

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY  
REGION I - NEW ENGLAND  
1 CONGRESS STREET, SUITE 1100  
BOSTON, MASSACHUSETTS 02114-2023

FACT SHEET

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

NPDES PERMIT NO. : **MA0101095**

NAME AND ADDRESS OF APPLICANT:

**Town of Douglas Water & Sewer Department  
P.O. Box 624  
Douglas, Massachusetts 01516**

NAME AND ADDRESS OF FACILITY WHERE DISCHARGE OCCURS:

**Douglas Wastewater Treatment Facility  
29 Charles Street  
East Douglas, Massachusetts 01516**

RECEIVING WATER: **Mumford River**

CLASSIFICATION: **B** (Blackstone River Watershed)

**I. PROPOSED ACTION, TYPE OF FACILITY, AND DISCHARGE LOCATION**

The above named applicant has applied to the U.S. Environmental Protection Agency for re-issuance of its National Pollutant Discharge Elimination System (NPDES) permit to discharge into the designated receiving water. The existing permit expired on September 30, 2005, but continues in effect in accordance with the Administrative Procedures Act. This permit, after it becomes effective, will expire five years after the effective date.

The facility is engaged in the collection and treatment of municipal wastewater. The discharge is from an advanced wastewater treatment plant and the effluent is discharged to the Mumford River. The plant was recently upgraded from a 0.18 MGD design flow to a 0.6 MGD design flow. The wastewater treatment units came on-line in December 2005 and the upgraded sludge treatment facilities came on-line in July 2005. The NPDES outfall serial number for the wastewater treatment plant discharge has been changed from "006" to "001" for clarification purposes, since there is only one outfall at this facility.

## II. DESCRIPTION OF THE DISCHARGE

A quantitative description of the wastewater treatment plant discharge in terms of significant effluent parameters based on recent monitoring data is shown on **Attachment A** of this fact sheet.

## III. LIMITATIONS AND CONDITIONS

The effluent limitations of the draft permit and monitoring requirements may be found in the draft NPDES permit.

## IV. PERMIT BASIS AND EXPLANATION OF EFFLUENT LIMITATION DERIVATION

### A. PROCESS DESCRIPTION

The Douglas Wastewater Treatment Plant (WWTP) is a municipal advanced wastewater treatment facility with a design flow of 0.6 MGD, which discharges to the Mumford River. The upgraded wastewater treatment consists of preliminary treatment, biological treatment via sequencing batch reactors, alum and polymer chemical addition, effluent filtration, and ultraviolet irradiation disinfection. The sludge is sent to the Woonsocket Regional Wastewater Treatment Plant in Rhode Island for incineration.

The annual average flow is expected to increase gradually over the next several years. The proposed draft permit limitations on page 2 of the permit are based on an annual average plant design flow of 0.6 MGD.

The Douglas WWTP does not currently serve any industrial users, and this facility does not anticipate serving any industrial users during the life of this permit. The facility's location and flow schematic are shown on Figures 1 and 2 of this fact sheet.

### B. AVAILABLE DILUTION

The available dilution (also referred to as the dilution factor) for the upgraded wastewater treatment plant was calculated to be 17. This calculation was based on a plant design flow of 0.6 million gallons per day and an estimated 7Q10 low flow of 15 cfs. The definition of the 7Q10 low flow is the mean low flow over 7 consecutive days, recurring every ten years. The 7Q10 low flow was based on the minimum instream flow requirements for the Interface Fabrics Group Finishing, Inc. (formerly named: Guilford of Maine Finishing Services, Inc.) located in East Douglas, Massachusetts (NPDES permit number MA0001538). Interface Fabrics Group Finishing, Inc. is required to operate two upstream impoundments on the Mumford River, named Whitin Reservoir and Manchaug Reservoir, in order to maintain a minimum flow of 16 cubic feet per second (cfs) over the Gilboa Dam. Past instream flow data has demonstrated an instream flow at the Gilboa Dam that is occasionally as low as 15.4 cfs. Therefore, the estimated 7Q10 instream flow proposed for the NPDES draft permit for the Town of Douglas is 15 cfs in order to provide adequate protection for the receiving water. In the event that this instream flow is not consistently met, the NPDES permit for the Town of Douglas would be subject to modification of its water quality-based permit

limitations in order to reflect a more accurate 7Q10 instream flow. Instream flow data is attached for informational purposes. (See also: **Attachments B and C** of this Fact Sheet - Calculations and Mumford River at Gilboa Dam Minimum Instream Flow.)

