed, reissued or modified with less stringent limitations or conditions than those contained in the previous permit unless an exception to the anti-backsliding requirements applies. CWA §§ 402(o), 303(d)(4); 40 CFR §122.44(l)(1) and (2). EPA's anti-backsliding provisions found at 40 CFR §122.44(l) generally prohibit the relaxation of permit limits, standards, and conditions.

In addition to technology-based and water quality-based requirements, limits for thermal discharges may potentially be based on a variance from such requirements under CWA § 316(a). Furthermore, permit limits on cooling water withdrawals may be imposed in an NDPES permit under CWA § 316(b). The requirements of CWA § 316(a) and (b) are discussed in Section 5 of this Fact Sheet.

4.2 Storm Water Outfalls

All six storm water outfalls, except combined storm water and process water discharges from Outfall 002, are covered under the General Permit for Storm Water Discharges Associated with Industrial Activity, No. MAR05B919. TMLP submitted a Notice Of Intent (NOI) for permit coverage on January 26, 2001. TMLP has a Storm Water Pollution Prevention Plan.

4.3 Outfall 001

Outfall 001 is located 100 feet South of the Power Plant Main Building and is the discharge point for the Unit 8 once through non-contact cooling water. Outfall 001 also serves as an emergency bypass discharge point for auxiliary equipment cooling water and Unit 8 gland seal containment leak off water (up to 1,400 gallons per day). The cooling water flows over a weir and into the Discharge Creek. The cooling water is periodically chlorinated to decrease biofowling. Compliance sampling is conducted at the condenser outlet prior to discharge.

Flow Pump Rate and Operational Hours

The existing permit limits both the average monthly and maximum daily flow from Outfall 001 to 36.0 million gallons per day (MGD). The Draft Permit limits flow seasonally to reduce the total heat load to the Taunton River and to reduce scouring in the Discharge Creek. See Section 5 of this Fact Sheet for a discussion of the flow restrictions in the Draft Permit. Flow monitoring is required under the provisions of 40 CFR §122.44(i)(1)(ii).

Temperature Maximum

The maximum daily discharge temperature of 90° F prior to discharge to the Discharge Creek is carried forward from the existing permit. Temperature shall be measured at the Unit # 8 condenser outlet. See the CWA 316(a) explanation in Section 5 of this Fact Sheet.

Delta T (ΔT) or Change in Temperature

The existing permit limits the ΔT to 30° F as measured at the intake structure and at the confluence of the Taunton River and the Discharge Creek. The Draft Permit has reduced the temperature limits to an instantaneous maximum ΔT of 23° F and requires continuous sampling. The Draft Permit requires the ΔT to be measured at the intake structure and at the Unit #8 condenser outlet. See the CWA 316(a) explanation in Section 5 of this Fact Sheet.

Total Residual Chlorine (TRC)

The existing permit requires, and the Draft Permit will continue to require, that chlorination does not occur more than 2 hours per day in accordance with Effluent Limitations Guidelines (ELG) at 40 CFR Part 423 for steam electric power generating point sources. Part 423 also sets a maximum technology-based effluent limitation of 0.20 mg/l of free available chlorine.

However, the permit limits for chlorine are based on water quality requirements for total residual chlorine, which in this case are more stringent than the BAT limits found at Part 423. *See* 40 CFR §122.44(d)(1)(i).

The existing permit limits both the maximum daily and average monthly total residual chlorine (TRC) to 0.1 mg/l consistent with the Massachusetts Water Quality Standards Implementation Policy for the Control of Toxic Pollutants in Surface Water (February 23, 1990), which sets a maximum discharge TRC limit of 0.1 mg/l for dischargers with dilution factors of less than 10. The existing permit assumed the point of dilution to be in the Taunton River at the confluence with the Discharge Creek. MassDEP determined on May 17, 2002 that the Discharge Creek is a Water of the Commonwealth/Water of the United States. *See* 40 CFR § 122.2. The Class SB Water Quality Standards apply to the Discharge Creek. Therefore, the dilution factor is now determined at the point where Outfall 001 discharges to the Discharge Creek. Because the discharge from Outfall 001 accounts for virtually all the flow in the creek during portions of the tidal cycle with no opportunity for mixing, no dilution has been factored into the calculation of water quality based effluent limits for TRC.

The chlorine and chlorine compounds produced by the chlorination of cooling water can be extremely toxic to aquatic life. The instream chlorine criteria for the Discharge Creek are based on the chronic and acute values recommended in EPA's Quality Criteria for Water 1986 (1986 "Gold Book," as amended at 67 Fed. Reg. 79091 (December 27, 2002)), which MassDEP has incorporated into the Massachusetts *Surface Water Quality Standards* at 314 CMR 4.05(5)(e). These standards specify the average Total Residual Chlorine (TRC) in the receiving water should not exceed 7.5 ug/l for chronic toxicity effects, and 13 ug/l to protect aquatic life from acute toxicity. Accordingly, the limits for TRC in this Draft Permit are 7.5 ug/l as a monthly average and 13 ug/l as a daily maximum concentration.

The EPA Technical Support Document For Water Quality-Based Toxics Control , EPA/505/2-90-001, March 1991, Page 111, states: *For most NPDES permitting situations EPA recommends that the compliance level be defined in the permit as the minimum level (ML).* The minimum level (ML) is the lowest point on the curve used to calibrate the test equipment for the pollutant of concern. Data collected at or above the ML is quantifiable. The ML for total residual chlorine is defined as 20 ug/l. This value is the minimum level for chlorine using EPA approved methods found in 40 CFR §136 and the most currently approved version of USEPA Manual of Methods of Analysis of Water and Wastes,

For effluent limitations less than 20 ug/l, compliance/non-compliance will be determined based on the ML. Sample results of 20 ug/l or less shall be reported as zero on the discharge monitoring report.

Chlorination may be conducted for no more than two hours per day for this condenser unit, in accordance with 40 CFR § 423.13(b)(2). The existing permit prohibits simultaneous chlorination at Units 8 and 9. This requirement was based on a misinterpretation of the ELG at the time the existing permit was issued. The prohibition on simultaneous multi-unit chlorination applies to any plant with a total rated generating capacity of less than 25 megawatts (MW). *See* 40 CFR §423.13(c)(1) and (2). TMLP has a total rated generating capacity of 135 MW. Therefore, this Draft Permit does not prohibit simultaneous chlorination at Units 8 and 9.

pH

The Draft Permit includes pH limitations which are required by state water quality standards. Title 314 of the Code of Massachusetts regulations, Part 4.05(b)(3), states that pH in Class SB waters shall be in the range of 6.5 to 8.5 standard units (SU) and not more than 0.2 SU outside of the normally occurring range. The 6.5 to 8.5 SU range for pH is carried forward from the existing permit.

Hours of Operation

The permittee is required to report the hours of operation for influent cooling water circulation pump.

4.4 Outfall 002

Outfall 002 also discharges to the Discharge Creek. The discharge from Outfall 002 consists of Unit 8 and 9 boiler blowdown, boiler blowdown Quench Water, auxiliary equipment cooling water, carbon filter back wash, and neutralized demineralizer regeneration wastes, and storm water. Boiler blowdown is water that is removed from the boiler in order to maintain the desired concentration levels of suspended and dissolved solids in the boiler. The boiler blowdown is replaced with potable municipal water from a boiler feed water treatment system. Samples are taken prior to discharge to the Discharge Creek.

Floor drains are located at strategic locations throughout the plant. These drains are normally plugged except when used for specific maintenance or operation activities. These drains do not serve areas where significant materials are stored or used. In the event of a significant material spill any drains in the vicinity are plugged by TMLP personnel until the spill has been cleaned up. The permit previously allowed discharges from floor drains. The Draft Permit prohibits the discharge of pollutants through the floor drains.

Storm water from roof drains combines with process wastewater from the main power generation building prior to discharge. The entire drainage area consists of the main power building roof area which is collected by roof drains and discharges to Outfall 002. The total area of discharge is approximately 33,000 ft^2 (0.76 acres).
Flow Rate

The existing permit limits the maximum daily flow from Outfall 002 to 0.450 million gallons per day (MGD) and the average monthly flow to 0.260 MGD. The Draft Permit limits the maximum daily flow to 0.35 MGD and the average monthly flow to 0.235 MGD. This proposed reduction in flow is based on past demonstrated performance (DMR Data) and actual operational procedures as described in supplemental information provided to EPA by TMLP on April 29, 2005. Flow monitoring is required under 40 CFR §122.44(i)(1)(ii).

Temperature Maximum

The daily maximum temperature limit of 90° F prior to discharge to the Discharge Creek is carried forward from the existing permit. The Draft Permit requires continuous temperature monitoring prior to discharge to the Discharge Creek.

pH

The Draft Permit includes pH limitations which are required by state water quality standards. Tittle 314, Code of Massachusetts regulations, Part 4.05(b)(3), states that the pH shall be in range of 6.5 to 8.5 standard units (SU), for Class SB waters. The 6.5 to 8.5 SU range is carried forward from the existing permit.

Total Suspended Solids (TSS)

The permit limits for TSS have been carried forward from the existing permit. The limits are 30 mg/l (average monthly) and 100 mg/l (maximum daily) as required by the Effluent Limitation Guidelines found at 40 CFR § 423.12(b)(3), *low volume wastes*.

Oil and Grease

The Effluent Limitation Guidelines at 40 CFR § 423.12(b)(3), *low volume wastes*, require oil and grease limits of 15 mg/l (average monthly) and 20 mg/l (maximum daily). The existing permit contains only a maximum daily limit for oil and grease at a concentration of 15 mg/l, and does not contain an average monthly limit. This was based on a misinterpretation of the ELGs at the time of issuance of the existing permit. EPA has corrected this mistake by establishing in the Draft Permit oil & grease limits of 15 mg/l (average monthly) and 20 mg/l (maximum daily), consistent with the applicable ELGs.

Process water shall be sampled prior to commingling with cooling water and storm water to determine compliance with technology based effluent limitations.

Whole Effluent Toxicity (WET) Testing

The addition of once per year WET testing shall be based on requirements found in the State Water Quality Certification, pursuant to Section 401 of the Clean Water Act.

4.5 Outfall 003

Outfall 003 discharges from the bank of the Taunton River to the South and downstream of the cooling water intake channel. Currently, the outfall discharges across the river bed at low tide. The permittee plans to extend the outfall out beyond the low tide mark.

The discharge from Outfall 003 is cooling tower blowdown from Unit # 9. *The term blowdown means the minimum discharge of recirculating water for the purpose of discharging materials contained in the water, the further buildup of which would cause concentration in amounts exceeding limits established by best engineering practices* (40 CFR §423.11(j).

Flow Rate

The existing permit limits the maximum daily flow from Outfall 003 to 0.50 million gallons per day (MGD) and the average monthly flow to 0.35 MGD. The Draft Permit reduces the maximum daily flow limit to 0.40 MGD and the monthly average flow limit to 0.26 MGD. The 003 discharge is the cooling tower blowdown for Unit # 9.

Cooling tower blowdown use is usually based on the river water conductivity. TMLP uses the cooling tower blowdown to maintain its conductivity below a concentration of 5 times the river water conductivity (e.g., (5) Cycles of Concentration). The river water used for cooling tower makeup is brackish and its conductivity varies based upon tides and rainfall. The quantity of cooling tower make up water must be adjusted to coincide with the conductivity of the receiving water. The result is a variable discharge rate. The flow reductions in the Draft Permit reflect past demonstrated performance with an added margin to allow for variations in the receiving water chemistry. Flow monitoring is required under 40 CFR §122.44(i)(1)(ii).

Temperature Maximum

The daily maximum discharge temperature of 83° F is carried forward from the existing permit. The 83° F maximum discharge temperature is measured at the end of the outfall to the Taunton River. The Draft Permit requires temperature monitoring by grab sample prior to discharge to the river.

Total Residual Chlorine (TRC)

TMLP adds 8.33 lbs/hr of sodium hypochlorite for 2 hours each day that unit # 9 is operated. The chlorine is added through a feed pipe at the bottom of the cooling tower reservoir to prevent biofowling.

The permit limits are based on water quality requirements (see 40 CFR §122.44(d)(1)(i)), which are more stringent than the BAT limits for free available chlorine found at Part 423.

The existing permit limits both the maximum daily and average monthly TRC to 0.1 mg/l consistent with the Massachusetts Water Quality Standards Implementation Policy for the Control of Toxic Pollutants in Surface Water (February 23, 1990).

Free available chlorine as a test measures a fraction of total residual chlorine (TRC). Limiting TRC is more protective of the aquatic environment than limiting free available chlorine.

The existing permit assumed the point of dilution to be in the Taunton River. As stated previously, the discharge from Outfall 003 travels across exposed riverbed at low tide. Until the outfall is extended there is no opportunity for mixing and, therefore, no dilution is factored into the calculation of water quality based effluent limits for TRC.

The chlorine and chlorine compounds produced by the chlorination of wastewater can be extremely toxic to aquatic life. The instream chlorine criteria for the Taunton River are based on the chronic and acute values recommended in EPA's Quality Criteria for Water 1986 (1986 "Gold Book," as amended at 67 Fed. Reg. 79091 (December 27, 2002)), which MassDEP has incorporated into the Massachusetts *Surface Water Quality Standards* at 314 CMR 4.05(5)(e). These standards specify the average Total Residual Chlorine (TRC) in the receiving water should not exceed 7.5 ug/l for chronic toxicity effects, and 13 ug/l to protect aquatic life from acute toxicity.

Accordingly, the limits for TRC in this Draft Permit are 7.5 ug/l as a monthly average and 13 ug/l as a daily maximum concentration. These limits will apply until such time as Outfall 003 is extended so as to insure dilution at low flow conditions.

The EPA Technical Support Document For Water Quality-Based Toxics Control , EPA/505/2-90-001, March 1991, Page 111, states: *For most NPDES permitting situations EPA recommends that the compliance level be defined in the permit as the minimum level (ML).* The minimum level (ML) is the lowest point on the curve used to calibrate the test equipment for the pollutant of concern. Data collected at or above the ML is quantifiable. The ML for total residual chlorine is defined as 20 ug/l.

This value is the minimum level for chlorine using EPA approved methods found in the most currently approved version of Standard Methods for the Examination of Water and Wastewater, Method 4500 CL-E and G, or USEPA Manual of Methods of Analysis of Water and Wastewater, Method 330.5. One of these methods must be used to determine total residual chlorine.

For effluent limitations less than 20 ug/l, compliance/non-compliance will be determined based on the ML. Sample results of 20 ug/l or less shall be reported as zero on the discharge monitoring report.

If Outfall 003 is extended to obtain additional dilution, the water quality-based effluent limitations (WQBELs) for TRC discharges shall be calculated as follows:

Maximum daily flow limit for Outfall 003 = 0.4 MGD = 0.62 CFS

7Q10 River flow 24.4 MGD = 37.7 CFS

(River 7Q10 flow/Plant Flow) + 1 = Dilution factor
(24.4 MGD/0.4 MGD) + 1= 62 Dilution factor

(Dilution factor)(EPA criteria) = WQBEL
(62)(7.5 ug/l) = 465 ug/l = 0.465 mg/l Chronic WQBEL
(62)(13 ug/l) = 806 ug/l = 0.806 mg/l Acute WQBEL

If and when TMLP extends the outfall as described previously, the limits for both the maximum daily and average monthly TRC concentration shall be 0.1 mg/l, consistent with the Massachusetts Water Quality Standards Implementation Policy for the Control of Toxic Pollutants in Surface Water (February 23, 1990), because this is the more stringent of two limits.

Chlorination may be conducted for no more than two hours per day for this condenser unit 8, in accordance with 40 CFR § 423.13(b)(2).

Total Suspended Solids (TSS)

The August 30, 1979 permit was issued with average monthly TSS concentration limits of 30 mg/l and a maximum daily TSS concentration limit of 75 mg/l. These limits were carried forward in the September 29, 1983 permit reissuance and again with the with issuance of the April 19, 1988 (current permit). The Effluent Limitation Guidelines at 40 CFR §423 set no limits for TSS in cooling tower blowdown. The TSS limits may have originated as a state technology-based limits and have been carried forward in each subsequent permit reissuance. The draft permit retains the current TSS limits based on anti-backsliding requirements.

The highest reported value for TSS from Outfall 003 during the three year period from January, 2002 through February 2005 was 40 mg/l.

Total Chromium

The EPA has no recommended water quality criteria, nor has Massachusetts adopted any criteria for total chromium in salt water. The ELGs, 40 CFR §423.13(d)(1) limit total chromium to 0.2 mg/l (200 ug/l) as both a maximum daily and 30 consecutive day average as BAT.

The Draft Permit includes concentration limits of 0.2 mg/l of total chromium as both average monthly and maximum daily limits. The monitoring frequency shall be once per year as specified in a 40 CFR §122.44(i)(iv)(2).

This is a technology-based limit which will apply both before and after the outfall is extended.

Total Zinc

The ELGs, 40 CFR §423.13(d)(1), *cooling tower blowdown*, limit the total zinc concentration to 1.0 mg/l as both a maximum daily and 30 consecutive day average as BAT.

EPA's *National Recommended Water Quality Criteria* were published in the Federal Register on December 10, 1998 (63 FR 68354) and updated November 2002 (EPA-822-R-02-047). Pollutant specific conversion factors (CF) are used for converting a metal criterion expressed as a total recoverable fraction in the water column to a criterion expressed as the dissolved fraction in the water column. The equations and constants for determining the water quality criteria for zinc and the conversion factors and equation parameters are listed in the Federal Register notice and subsequent correction. The EPA recommended Water Quality Criteria for zinc are adopted into the Massachusetts Surface Water Quality Standards at 314 CMR 4.05(5)(e).

40 CFR §122.45(c) requires that permit limits for metals be expressed as total recoverable metal.

Chronic criteria (CCC) for dissolved zinc = 81 ug/l
conversion factor for dissolved versus total recoverable zinc = 0.946
81 ug/l/0.946 equivalent value to total recoverable zinc is = 86 ug/l

Acute criteria (CMC) for dissolved zinc = 90 ug/l
conversion factor for dissolved versus total recoverable zinc = 0.946
90 ug/l/0.946 equivalent value to total recoverable zinc is = 95 ug/l

Until such time as Outfall 003 is extended belyod the low tide level as described previously, the average monthly limit for total zinc shall be the chronic criteria of 86 ug/l (0.086 mg/l), and the maximum daily limit for total zinc shall be the acute criteria of 95 ug/l (0.095 mg/l).

After Outfall 003 is extended as previously described, the technology-based limit for total zinc of 1.0 mg/l (1000 ug/l) shall apply to the discharge, both as a maximum daily and average monthly (30 consecutive day) limit, because this technology-based limit is more stringent than the water quality-based effluent limitations (WQBEL) for total zinc, which are calculated below.

Maximum daily flow limit for Outfall 003 = 0.4 MGD = 0.62 CFS

7Q10 River flow 24.4 MGD = 37.7 CFS

(River 7Q10 flow/Plant Flow) + 1 = Dilution factor
(24.4 MGD/0.4 MGD) + 1= 62 Dilution factor

(Dilution factor)(EPA criteria) = WQBEL
(62)(0.081 mg/l) = 5.022 mg/l Chronic WQBEL
(62)(0.091 mg/l) = 5.642 mg/l Acute WQBEL

Priority Pollutants

The BAT ELGs at 40 CFR § 423.13(d) state that discharges of cooling tower blowdown may not contain any of the Priority Pollutants found in 40 CFR § 423, Appendix A, in detectable concentrations. Section 423.13(d)(3) states: "At the permitting authority's discretion, instead of the monitoring specified in 40 CFR 122.11(b) compliance with the limitations for the 126 priority pollutants in paragraph (d)(1) of this section may be determined by engineering calculations which demonstrate that the regulated pollutants are not detectable in the final discharge by the analytical methods in 40 CFR part 136." TMLP anticipates using engineering calculations in place of effluent sampling to demonstrate compliance with this permit requirement.