C. **OUTFALL 001 EFFLUENT LIMITATIONS AND MONITORING REQUIREMENTS**

1. **Overview of Federal and State Regulations**

Secondary treatment technology guidelines (effluent limits), which represent the minimum level of control for Publicly Owned Treatment Works, can be found at 40 CFR Part 133. Since all Clean Water Act statutory deadlines for meeting technology-based guidelines (effluent limits) have expired, the deadline for compliance with technology-based effluent limits for a Publicly Owned Treatment Works is the date of permit issuance (See also: 40 CFR §125.3(a)(1)). Extended compliance deadlines cannot be authorized by a NPDES permit, if the statutory deadlines have passed.

Section 301(b)(1)(C) of the Clean Water Act requires water quality-based limits 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. Receiving water requirements are established according to numerical and narrative standards adopted under state law. A water quality standard consists of three elements: (1) beneficial designated use(s) for a water body or segment of a water body; (2) a numeric or narrative water quality criteria sufficient to protect the designated use(s); and (3) an anti-degradation requirement to ensure that once a use is attained, it will be maintained.

Pursuant to 40 CFR § 122.44 (d), permittees must achieve water quality standards established under Section 303 of the CWA, including state narrative criteria for water quality. Additionally, under 40 CFR § 122.44 (d)(1)(i), "Limitations must control all pollutants or pollutant parameters which the Director determines are or may be discharged at a level which will cause, have the reasonable potential to cause, or contribute to an excursion above any state water quality standard." When determining whether a discharge causes, or has the reasonable potential to cause or contribute to an in-stream excursion above a narrative or numeric criterion, the permitting authority will use procedures which account for existing controls on point and non-point sources of pollution, and where appropriate, consider the dilution of the effluent in the receiving water.

2. **Water Quality Standards; Designated Use; Outfall 001**

The Mumford River is a major tributary to the Blackstone River, which is a part of the Blackstone River Basin and Narragansett Bay Basin. The Massachusetts Surface Water Quality Standards, 314 Code of Massachusetts Regulations ("CMR") 4.05(4)(a) classify the segment of the Mumford River which includes the Douglas discharge as a Class B warm water fishery. The Massachusetts Surface Water Quality Standards describes Class B waters as having the following uses: (1) a habitat for fish, other aquatic life, and wildlife, (2) primary and secondary contact recreation, (3) a source of public water supply (i.e., where designated and with appropriate treatment), (4) suitable for irrigation and other agricultural uses and for compatible industrial cooling and process uses, and (5) will have consistently good aesthetic value.

## OUTFALL 001 - CONVENTIONAL POLLUTANTS:

### Biochemical Oxygen Demand (BOD)

The draft permit includes summer BOD mass limitations, which are the same as the pre-upgrade summer mass limitations, in order to protect the receiving stream from degradation. The draft permit also includes higher winter seasonal BOD limitations that reflect the plant upgrade. MassDEP and EPA have concluded the increased discharge of BOD during the cold weather months may be allowed under the MassDEP's antidegradation policy since the higher receiving water flow and lower stream temperature during the winter months will ensure that no degradation of water quality will occur. (See **Attachment B** of this Fact Sheet - Calculations.)

### Total Suspended Solids (nonfilterable) (TSS)

The draft permit includes proposed post-upgrade summer TSS mass limitations, which are the same as the pre-upgrade TSS loads in order to protect the receiving stream from degradation. The draft permit also includes higher winter seasonal TSS limitations that reflect the plant upgrade. MassDEP and EPA have concluded the increased discharge of TSS during the cold weather months may be allowed under the MassDEP's antidegradation policy since the higher receiving water flow and lower stream temperature during the winter months will ensure that no degradation of water quality will occur. (See **Attachment B** of this Fact Sheet - Calculations.)

pH - Historically, the MassDEP has required compliance with pH limits at the end-of-pipe with no allowance for dilution. Therefore, the pH limits proposed in the draft permit are based on the Class B water quality criteria, with no allowance for dilution. These limits are State certification requirements for Publicly Owned Treatment Works under section 401(d) of the Clean Water Act, 40 CFR § 124.53 and § 124.55, and are at least as stringent as pH limitations set forth at 40 CFR § 133.102(c).