4.6 Outfall 004

Discharge from Outfall 004 is estimated at 13,000 gallons per day when in operation. The flow is from the traveling screen and service water pump strainer backwash. This is an intermittent discharge that only occurs when the backwash water for the traveling screens is used when the screens are operating. The water is sprayed on the screens to dislodge debris or fish back into the Taunton River.

Flow Rate

The existing permit has no flow limit for Outfall 004. The permittee must estimate the flow rate when the outfall is discharging. This requirement is carried forward in the Draft Permit. Flow monitoring is required under 40 CFR § 122.44(i)(1)(ii).

pH

The Draft Permit includes pH limitations which are required by state water quality standards. Tittle 314, Code of Massachusetts regulations, Part 4.05(b)(3), states that the pH shall be in range of 6.5 to 8.5 standard units (SU), for Class SB waters. The 6.5 to 8.5 SU range is carried forward from the existing permit.

4.7 Outfall 005

Outfall 005 is from screenhouse spray nozzles. Water is sprayed on the river surface to deflect leaf debris etc. from the cooling water intake structure. This is a newly designated outfall for this permit reissuance.

The application estimated flow is 152,000 gallons per day to the Taunton River. There are no effluent limitation guidelines applicable to this type of discharge. Flow and pH monitoring are required for all outfalls.

Flow Rate

The existing permit has no limit for Outfall 005. The permittee must estimate the flow rate when the outfall is discharging. Flow monitoring is required under 40 CFR §122.44(i)(1)(ii).

pH

The Draft Permit includes pH limitations which are required by state water quality standards. Tittle 314, Code of Massachusetts regulations, Part 4.05(b)(3), states that the pH shall be in range of 6.5 to 8.5 standard units (SU), for Class SB waters. The 6.5 to 8.5 SU range is carried forward from the existing permit.

4.8 Narrative Conditions

Consistent with the Massachusetts Surface Water Quality Standards at 314 CMR 4.00, the Draft Permit prohibits the discharge of floating solids, oil sheens or visible foam attributable to station operation in other than trace amounts.

Polychlorinated Biphenals (PCB)

40 CFR § 423.12(b)(2) states that: *There shall be no discharge of polychlorinated biphenyl compounds such as those commonly used for transformer fluid.* The permittee shall dispose of any and all known PCB equipment, articles, and wastes in accordance with 40 CFR 761. The permittee shall certify that this disposal has been accomplished within 180 days of the effective date of the permit.

Metal Cleaning Wastes

The permittee has agreed in discussions subsequent to the submission of the permit application and CWA §316 Demonstration Document that chemical metal cleaning and metal cleaning wastes will not be discharged from the facility. Chapter 40 CFR § 423.11 defines the metal cleaning and wastes as follows: "The term chemical metal cleaning waste means any wastewater resulting from the cleaning of any metal process equipment with chemical compounds, including, but not limited to, boiler tube cleaning. The term metal cleaning waste means any wastewater resulting from cleaning [with or without chemical cleaning compounds] any metal process equipment including, but not limited to, boiler tube cleaning, boiler fireside cleaning, and air preheater cleaning."

The permit application provides the following information:

> *Periodically, every one to five years TMLP may use an inhibited hydrofluoric acid based solvent formulation followed by soda ash neutralization/passivation in order to chemically clean accumulated scale from and passivate the Unit #9 boiler surfaces. A solution of hydrofluoric acid, thiourea, ammonium bifluoride, and an inhibitor will be used to remove scale from the boiler surfaces. A citric acid rinse will be used to remove residual material/chemicals from the boiler followed by soda ash and sodium hydroxide rinses for passivation and neutralization.*
>
> *The spent chemical solutions once flushed from the boiler tubes will be treated and disposed of off-site in accordance with all applicable local, state, and federal regulations.*

The permit prohibits the discharge of metal cleaning wastes.

5.0 Cooling Water-Related Limits Under Section 316 of the Clean Water Act

5.1 Thermal Discharge Limits

With any National Pollutant Discharge Elimination System (NPDES) permit issuance or reissuance, EPA is required to evaluate compliance with applicable standards. For some permits, this includes the application of the standards stated in CWA § 316(a) regarding thermal discharges and CWA § 316(b) regarding cooling water intake structures. CWA § 316(a) applies if the permit applicant seeks a variance from technology-based and water quality-based effluent limits for the discharge of heat. To obtain the variance, the applicant must demonstrate to the satisfaction of the EPA (or, if appropriate, the State) that the alternative effluent limitations proposed will assure the protection and propagation of a balanced, indigenous population of shellfish, fish, and wildlife in and on the receiving water body. 33 U.S.C. § 1326(a); 40 C.F.R. § 125.70. CWA §316(b) applies if the discharger seeks to withdraw cooling water from a water of the United States. To satisfy §316(b), the permit applicant must demonstrate to the satisfaction of the EPA (or, if appropriate, the State) 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 impacts.

Both CWA §§ 316(a) and 316(b) apply to this permit: § 316(a) due to the proposed thermal discharge in excess of that allowed by State Water Quality Standards or technology-based standards, and § 316(b) due to the presence and operation of a CWIS at TMLP.

5.1.1 Thermal Discharge Limits under Section 316(a)

In developing a permit's effluent limits, EPA compares technology-based and water quality-based requirements, and whichever is more stringent governs the permit requirements.

For thermal discharges, however, EPA may also consider granting a variance under CWA § 316(a) from the technology-based and/or water quality-based limits if less stringent variance-based limits will nevertheless be sufficient to "assure the protection and propagation of a balanced, indigenous population of shellfish, fish, and wildlife" (BIP) in and on the water body receiving the discharge. As a practical matter, EPA has with some permits proceeded directly to developing permit limitations under a Section 316(a) variance if a set of limitations were determined to be sufficient to assure protection and propagation of the BIP. In such cases, determining the technology-based and water quality-based limitations would serve no practical purpose.

The state classification for the receiving waters (namely, the Taunton River and the Discharge Creek) of TMLP's discharge is Class SB (saltwater). Thus, the Water Quality Standards require that the in-stream water temperature not exceed either an instantaneous maximum of 85°F (29.4°C) or a maximum daily mean of 80°F (26.7°C), and the rise in the receiving water's temperature due to a discharge shall not exceed 1.5° F (0.8° C) during the summer months (July through September) or 4° F (2.2° C) during the winter months (October through June). Furthermore, any mixing zone applied to this discharge to achieve Water Quality Standards must conform to the mixing zone requirements of the Water Quality Standards.

According to CWA §316(a) and EPA regulations promulgated thereunder at 40 CFR 125 subpart H, thermal discharge effluent limits in permits may be less stringent than those required by otherwise applicable standards if the discharger demonstrates that such limits are more stringent than necessary to assure the protection and propagation of the BIP. This demonstration must show that the alternative thermal discharge limits desired by the discharger, considering the cumulative impact of its thermal discharge together with all other significant impacts on the species affected, *see* 40 CFR 125.73(a), will assure the protection and propagation of the BIP in and on the body of water into which the discharge is made.

The thermal discharge limits in TMLP's existing permit were based on a § 316(a) variance. TMLP has requested the continuation of this variance based on the demonstration made in its NPDES Permit Renewal Application - Supplemental Information Request: 316(a) Demonstration Document, dated January 30, 2004 (Demonstration Document), which supplemented its May 22, 2000, permit renewal application. TMLP's existing permit contains a maximum thermal discharge limit of 90° F and a maximum temperature rise limit of 30° F. As discussed below, discharges at these levels would exceed the Water Quality Standards' applicable temperature criteria for the Taunton River and the Discharge Creek.

5.1.2 Review of 316(a) Variance Request and Scope of Impact

Prior environmental reviews in support of reissuance of TMLP's NPDES permit focused primarily on thermal impacts to aquatic organisms in the main stem of the Taunton River. During a site visit on October 24, 2000, EPA personnel noted that Unit 8 (Outfall 001) discharged into what appeared to be a natural tidal creek. EPA requested that MassDEP make a determination on the status of what TMLP referred to as its "Discharge Channel." In May 2001, MassDEP provided a preliminary determination to EPA that the channel into which TMLP discharged heated effluent from Outfall 001 is a natural tidally-influenced creek. As such, the creek, referred to in this fact sheet as the "Discharge Creek," is considered a "Water of the Commonwealth," and should achieve the Water Quality Standards associated with its given classification (Class SB). MassDEP confirmed this determination in a letter to EPA dated May 17, 2002.

MassDEP's formal determination that the Discharge Creek is a Class SB water prompted the need for EPA to assess the impacts of TMLP's thermal discharge not only on the aquatic community and habitats within the main stem of the Taunton River, but also on those within the Discharge Creek. EPA sent a letter to TMLP, dated September 6, 2001, requesting information on the physical conditions and biological communities within the Discharge Creek, as well as a detailed comparison of two similar tidal creek communities that are in close proximity to the Discharge Creek, but beyond the influence of Unit 8's thermal plume. TMLP complied with this request and submitted its Demonstration Document on January 30, 2004.

In considering this variance request, EPA reviewed, among other things, all information provided by TMLP to date in order to determine whether the existing permit limits assure the protection and propagation of the BIP in the Discharge Creek and the low salinity, tidally-influenced section of the Taunton River that may be affected by TMLP's thermal discharge.

5.1.3 Determination of Impacts

EPA has determined that the heated effluent from Unit 8 is a significant stressor to the entire Discharge Creek and has the potential to affect portions of the mainstem of the Taunton River. As such, EPA has determined that flow limits and temperature limits more stringent than those in the existing permit are necessary to assure the protection and propagation of the BIP within the the Discharge Creek and the main stem of the Taunton River. Following is an explanation of the basis for EPA's determinations.

Discharge Creek

Information provided in the Demonstration Document, as well as observations made during site visits by EPA personnel, clearly indicate that aquatic habitats within the Discharge Creek have been significantly altered as a result of the cumulative effects associated with the Unit 8 discharge, including thermal and flow-velocity effects. As explained in the Determination Document (page 7-40) and confirmed by EPA's observations, physical scouring from the discharge flow has directly altered the creek morphology.

Additional information on physical alterations in the Discharge Creek are included in Attachment D to the Fact Sheet. This scouring contributes to the impact of the heated effluent discharged from Outfall 001.

During summer the thermal discharge into the Discharge Creek routinely exceeds temperatures documented in scientific literature to cause an avoidance response in many fish species, and lethality to some if avoidance is not possible. According to information provided in the Demonstration Document, there is little to no dissipation of heat from the Unit 8 discharge throughout the entire length of the Discharge Creek.

Beginning in June or July of 2002 (depending on the species) and lasting through September, the discharge from Unit 8 created stressful thermal conditions for all species reviewed that might be expected to utilize the Discharge Creek. These species include alewife (*Alosa pseudoharengus*), blueback herring (*Alosa aestivalis*), blue crab (*Callinectes sapidus*), Atlantic menhaden (*Brevoortia tyrannus*), banded killifish (*Fundulus diaphanous*), white perch (*Morone americana*), bluegill sunfish (*Lepomis macrochirus*), largemouth bass (*Micropterus salmoides*), yellow perch (*Perca flavescens*), and threespine stickleback (*Gasterosteus aculeatus*). Fish sampling prior to, during, and following the operation of Unit 8 was conducted in the Discharge Creek and two reference creeks from April to November. The samples indicated a substantially reduced number of fish, if any, in the Discharge Creek while Unit 8 was operating during the summer months, as compared to periods during which Unit 8 was not operating and as compared to fish populations in the two reference creeks. The absence of these fish species in the Discharge Creek during periods when Unit 8 was operating strongly suggests that the Unit 8 thermal discharges resulted in water temperatures throughout the entire length of the Discharge Creek that were intolerable to most fish.

When functioning under natural conditions, the Discharge Creek serves as subtidal habitat for foraging fish and invertebrates during higher stages of tide. It also serves as a refuge for species such as banded killfish, and the early lifestages of other fish such as alewife, that seek the relative safety tidal creeks provide, as compared to the mainstem of the river. At lower tidal stages, however, much of the creek is exposed which provides forage opportunities for mammals, birds, and other wildlife. When Unit 8 operates at lower stages of the tide, the intertidal habitat is replaced by high-flow subtidal conditions, and therefore the Discharge Creek temporarily loses this important function.
In conclusion, considering the cumulative impacts of the thermal discharge from Unit 8, EPA has determined that the thermal discharge limits in TMLP's existing permit which allow TMLP to substantially increase its operations over current levels (which are well below permitted levels) are not sufficient to assure the protection and propagation of the BIP in the Discharge Creek.

Main stem of the Taunton River

EPA has reviewed a thermal plume study conducted at TMLP in 1974-75, and additional information provided by TMLP in more recent documents. Thermal plume tracking studies conducted in 1975 depict the plume's movement up and down the river through various seasons and tidal scenarios. According to this information, the plume does at times extend across the width of the river during periods of slack water just prior to the tidal current reversal, and during flood tides.

For example, data collected during slack high tide on August 27, 1975, indicate that the thermal plume extended from the mouth of the Discharge Creek to the opposite bank with a delta T of 5°F. During a falling tide (ebb flow), the data indicates that the plume tends to move

downstream from the mouth of the Discharge Creek, along the western bank.

On a flood tide the plume moves upstream, but drifts across to the opposite bank. Computer plume modeling conducted in May 2000 for TMLP predicted that periods of slack water were limited to four 10-minute periods per day during tide reversal. While the plume is generally surface-oriented, data submitted by TMLP indicate that it can extend down close to the bottom in the shallows along the shorelines.

EPA has found no evidence from the information reviewed to suggest that thermal discharges from Outfall 001 have caused appreciable harm to biological communities in the main stem of the Taunton River. Environmental impacts in the river from the thermal plume caused by Outfall 001 have probably been minimal over the past 24 years given the relatively infrequent and short-term (11-hour average run time) operation of Unit 8, combined with the continual changes in tidal current direction and velocity in the river that influence the spatial extent and configuration of the thermal plume. However, information specific to the aquatic populations in the main stem is limited, and much of it is based on surveys conducted for TMLP in the mid-1970s and early 1990s. One positive indicator that the thermal plume is not impeding anadromous fish migration in this portion of the river is the fact that the Taunton River supports river herring runs. The Middleborough run is one of several herring runs in the Taunton River in which fish must pass the plant while en route to, and returning from, spawning grounds upstream in the Nemasket River and connected ponds. In addition, their offspring must pass the plant as they move downstream towards the Taunton River Estuary, starting in summer.

While there is evidence that some fish populations utilizing the main stem of the Taunton River do not appear to be adversely affected by the thermal discharge from Outfall 001 at the current levels of operation, impacts to populations of fish and other aquatic organisms either residing in, or transiting through, this section of the Taunton River could be significantly greater if Unit 8 were to operate at the higher levels allowed by the existing permit.

TMLP has provided insufficient information to determine specific population-level impacts that might occur in the Taunton River at higher operating levels for Unit 8. Given the demonstrated impacts of TMLP's current thermal discharge on the Discharge Creek, however, EPA has determined that thermal discharge limits commensurate with any significant increase in the operation of Unit 8 would not assure the protection and propagation of the BIP in the main stem of the Taunton River. EPA has, therefore, revised the thermal discharge and flow limits in this Draft Permit to ensure that TMLP does not significantly increase its operation of Unit 8 beyond current levels. (See sections 5.2.2 and 6.0 of this Fact Sheet for additional information about possible impacts to aquatic resources.).

5.1.4 Proposed 316(a) Variance Limits

EPA has revised the thermal load limitations for Outfall 001 in this Draft Permit to prevent more persistent adverse impacts to the Discharge Creek associated with TMLP's thermal discharge and to assure the protection and propagation of the BIP in and on the Discharge Creek and the main stem of the Taunton River. The new 316(a) variance limits represent an approximate 85% reduction in the permitted average annual flow, and a corresponding reduction in permitted thermal loading.

In addition, EPA has also revised the maximum difference in temperature (delta T) between the 001 discharge and ambient river conditions from 30°F to 23°F. This revision to the delta T limit is based on past demonstrated performance, specifically the Station's routine ability to maintain a delta T less than 23°F. In calculating delta T, the ambient temperature is measured at the intake, and the discharge temperature is measured prior to discharge into the Discharge Creek.

TMLP's Unit 8 has operated significantly below the maximum average monthly flow limits established in the existing permit, which was issued in 1988. EPA anticipates that limiting flow to Unit 8's present, low operating levels will prevent further alteration of the habitat within the Discharge Creek and restrict the period of time when thermal conditions within the Discharge Creek may be intolerable to fish and aquatic invertebrates. For example, under the flow limitations in the Draft Permit, Unit 8 will be restricted to approximately nine "generation events" during the month of August, based on an 11- hour average generation event (i.e., the period when Unit 8 is on line and generating electricity). The Demonstration Document provides evidence that, while much of the fish community in the Discharge Creek is displaced when Unit 8 is operating, the functions of this tidal creek habitat are largely maintained when Unit 8 is not operating.

EPA reviewed TMLP's operational records for the period of 1994-2003 to determine the Capacity Utilization Factor (CF) for each month of the year. The CF is a measure of a generating unit's actual operating hours as a percentage of the total available operating hours over a given period of time. Tow sets of flow limits have been established in the Draft Permit based on seasonal considerations related to the thermal discharge and historical CF's.

The appropriate CF was applied to TMLP's maximum design flow of approximately 36 MGD in order to calculate the maximum average monthly flow limits. The permitted flow reduction from 39.5 MGD in the current permit to 36 MGD in this draft is based on revised pump capacity figures provided by the permittee. The flow limit established for the period from March 1 to November 30 is based on the highest average monthly CF recorded for that time period from 1994-2002. During this period, the month of July had the highest average monthly CF (approximately 13.6%).

The flow limit for December 1 to February 29 is based on the highest single monthly CF recorded during these months for the period 1994-2003. The highest single monthly CF occurred in February 2003 (20.3%). This approach to calculating the winter flow limit allows for a three-month period of increased operations in response to cold weather electricity demands, while limiting the CF to approximately 20% of Unit 8's maximum operating potential. Unit 8's periodic operations are less likely to cause harm to fish and invertebrate communities at this time of year due the absence of many species during winter months, and because discharge temperatures from Unit 8 are not likely to prompt an avoidance response by those species that are present. In addition, based on the irregular frequency at which Unit 8 will be operating during this period, combined with the dynamic nature of the tidal influence, the thermal plume is unlikely to attract a substantial number of fish or subject them to cold shock when Unit 8 shuts down.

Thus, the following maximum temperature and change in temperature (delta T) limits for Outfall 001 are based on past demonstrated performance at TMLP.

	Existing Limits	Proposed Limits
Max. T	90°F	**90°F**
Max. Delta T	30°F	**23°F**
Flow (March - Nov.)		
Max. Daily	39.5 MGD	**36.0 MGD**
Avg. Monthly	39.5 MGD	**4.9 MGD**
Flow (Dec. - Feb.)		
Max. Daily	39.5 MGD	**36.0 MGD**
Avg. Monthly	39.5 MGD	**7.3 MGD**

In summary, EPA has determined that these revised flow and thermal discharge limits are sufficient to assure the protection and propagation of the BIP in and on the water body into which TMLP discharges.

EPA is granting this CWA § 316(a) variance based on available data. EPA may require TMLP to submit additional information in the future to assess changes to habitat use, resident populations, and conditions within the Discharge Creek and/or mainstem of the Taunton River, and to help EPA determine whether the permit limits require further modification in order to assure protection and propagation of the BIP in the Discharge Creek and the main stem of the Taunton River.

5.2 Cooling Water Intake Structure Requirements under Section 316(b)

5.2.1 Introduction and Regulatory Background

This section presents EPA's determination with respect to the application of CWA § 316(b), 33 U.S.C. § 1326(b), to the Draft Permit for TMLP. CWA § 316(b) governs requirements related to cooling water intake structures (CWISs) and requires "that the location, design, construction, and capacity of cooling water intake structures reflect the best technology available for minimizing adverse environmental impact." The operation of CWISs can cause or contribute to a variety of adverse environmental effects, such as killing or injuring fish larvae and eggs by entraining them 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. TMLP operates a CWIS and is therefore subject to CWA § 316(b).