A change of pH limits in the draft permit would be considered if the applicant demonstrates to the satisfaction of EPA and the MassDEP that the in-stream pH standard will be protected when the discharge is outside the permitted range. The applicant may request in writing that the permit limits be modified by the agencies to incorporate the results of the demonstration, or the limits may be modified by the agencies in response to comments made during the public comment period.

Fecal Coliform Bacteria - The draft permit includes proposed fecal coliform bacteria limitations which are seasonal and are based on the Class B water quality criteria with no allowance for dilution.

## OUTFALL 001 - NON-CONVENTIONAL POLLUTANTS (i.e., NUTRIENTS)

### Nitrogen

The draft permit includes a 5 mg/l average monthly limit for ammonia-nitrogen during the summer period. This limit is included in order to maintain the estimated existing load of ammonia to the receiving water, in order to ensure that degradation of the receiving water does not occur. Biological decomposition of ammonia-nitrogen utilizes dissolved oxygen, and if the mass discharge were allowed to increase in the summer months this could result in lowering of instream concentrations of dissolved oxygen. The limit was calculated by determining the existing ammonia nitrogen loading using an estimated concentration of 15 mg/l (typical of POTWs which do not nitrify) and the permitted design flow of 0.18 MGD, and then back calculating the concentration limit for the upgraded plant using the new design flow of 0.6 MGD. (See also: Section V of this Fact Sheet). The draft permit also continues the once per month monitoring requirement for ammonia-nitrogen (during the winter), nitrite, nitrate, and Kjeldahl nitrogen.

### Phosphorus

EPA 1986 Quality Criteria of Water (“the Gold Book”) recommends that instream phosphorus concentrations not exceed 0.05 mg/l in any stream entering a lake or reservoir, 0.1 mg/l for any stream not discharging directly to lakes or impoundments, and 0.025 mg/l within the lake or reservoir. Since the Mumford River contains impounded areas downstream of this discharge, and since EPA believes that phosphorus will likely accumulate in the downstream impoundments, the draft permit limits were calculated to ensure that the combined phosphorus loadings from the Douglas wastewater treatment plant, Interface Fabrics Group Finishing, Inc., and background conditions achieve an instream concentration of 50 µg/l. A limit of 1.2 lbs/day of phosphorus for the Douglas discharge was calculated. (The calculations are shown on **Attachment B** of this Fact Sheet - Calculations.)

A 1.2 lbs/day monthly average phosphorus limit is included, which will be in effect from April 1 through October 31 and monitored once per week. EPA believes that imposing a mass based phosphorus limit during the summer period will be protective of the receiving stream.

A 1.0 mg/l monthly average phosphorus limit will be in effect from November 1 through March 31, which will be monitored once per month. The winter period limitation on total phosphorus is necessary to ensure that the higher levels of phosphorus discharged in the winter period do not result in the accumulation of phosphorus in the sediments downstream. The limitation assumes that the vast majority of the phosphorus discharged will be in the dissolved fraction and that dissolved phosphorus will pass through the system given the short detention time of the impoundments and the lack of plant growth during the winter period. If future evaluations indicate that phosphorus may be accumulating in the impoundments, the winter period phosphorus limit may be reduced in future permit actions. The agencies will pursue the necessary resources in order to conduct the evaluation. If necessary, the permittee may be asked to conduct the analysis through the authority of Section 308 of the Clean Water Act.

A monitoring requirement for ortho-phosphorus during the winter period is included in the draft permit. Monitoring for ortho-phosphorus is necessary to identify whether the particulate fraction remains low and to further understand the physical dynamics of phosphorus in the non-growing season. Without the ortho-phosphorus monitoring requirement, the Agencies cannot ensure that the higher loads authorized in the winter period are sufficiently protective of standards, specifically that the higher loads will not cause or contribute to instream eutrophication. The monitoring requirement in the draft permit requires sampling results that reflect the dissolved ortho-phosphorus (P) concentration in the discharge.