In the absence of applicable regulations, for many years EPA has made CWA § 316(b) determinations on a case-by-case basis based on best professional judgment (BPJ), for both new and existing facilities with regulated CWISs. Then, in December 2001, EPA promulgated new final § 316(b) regulations providing specific technology-based requirements for *new* power plants and other types of *new* facilities with CWISs. 66 Fed. Reg. 65255 (Dec. 18, 2001) (Phase I Rule or Phase I Regulations). These regulations do not, however, apply to *existing* facilities such as TMLP.

In July 2004, EPA also published final regulations applying CWA § 316(b) to large, *existing* power plants (Phase II Rule or Phase II Regulations). EPA's final CWA § 316(b) Phase II Rule for existing facilities was published in the Federal Register on July 9, 2004, and became effective on September 7, 2004. See 69 Fed. Reg. 41576 (July 9, 2004) (codified at 40 CFR Part 125, Subpart J). The compliance standards of the Phase II Rule apply to an existing Phase II facility if, among other things, it "uses or proposes to use cooling water intake structures with a total design intake flow of 50 million gallons per day (MGD) or more to withdraw cooling water from waters of the United States." 40 CFR § 125.91(a)(2).

TMLP's maximum water withdrawal requirement when all pumps are operating is approximately 36 MGD. As such, TMLP is not subject to the compliance standards of the Phase II Rule.

EPA recently proposed new CWA § 316(b) regulations that apply to certain existing facilities not covered by the Phase II Rule. See 69 Fed. Reg. 68444 (November 24, 2004) (Proposed Phase III Rule or Regulations). The proposed rule identifies three possible options for defining which existing facilities would be subject to the Phase III Rule, based on design intake flow threshold and source waterbody type. All three of the proposed options are based on a design intake flow threshold of at least 50 MGD. In addition, the proposed rule indicated that it would apply only to existing *manufacturing* facilities, given that power producers with a flow of at least

50 MGD are regulated under the Phase II rule.

TMLP has a total design intake flow of less than 50 MGD and, therefore, would not be covered by the Phase III Rule, as currently proposed. In any event, even if the proposed Phase III Rule did appear to cover TMLP, these regulations would not apply as they have not yet become effective and are subject to change.

In the absence of applicable compliance standards, 40 CFR § 125.90(b) of the Phase II Rule requires that CWA § 316(b) permit requirements for smaller, existing power plants, such as TMLP, continue to be established on a BPJ basis. Specifically, section 125.90(b) states that "[e]xisting facilities that are not subject to requirements under this or another subpart of this part must meet requirements under section 316(b) of the CWA determined by the Director on a case-by-case, best professional judgment (BPJ) basis." Because the compliance standards of the Phase I and Phase II Rules do not apply to TMLP, EPA is making a CWA § 316(b) determination for TMLP on a case-by-case, BPJ basis. Such a determination is also consistent with the preamble to the proposed Phase III Rule, which states: "If a facility is a point source that uses a cooling water intake structure and has, or is required to have, an NPDES permit but does not meet the proposed applicable design intake flow/source waterbody threshold or the 25 percent cooling water use threshold, it would continue to be subject to permit conditions implementing CWA section 316(b) set by the permit director on a case-by-case, best professional judgment basis." 69 Fed. Reg. at 68452.

In making determinations under CWA § 316(b), EPA must consider environmental/ecological issues, engineering issues, economic issues related to the cost of implementing CWIS technology options, legal issues, and, ultimately, policy issues regarding the final choice of appropriate steps to minimize adverse environmental effects. These issues, as well as the permit conditions resulting from EPA's CWA § 316(b) determinations for TMLP, are addressed below.

State legal requirements, including state water quality standards, also may apply to the development of permit conditions for CWISs. State water quality standards establish designated uses for water bodies within a state and specify narrative and numeric criteria that the water bodies must satisfy.

The limits in EPA-issued NPDES permits that address CWISs must satisfy both CWA § 316(b) and any applicable state requirements, such as appropriate water quality standards. See CWA §§ 301(b)(1)(C), 401(a)(1) and (d), and 510; 40 CFR §§ 122.4(d), 122.44(d), 125.84(e), and 125.94(e).

MassDEP has primary responsibility for determining what permit limits are necessary to achieve compliance with state law requirements. Since this draft NPDES permit will be subject to state certification under CWA § 401, the permit will also need to satisfy any conditions set by MassDEP in its certification. See also 40 CFR §§ 124.53 and 124.55. EPA will incorporate any

such state certification requirements into the final permit.

5.2.2 Biological Impacts of the Cooling Water Intake

Section 316(b) of the CWA addresses the adverse environmental impact of CWISs at facilities requiring NPDES permits. The operation of CWISs may adversely affect the environment in two ways: first, from the entrainment of fish eggs and larvae and other aquatic life through the plant's cooling system; and second, from the impingement of fish and other aquatic life on the intake screens.

EPA has reviewed the entrainment and impingement data provided by TMLP, as well as other biological information about the Taunton River in the vicinity of the plant. The following is a discussion of EPA's review of environmental impacts related to TMLP's CWIS, which withdraws water from the Taunton River.

5.2.2.1 Entrainment Impacts

Fish eggs and larvae, and other aquatic organisms small enough to pass through the mesh of intake screens, are entrained in water drawn into a facility's cooling system. Organisms carried through the cooling system are exposed to high sheer stress, and a rapid increase in water temperature as heat is transferred to the cooling water from the plant's condensers. Entrained organisms may also be exposed to high concentrations of chlorine or other biocides which are periodically injected into the system to retard biofouling within the pipes. Finally, after being discharged, organisms that survive traveling through the plant's CWIS may then be exposed to rapid decreases in water temperature as the heated cooling water mixes with the receiving waters. At TMLP, there is very little, if any, dissipation of heat from the Unit 8 effluent within the Discharge Creek, so entrained organisms continue to be exposed to elevated temperatures as they drift the length of the 1,700-foot creek. These physical, chemical, and thermal stressors, individually or in combination, can kill or injure the entrained organisms.

In the absence of site-specific studies demonstrating a different mortality rate, EPA assumes 100% mortality of entrained organisms in order to determine adverse environmental impacts to local fish and invertebrate populations. See 69 Fed. Reg. 41620 (July 9, 2004) (codified at 40 CFR Part 125, Subpart J).

According to TMLP's Demonstration Document, the calculated flow of the Taunton River at the plant under 7-day, 10-year low flow conditions (7Q10) is 37.7 cubic feet per second (cfs). When TMLP is operating at full capacity, it withdraws water from the Taunton River at a rate of 56 cfs,

exceeding the calculated 7Q10. This underscores the significant fraction of the Taunton River's flow that is withdrawn when TMLP operates at full capacity.

Based on information provided in the Demonstration Document, the mean flow in August, when the lowest flows typically occur, is estimated to be 233 cfs. Therefore, TMLP can withdraw approximately 24% of the Taunton River's mean flow when operating at full capacity (56 cfs) in August. It should be noted that the number of organisms entrained is roughly a function of the volume of cooling water withdrawn multiplied by the concentration of organisms in the source water during withdrawal. The Taunton River flow tends to be considerably higher during spring months, when many of the fish eggs and larvae that are particularly vulnerable to entrainment are most abundant. EPA calculated that during April, May, and June, the fraction of the Taunton River's mean flow withdrawn by TMLP when operating Unit 8 at full capacity is approximately 4.3%, 6.8%, and 10.7%, respectively.

In its Demonstration Document, the Permittee estimated entrainment impacts from the plant's CWIS on a number of species, based on sampling conducted in 1990-1991. TMLP calculated entrainment losses for 11 fish species using Unit 8 Capacity Utilization Factors (CFs) from 1994-2002. In addition, TMLP estimated the total annual entrainment of eggs and larvae if Unit 8 operated at 100% capacity. According to the Demonstration Document, the plant would have entrained approximately 2 million eggs and 5 million larvae annually if Unit 8 had operated at 100% capacity. However, since Unit 8 operated at relatively low CFs, averaging approximately 6 % from 1994-2002, the actual annual mean entrainment of eggs and larvae by TMLP was reported to be approximately 81,000 and 282,000, respectively. Of these, about 80% are white perch (*Morone americana*) eggs and larvae, 10% are blueback herring (*Alosa aestivalis*) and alewife (*Alosa pseudoharengus*) larvae, and 9% are bluegill (*Lepomis macrochirus*) larvae.

A prior entrainment analysis conducted by the Permittee and included in TMLP's 2000 Demonstration Report used the same data collected in 1990-1991. Based on Unit 8's CF for 1999, TMLP estimated the entrainment of 756,388 eggs and 1,470,754 larvae is equivalent to the loss of 1,504 adult (age-2) white perch.

Had the plant been operating in 1999 at 100% capacity during the eight-week period when white perch eggs and larvae were collected in 1991 (1,344 hours vs.134 hours), a ten-fold increase, EPA estimates that the equivalent of 4,591 adult white perch could have been lost through the entrainment of eggs and larvae. EPA's calculation is based on the same assumptions used by TMLP. According to TMLP's Demonstration Document (2004), the local stock size of white perch is estimated to be 13,500. Therefore, at the currently permitted flow level, a large proportion of the future white perch stock for this area could be lost to entrainment. Similarly, the Demonstration Document indicates that at 100% capacity, the entrainment of bluegill larvae and impingement of juveniles could represent, in equivalent adults, 15% of the local bluegill population.

EPA calculated the potential loss from entrainment for blueback herring, using survival rates and larva densities from 1991 sampling data provided in TMLP's Demonstration Reports of 2000 and 2002. Based on these data, EPA estimated that approximately 3,151,650 blueback herring larvae could be entrained if TMLP operated Unit 8 at 100% capacity during the eight-week period when blueback larvae were collected. This figure is equivalent to 10,842 young-of-year herring, or 576 age-III adults.

The data used as the basis for entrainment estimates provided in the Demonstration Document confirms that entrainment of fish eggs and larvae does occur in significant numbers. Entrainment represents an adverse environmental impact on fish populations that can be minimized. Therefore, EPA has included measures in the Draft Permit to minimize this adverse impact.

5.2.2.2 Impingement Impacts

The impingement of organisms occurs when water is drawn into a facility through a CWIS and organisms become trapped against the traveling screens. The quantity of organisms impinged is a function of the intake structure's location, design, flow capacity (and resulting intake velocity), frequency of operation (i.e., capacity utilization), and the abundance of impingeable organisms within the influence of the cooling water intake current.

While it is very important to understand an intake structure's potential to impinge organisms, it is also important to assess the capability of the intake system's design and operation to effectively return impinged organisms back to the receiving waters alive and uninjured. This evaluation includes an assessment of the design and operation of the traveling screens and spray wash systems, the location and schedule of biocide treatments, and the location and design of the fish return system. In the Demonstration Document, TMLP estimated impingement impacts from TMLP's intake structure for 11 fish species and 1 invertebrate species.

Based on sampling conducted by TMLP in1990-1991 and applying the Unit 8 capacity utilization factors from 1994-2002 to these results, TMLP estimates an annual average impingement of 4,580 fish, of which 4,526 are juvenile Atlantic menhaden (*Brevoortia tyrannus*). Had Unit 8 been operating at 100% capacity, TMLP estimates that 77,088 juvenile Atlantic menhaden and 920 other individuals from the evaluated species would have been impinged each year.

The limited sampling conducted by TMLP indicates there is considerable annual variability in impingement rates for those species and life stages most vulnerable to impingement. This may reflect annual fluctuations in species abundance within the Taunton River, differences in environmental conditions affecting the river, or other causes.

EPA has concluded that the impingement of fish resulting from the operation of TMLP's CWIS represents an adverse environmental impact, particularly for species that, as juveniles, may congregate in dense schools near the intake structure. In addition, based on the present design of the fish return system, it is highly unlikely that impinged fish ever return to the river alive. EPA has determined, however, that impingement impacts at TMLP can be minimized through a combination of fish return design modifications and changes in plant operations, including a reduction in the permitted flow.

5.2.3 Assessment of Available CWIS Technologies

As required by CWA § 316(b), EPA assessed the location, design, construction, and capacity of TMLP's CWIS to determine whether it reflects the best technology available (BTA) for minimizing adverse environmental impact. In its Demonstration Document, TMLP provided an assessment of flow reduction options to address thermal impacts, some of which would also be effective in minimizing adverse environmental impacts associated with the CWIS.

In addition to relevant documentation provided by TMLP, EPA assessed the Station's CWIS design and operation during several site visits, and through discussions with TMLP personnel familiar with the CWIS and its operation. The dates of EPA's site visits are included in Section 1 of this Fact Sheet. Following is a description of the existing CWIS and EPA's determination of BTA for each specific component.

5.2.3.a. Location of the CWIS

EPA personnel compared the location of TMLP's CWIS to other possible locations along the bank of the Taunton River in close proximity to the plant. This assessment took place during four site visits, and by reviewing aerial photographs, topographic maps, hydrographic survey data from the front of the intake structure, impingement and entrainment data, and other resource information for this area. Based on this analysis, EPA determined that the existing location of the CWIS does not significantly increase the probability that organisms will be impinged or entrained compared to other reasonably possible locations. However, it does appear that sediment and debris have accumulated in front of the intake structure openings to such a degree that the flow of water into the CWIS may be restricted.

Since the circulation pumps withdraw water at a constant the rate, any reduction in the area of the intake opening would likely cause an increase in the designed intake velocity, which is approximately 1.02 feet per second (fps). An increase in intake velocity increases the potential for fish and other aquatic organisms to become impinged on the traveling screens.

Therefore, as part of its BPJ-based determination of BTA for TMLP's intake structure, EPA has included a new condition in this Draft Permit requiring the removal of any sediment or debris located in front of the CWIS that causes an increase to the intake velocity.

5.2.3.b Design, construction, and operation of the CWIS

EPA has evaluated the design, construction, and operation of TMLP's CWIS and compared it to other available CWIS designs, technologies and operations currently used at other similar plants. This evaluation focused primarily on the fish return system and modifications that could be made to reduce impingement mortality. EPA has determined that there are several design and operational components to TMLP's CWIS that currently do not meet BTA. Therefore, this Draft Permit requires certain modifications to TMLP's fish return system using available technologies that could significantly increase the survival of impinged fish and other aquatic organisms. Unit 8's capacity limitations, which reduce the adverse effects of both entrainment and impingement, are discussed below in section 5.2.3.c.

5.2.3.b.i General design, construction, and operation

According to information provided in the Permittee's Demonstration Document, Unit 8 has two circulating water pumps located in a pump house that convey cooling water to the main condenser. The pump house and related components of the CWIS were constructed in the mid-1960s. Water enters the pump house through one of two 6.5' x 8.5' wet well inlet openings. Only one inlet – and it's corresponding traveling screen – is operated at any given time, even if both Unit 8 and 9 are on line. The other inlet serves as a backup.

Each opening is equipped with a sluice gate to prevent flows from entering the wet well section of the pump station. Each wet well inlet opening is equipped with a 3/8" mesh traveling screen to prevent fish and debris from entering the wet well. The screens are routinely rotated once every eight hours, and more often during periods when debris such as leaves are more abundant. The longer a soft-bodied organism, such as a fish, remains impinged against a screen, the less likely it will survive. Descaling, internal injuries, and drowning can all result from prolonged impingement.

Therefore, in order to minimize the potential for impingement mortality, the Draft Permit requires that from March 1 through November 30, traveling screens be rotated continuously when Unit 8 is on line, except during periods of chlorination and maintenance. From December 1 through February 29, when the potential for impingement is significantly reduced, the Draft Permit allows the screens to be rotated a minimum of once every eight hours.

Chlorine compounds are introduced into the pump house wet well, inboard of the traveling screens, to retard the growth of biofoulants within the cooling water system. Under TMLP's existing permit, chlorination may occur when the traveling screens are operating, in which case, the spray wash used to dislodge impinged organisms could contain chlorine. In order to avoid exposing impinged organisms to chlorine, the Draft Permit requires that the traveling screens and the spray wash system *not* be operated during the chlorination process, which normally does not exceed two hours per day. In addition, the Draft Permit provides that screen backwashing, which is done periodically to remove excess debris, shall not be performed during the chlorination process so that organisms are not exposed to chlorine during impingement on the intake screens.

The traveling screen wash flow is presently based on the water pressure required to remove debris from the screen. This pressure, which is normally 100 pounds per square inch (psi) or greater, can cause injury or death to impinged organisms. In order to dislodge impinged organisms while minimizing injury, a low pressure spray should be applied to the screens prior to the high pressure spray.

Therefore, as part of EPA's BPJ-based determination of BTA under CWA § 316(b), the Draft Permit requires the installation and use of a low-pressure spray wash (30 psi or less) in a manner that ensures organisms are not exposed to high pressure spray during impingement on the intake screens.

5.2.3.b.ii Fish return pipe

The existing pipe that discharges trash and organisms collected on the traveling screens back to the river through Outfall 004 appears to have a sharp angle (approximately 90°) where the pipe turns towards the river. This assessment is based on EPA's review of schematics provided by TMLP, but has not been confirmed since most of the pipe is currently buried. Organisms hitting such a hard turn as they are carried swiftly through the pipe could be stunned, injured, or killed just prior to being returned to the river. In addition, Outfall 004 discharges to an area of concrete rip-rap located above the high tide line. The present design virtually eliminates any chance of organisms returning to the river alive, especially at lower tides.

Therefore, as part of EPA's BPJ-based determination of BTA under CWA § 316(b), the Draft Permit requires structural modifications to the fish return system to increase the potential of survival of organisms being returned to the river. These include requirements to replace the sharp angle in the pipe (if such an angle exists) with a more gradual turn, and to extend the outfall so that organisms are returned to water year-round, at all stages of tide or flow.

5.2.3.c. Capacity of Unit 8

As discussed above, TMLP's cooling water needs when operating at full capacity can represent a significant percentage of the natural flow of the Taunton River. Between 1968 and 1975, Unit 8 was operating at a CF of approximately 95%. However, now operating as a "peaking plant" (*i.e.*, a plant that operates only when electricity is needed above base load), the demand for Unit 8 to operate has substantially decreased to a CF of 21% between 1976-1991, and further declined to a CF of 6% during the period 1992-2002. TMLP's Demonstration Document states that the steady decline in Unit 8's operation is expected to continue, given Unit 8's inefficiency relative to Unit 9 and relative to other power plants.

As part of its BPJ-based determination of BTA under CWA § 316(b), EPA first considered the construction and use of a cooling tower at Unit 8. Under this alternative, which TMLP evaluated in its Demonstration Document, the Unit 8 once-through condenser would be retrofitted with a closed-loop wet cooling tower.

The design evaluated by TMLP would reduce the plant's withdrawal of water from the Taunton River from the existing design rate of 25,000 gallons per minute (gpm) to 500 gpm. (A complete description of this alternative is found in Section 9 of the Demonstration Document.)

The use of a wet cooling tower would significantly reduce flow and entrainment compared to the Station's current flow needs at full operating capacity. However, as discussed above, the operation of Unit 8 and its once-through cooling water system has substantially decreased in recent years. EPA conducted a qualitative assessment of cooling towers in this case by comparing the volume of water withdrawn by Unit 8 over the past 15 years to the cost of retrofitting the unit with a closed-cycle cooling tower. TMLP has estimated the costs of a cooling tower at Unit 8 to be $5.2 million. Given the substantially-reduced operations of Unit 8 in recent years, and TMLP's expectation that the unit will continue to be operated at very low CF levels, EPA has concluded in this specific case that the costs of a cooling tower would be wholly disproportionate to its benefits in minimizing the adverse environmental impacts of the Station's CWIS.

Reductions in flow can be expected to yield a proportional reduction in entrainment, as well as a reduction in impingement. In this case, EPA has established specific flow limitations as BTA for minimizing the adverse environmental impact of TMLP's CWIS.

Given the substantially-reduced operations of Unit 8 and TMLP's expectation to continue operating Unit 8 at these low CF levels, EPA has reduced the permitted flow limits for Unit 8 to a flow rate commensurate with a 15% average annual CF. As explained in the preamble to the Phase II Rule, EPA has determined that facilities operating at an overall capacity of less than 15%, defined as "peaking facilities," should not be subject to the entrainment reduction requirements of the Phase II Rule. See 69 Fed. Reg. at 41616 (July 9, 2004). The threshold of 15% was based on these facilities' reduced operating levels, low potential for significant entrainment impacts, and consideration of economic practicability. Id. Given that most peaking facilities are older, less efficient generating units that are generally employed only during highest electrical demand periods when economic conditions justify their use – which generally occur during mid-winter or mid-summer months that are not typically considered to be critical periods for aquatic communities – EPA concluded that entrainment controls would typically be an unnecessary cost for these peaking facilities. Id. Therefore, Phase II facilities that operate at a CF of less than 15% are not subject to entrainment performance standards as part of the national BTA technology standards under CWA § 316(b). 40 CFR § 125.94(b)(2)(i). Other legal requirements, such as state water quality standards or Endangered Species Act requirements, might still lead to entrainment reduction requirements for such facilities based on a case-specific analysis.

In light of the Agency's determination that large power producers operating at a CF of less than

15% are not required to further reduce entrainment impacts, EPA has determined that a flow limit commensurate with a 15% average annual CF is an appropriate limit on TMLP's operations. The new flow limits will allow TMLP to continue operating Unit 8 at or above current levels while preventing substantial increases in flow and, thus, substantial increases in the adverse environmental impacts caused by operation of the CWIS. EPA has determined this new reduced flow rate constitutes BTA at TMLP under CWA § 316(b) for minimizing adverse environmental impacts, particularly entrainment impacts (since entrainment mortality is roughly proportional to flow).

In its review of monthly CF data for Unit 8 from 1994 to 2003, EPA focused in particular on the months of March through November, when early life stages of many fish and other organisms are most vulnerable to entrainment and/or impingement. Given the increased potential for entrainment and impingement from March to November, EPA has developed two separate flow limits. The maximum average monthly flow will limit the CF to 13.6% for the period from March through November, and 20.3 % for the period from December through February.

In summary, EPA's BPJ-based determination of BTA under CWA § 316(b) for Unit 8 is based upon the following considerations: the significance of actual biological impacts at current operations, recognizing the limited biological information available; potential impacts on the environment at the higher flow rates allowed under TMLP's existing permit; the 15% CF threshold for applicability of entrainment performance standards in the Phase II Rule; and the current and historical CF of Unit 8, given market-based operational restrictions. Based on these considerations, EPA has concluded on a qualitative basis that the cost of an 85% reduction in the permitted flow rate for Unit 8 is not wholly disproportionate to its environmental benefits and is, therefore, BTA.

5.2.3.d Capacity of Unit 9

Unit 9's water requirements are largely limited to the replenishment of water lost to the atmosphere from the cooling tower. Make-up water is supplied to Unit 9 at a rate of 685,000 gpd when Unit 9 is operating. At this rate, the volume of water withdrawn for Unit 9 is approximately 2% of Unit 8's maximum withdrawal rate of 36 MGD.

According to TMLP, the intake velocity when Unit 9 is operating alone is 6% of the intake velocity when both units are on line. Therefore, EPA has determined that Unit 9's contribution in flow and velocity is negligible compared to the capacity of Unit 8.

When Unit 9 is operating alone, the intake velocity is 6% of the Station's maximum intake design velocity of 1.02 fps, or approximately 0.06 fps. Given the low volume and correspondingly-low intake velocity of Unit 9's intake, the entrainment and impingement impacts of Unit 9 are expected to be minimal. EPA has therefore determined that the current design, construction, and capacity of Unit 9 constitutes BTA under CWA §316(b).

5.2.4 316(b) Determination, Monitoring Requirements, and Summary

The section presents EPA's determination with respect to the application of CWA § 316(b), 33 U.S.C. § 1326(b), to the NPDES permit for TMLP Cleary-Flood Station. CWA § 316(b) requires that the location, design, construction, and capacity of cooling water intake structures reflect BTA for minimizing adverse environmental impacts. Entrainment and impingement of aquatic life are the two key adverse environmental impacts potentially associated with cooling water intake structure operations at TMLP. Based on information available at this time, EPA has determined that the adverse environmental impacts of the CWIS at TMLP would be significant at the flow limits allowed under the existing permit. It should be noted that EPA lacks information on certain parameters of interest, as discussed above, and new information could lead to different conclusions in the future.

As part of its CWA § 316(b) determination of BTA, EPA considered the adverse environmental effects from operation of the facility's CWIS and options for minimizing these adverse effects by altering the CWIS's location, design, construction, and capacity. In sum, EPA's BPJ-based determination of BTA for TMLP consists of the following requirements:

1. A low pressure spray wash which discharges at a rate of 30 psi or less shall be installed and operated on both traveling screens. The low pressure spray shall be engineered to deliver aquatic organisms without injury to the return pipe in a manner that organisms are not exposed to high pressure spray during impingement on the intake screens.

2. Modify the existing fish return pipe as necessary to ensure that fish and other organisms can safely be returned to the river at all stages of tide and flow. Modifications include replacing any existing sharp angles in the pipe with multiple low-angle turns (<22.5°) or one continuous arc. Also, the end of the fish return pipe (Outfall 004) shall be extended a sufficient distance into the river to ensure the discharge flows directly into subtidal waters of the river at all stages of tide and flow. Along the fish return pipe, install an in-line fish tank or other means to allow for better counts of the impinged fish and to reduce the physical stress when fish transit from the traveling screen to the sluiceway. The construction of these modifications shall be done in accordance with applicable federal, state, and local legal requirements governing construction of or in waterways and banks. With approved mitigation measures, this construction is not expected to pose significant adverse environmental impacts.

3. Remove any sediment or debris from in front of the cooling water intake openings that is causing an increase in intake flow velocities above those calculated for the existing intake design and circulation pump flow requirements.

4. During the period March through November of each year, rotate the Unit 8 traveling screen continuously while Unit 8 is operating, except during periods of chlorination and required maintenance and repair. Traveling screens will be rotated at least once every eight hours from December through February. The operation of the traveling screens will be logged (actual times screens are activated and secured), and this information will be submitted with the monthly discharge monitoring report. In addition, monitoring for unusual impingement events and fish kills will be required year-round.

5. No chlorine or other biocide treatments shall be applied into the wet wells while traveling screens are being rotated, or during screen back washing so that organisms are not exposed to chlorine prior to and during impingement on the intake screens.

6. From June 1 through November 30 of each year, the permittee shall take operational measures to minimize intake velocity to the degree practicable, to minimize impingement of fish. These measures may include using both inlets and traveling screen simultaneously to increase the screen area and reduce the through screen velocity.

7. Restrict the intake flow of Unit 8 as follows: (**March - November**) 36 MGD maximum daily/4.9 MGD maximum monthly; **(December - February)** 36 MGD maximum daily/7.3 maximum monthly. This represents an annual average capacity utilization rate of approximately 15% for Unit 8.

In summary, the adverse environmental impacts associated with the operation of the CWIS at TMLP include the entrainment of small aquatic organisms, including fish eggs and larvae, and the impingement of small fish and other organisms too large to pass through intake traveling screens. As currently operated, the plant can withdraw up to approximately 39.5 MGD of water from the Taunton River.

EPA has considered the nature and magnitude of the adverse environmental impacts from the CWIS at TMLP and has evaluated the technological options for minimizing these impacts. EPA has determined that the site-specific BTA for this facility consists of the measures listed above, which includes a reduction in permitted flow for Unit 8 by approximately 85%.

6.0 Essential Fish Habitat (EFH)

Under the 1996 Amendments (PL 104-297) 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 Service (NOAA Fisheries) if EPA's actions, or proposed actions that EPA funds, permits, or undertakes, "may adversely impact any essential fish habitat." 16 U.S.C. § 1855(b). The Amendments broadly define essential fish habitat as, "... those waters and substrate necessary to fish for spawning, breeding, feeding, or growth to maturity." 16 U.S.C. § 1802(10). Adverse effect 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. Id.

EFH is only designated for species for which federal Fishery Management Plans exist (16 U.S.C. § 1855(b)(1)(A)). EFH designations were approved for New England by the U.S. Department of Commerce on March 3, 1999.

As the federal agency charged with authorizing the discharge from this facility, EPA is initiating consultation with NOAA Fisheries in this Fact Sheet consistent with the Finding established between these agencies, as specified in a NOAA Fisheries letter to EPA, dated October 10, 2000. This consultation will be completed before the permit is finalized.

6.1 Proposed Action

EPA is reissuing the National Pollutant Discharge Elimination System (NPDES) individual permit for the Taunton Municipal Lighting Plant (TMLP), Cleary-Flood Generation Station. Please see Section 2 of this Fact Sheet for a more detailed description of the proposed action.

6.2 EFH Species

The following is a list of the EFH species and their applicable lifestages identified for the area just downstream from TMLP, including the lower Taunton River and Mount Hope Bay.

Species	Eggs	Larvae	Juveniles	Adults
winter flounder (*Pseudopleuronectes americanus*)	X	X	X	X
windowpane flounder (*Scopthalmus aquosus*)	X	X	X	X
American plaice (*Hippoglossoides platessoides*)			X	X
Atlantic sea herring (*Clupea harengus*)			X	X
bluefish (*Pomatomus saltatrix*)			X	X
summer flounder (*Paralichthys dentatus*)		X	X	
scup (*Stenotomus chrysops*)	X	X	X	X
king mackerel (*Scomberomorus cavalla*)	X	X	X	X
Spanish mackerel (*Scomberomorus maculatus*)	X	X	X	X
cobia (*Rachycentron canadum*)	X	X	X	X
sand tiger shark (*Odontaspis taurus*)		X		

Most of the species listed are not likely to inhabit the waters in proximity to TMLP due to the consistently low salinities (0-2 parts per thousand) in this section of the Taunton River. Sampling for fish and fish larvae during a study conducted in 1974-75 produced no species listed. A more comprehensive study conducted in 1990-91 reported four bluefish (probably adults) and an unquantified number of windowpane flounder eggs. The report does not mention windowpane flounder among the dominant species represented as eggs. Fish studies conducted in the Discharge Creek and two nearby tidal creeks in 2002 produced only one large bluefish from among the 11 species listed.

Forage species on which some EFH species may prey do inhabit the waters in proximity to TMLP for part of the year. Blueback herring and alewives (collectively referred to as river herring,) and Atlantic menhaden have all been documented in large numbers. River herring spawn in many of the tributaries and headwater ponds of the Taunton River. Atlantic menhaden have ascended the river up to the plant as juveniles during late summer, and returned to estuarine and marine waters in mid to late autumn.

6.3 Analysis of Effects

TMLP, like most power plants that utilize a natural waterbody for cooling purposes, can impact aquatic resources in three major ways: (A) by the entrainment of small organisms into and through the cooling water system; (B) by the impingement of larger organisms on the intake screens; and (C) by creating adverse conditions in the receiving waters from the discharge of heated effluent. In addition, many power plants periodically treat their cooling water systems with biocides, typically a chlorine compound, to retard the growth of biofoulants. This treatment can potentially expose entrained and impinged organisms to high concentrations of chlorine, and possibly affect organisms in the receiving waters if chlorine concentrations exceed the authorized limits of the permit.

A. Entrainment

The potential to impact aquatic organisms by entrainment largely depends on the presence and abundance of organisms that are vulnerable to entrainment, and the flow required for cooling. Other important considerations include the location and design of the cooling water intake structure. See Section 5.2.2.1 of this Fact Sheet for a more thorough description of entrainment.

The EFH species listed (and major forage species) that are most vulnerable to entrainment have positively buoyant eggs, and/or pelagic larvae. These species include:

Species	Egg	Larvae
EFH		
1. winter flounder	demersal, adhesive	pelagic
2. windowpane flounder	buoyant	pelagic
3. American plaice	buoyant	pelagic
4. Atlantic sea herring	demersal, adhesive	pelagic
5. bluefish	buoyant	pelagic
6. summer flounder	buoyant	pelagic
5. scup	buoyant	pelagic
6. king mackerel	buoyant	pelagic
7. Spanish mackerel	buoyant	pelagic
8. cobia	buoyant	pelagic
9. sand tiger shark	internal	internal
Major Forage Species		

1. banded killifish	demersal	pelagic
2. blueback herring	demersal, adhesive	pelagic
3. alewife	demersal, adhesive	pelagic
4. Atlantic menhaden	buoyant	pelagic

While the potential exists for a number of EFH species to be present in proximity to TMLP as eggs or larvae, it is unlikely that significant numbers would be found there given the low salinities in this area. This is confirmed by icthyoplankton studies conducted in 1974-75 and 1990-91. However, larvae of forage species such as river herring have been collected, as would be expected. Atlantic menhaden typically spawn in coastal marine waters, and have not been collected as eggs or larvae, except for a single larva in August 1991. Banded killifish (*Fundulus diaphanus*) eggs and larvae have been collected in relatively low abundances despite their high abundances as adults.

Entrainment Impacts from TMLP

While the fish egg and larva community found in this section of the Taunton River is fairly diverse, EFH species are largely absent due to the low salinities that typically exist. Therefore, entrainment rates of EFH species are expected to be very low.

Entrainment will be further minimized by an approximate 85% reduction in authorized water withdrawal during periods when these early life stages are normally present in the water column.

B. Impingement

Organisms too large to pass through intake traveling screens are still vulnerable to being impinged on these screens. The intake location and design, and cooling water flow requirements are major factors in assessing impingement potential.

Fish species that are especially vulnerable to impingement mortality tend to have one or more of the following characteristics:

- pass intake structures in large, dense schools;
- are pursued as major forage species;
- are attracted to the intake structure as a source of forage or refuge;
- are slow moving or are otherwise unable to escape intake current;

- are structurally delicate, and likely to die if impinged.

Impingement Impacts from TMLP

Of the EFH species and their forage previously listed, the only species that have been collected in impingement sampling at TMLP are Atlantic menhaden, blueback herring, alewife, and banded killifish. No EFH species were collected during sampling. Of the EFH species listed, bluefish are the species most likely to be found near the plant at a size that could be impinged, though their impingement is unlikely given their strong swimming abilities. Bluefish probably ascend the river in pursuit of forage species, such as young-of-year Atlantic menhaden.

While the potential for any EFH species to be impinged on TMLP's intake screens appears to be minimal, forage species are at greater risk. Schools of adult river herring pass the intake structure in the spring en route to spawning grounds upstream, and pass it again on their return migration in late spring and early summer.

Juvenile river herring descend the river in late summer, early autumn to mature in marine waters before returning to the river to spawn. Juvenile Atlantic menhaden have been found in dense schools in proximity to the plant, and over 7,000 fish were impinged during a single sampling event in 1990. Block net sampling in the Discharge Creek and to nearby tidal creeks in the fall of 1992 produced nearly 194,000 juvenile Atlantic menhaden in the Discharge Creek and 495,000 fish in a similar creek south of the plant.

Intake Location, Design and Flow

Modifications to the design and operation of the cooling water intake system required by this Draft Permit are intended to reduce the potential for entrainment and impingement, and increase the survivability of impinged fish. Foremost is a flow limit for Unit 8 that restricts operations to approximately 15% of maximum capacity. See Section 5.2.3 for a more detailed description of cooling water intake structure modifications.

Impingement Monitoring

Traveling screens will be monitored for the impingement of aquatic organisms at least once every eight hours, and Unit 8 traveling screens will be rotated continuously when Unit 8 is operating between March 1 and November 30 when aquatic organisms are most likely to be present. TMLP is required to report "unusual impingement events" (i.e., when 25 or more fish are observed impinged within any 24-hour period) to EPA and MassDEP within 24 hours. The

specific reporting requirements are found in the Draft Permit.

C. Discharge of Heated Effluent

The discharge of heated effluent may kill or impair organisms outright, or create intolerable conditions in otherwise high value habitats, and interfere with spawning. Thermal impacts associated with the discharge are related primarily to the dilution capacity of the receiving water, the rate of discharge, and the temperature of the effluent compared to ambient conditions.

EFH Species at Risk

EPA has identified concerns related to the heated discharge from Unit 8, which are described in Section 5.1.3 of this Fact Sheet. However, direct impacts to EFH species are not likely to occur since those species are largely absent from the area influence of the thermal plume.

EPA continues to be concerned that the operation of Unit 8 above present levels could potentially adversely affect aquatic habitats and populations within the Discharge Creek and main stem of the Taunton River in close proximity to the plant, and has conditioned the Draft Permit accordingly.

6.4 EPA's Opinion of all Potential Impacts and Proposed Mitigation

EPA has concluded that the conditions contained within the Draft Permit will minimize adverse impacts to EFH species, and their habitat and forage, and that mitigation is not warranted at this time. If EPA receives new information that changes this conclusion, EPA will re-initiate consultation with NOAA Fisheries.

7.0 Endangered Species Act (ESA)

Under Section 7 of the Endangered Species Act, federal agencies are required to ensure that actions they conduct, authorize, or fund are not likely to jeopardize the continued existence of any federally-listed threatened or endangered species or result in the adverse modification of designated critical habitat. EPA has reviewed information on federally-listed species in New England and concluded that no federally-listed threatened or endangered species, or their designated critical habitat, are present within this general area of the Taunton River.

EPA will confirm this conclusion through consultations with NOAA Fisheries and US Fish and Wildlife Service.

8.0 Monitoring Frequency

The effluent monitoring requirements have been established to yield data representative of the discharge under authority of Section 308(a) of the CWA as required by 40 CFR 122.41 (j), 122.41 (j)(4), (5), 122.44 and 122.48.

9.0 Compliance Schedules

The Draft Permit includes new water quality based effluent limitations that will necessitate construction at TMLP in order to achieve compliance with the new more stringent permit conditions. See Section I.D. of the Draft Permit for schedules of compliance.

Schedules of compliance may be placed in NPDES permits under the provisions of 40 CFR § 122.47, and where state water quality standards permit. Title 314, Section 3.11(10) of the Code of Massachusetts Regulations mirrors Federal law in allowing schedules in NPDES permits and Massachusetts Clean Waters Act permits.

The Draft Permit also requires TMLP to submit, on the anniversary of the effective date of the permit, a report detailing completion or progress toward completion of the scheduled requirements, as mandated by 314 CMR 3.11(10), which states:... *If the time necessary for completion of any interim requirement is more than one year and is not readily divisible into stages for completion, the permit shall specify interim dates for the submission of reports of progress toward completion of the interim requirements and indicate a projected completion date.*

10.0 State Certification Requirements

EPA may not issue a permit unless MassDEP certifies that the effluent limitations contained in the permit are stringent enough to assure that the discharge will not cause the receiving water to violate State Water Quality Standards or unless state certification is waived. MassDEP is reviewing the Draft Permit and will determine if the limitations are adequate to protect water quality. EPA has requested permit certification by the State pursuant to 40 CFR 124.53 and expects that the Draft Permit will be certified.

11.0 General Conditions and Definitions

The remaining general and special conditions of the permit are based on the NPDES regulations, 40 CFR Parts 122 through 125, and consist primarily of management requirements common to all permits.

12.0 Comment Period, Hearing Requests, and Procedures for Final Decisions

All persons, including applicants, who believe any condition of the Draft Permit is inappropriate 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, Massachusetts State Program Unit, 1 Congress Street, Suite 1100, Boston, Massachusetts 02114-2023. 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.

13.0 EPA Contact

Additional information concerning the Draft Permit may be obtained between the hours of 9:00 A.M. and 5:00 P.M. (8:45 A.M. and 5:00 P.M. for the state), Monday through Friday, excluding holidays from:

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February 9, 2006 **Linda M. Murphy, Director***
Date: **Office of Ecosystem Protection**
U.S. Environmental Protection Agency

*Please send all public notice comments to both Doug Corb and Paul Hogan at the address above.