#### OUTFALL 001 - METALS

The Massachusetts Water Quality Standards include requirements for the regulation and control of toxic constituents and also require that EPA criteria established pursuant to Section 304(a) of the CWA shall be used unless site specific criteria are established.

**Attachment B** shows the calculations for the acute and chronic limits for copper, lead, aluminum, and zinc, if limits were established in the permit. Effluent data for copper, lead, aluminum, and zinc indicate that there is not a reasonable potential to exceed criteria.

#### OUTFALL 001 - TOXICS CONTROL

Under Section 301(b)(1)(C) of the CWA, discharges are subject to effluent limitations based on water quality standards. The Massachusetts State Surface Water Quality Standards include the following narrative statement and requires that EPA criteria established pursuant to Section 304(a)(1) of the CWA be used as guidance for interpretation of the following narrative criteria:

All surface waters shall be free from pollutants in concentrations or combinations that are toxic to humans, aquatic life or wildlife.

National studies conducted by the EPA have demonstrated that domestic sources, as well as industrial sources, contribute toxic constituents to POTWs. These constituents include metals, chlorinated solvents, aromatic hydrocarbons and others. Based on the potential for toxicity from domestic and industrial contributions, the state narrative water quality criterion, the level of dilution at the discharge location, and in accordance with EPA national and regional policy and 40 CFR § 122.44(d), the draft permit includes a whole effluent acute toxicity limitation (LC50) and a chronic no observed effluent concentration (C-NOEC) monitoring requirement. (See also "Policy for the Development of Water Quality-Based Permit Limitations for Toxic Pollutants", 49 Fed. Reg. 9016 March 9, 1984, and EPA's "Technical Support Document for Water Quality-Based Toxics Control", September, 1991.)

The Massachusetts Department of Environmental Protection's (MassDEP) Division of Watershed Management has a current toxics policy which requires toxicity testing for all major dischargers such as the Town of Douglas. In addition, EPA feels that toxicity testing is required to assure that the synergistic effect of the pollutants in the discharge does not cause toxicity, even though the pollutants may be at low concentrations in the effluent. Thus, the draft permit includes a whole effluent toxicity limitation requirement for the 001 outfall, to assure that the Town of Douglas does not discharge combinations of toxic compounds into the Mumford River in amounts which would affect aquatic or human life. The proposed draft permit includes a requirement for a 7-day

Chronic and a Modified Acute toxicity test using the daphnid, *Ceriodaphnia dubia*. The toxicity tests must be performed in accordance with the test procedures and protocols specified in **Attachment B** of the permit. The permittee may request a reduction in the toxicity testing requirements if there are four consecutive passing toxicity test results. The permittee will continue conducting toxicity testing in accordance with the permit until notice is received by certified mail from the EPA that the toxicity testing requirements have been changed.

#### OUTFALL 001 - NUMERICAL EFFLUENT LIMITATIONS FOR TOXICANTS

EPA and the MassDEP may use the results of the monthly toxicity tests and chemical analyses conducted by the permittee, required by the permit, as well as national water quality criteria developed pursuant to Section 304(a)(1) of the Clean Water Act (CWA), state water quality criteria, and any other appropriate information or data, to develop numerical effluent limitations for any pollutants.

#### V. FLOW INCREASE and ANTI-DEGRADATION REVIEW

The antidegradation provisions in the Massachusetts Surface Water Quality Standards, 314 CMR 4.00, require the protection of existing uses and the level of water quality necessary to sustain these uses. Section 4.04 of the Massachusetts Water Quality Standards requires that: (1) in all cases, existing uses and the level of water quality necessary to protect the existing uses will be maintained and protected; and (2) certain waters, including low flow waters whose character cannot be adequately described or protected by the traditional criteria, will be designated for protection under 314 CMR 4.06(2) and 4.06(3). These waters will be protected and maintained for their existing level of quality unless limited degradation by a new or increased discharge is authorized by the Massachusetts Division of Watershed Management. The antidegradation provisions at 314 CMR 4.04(2) allow limited degradation by a new or increased discharge, as long as it is authorized by the MassDEP. Limited degradation of a high quality water is allowed under either of two circumstances: (1) the discharge is insignificant because it does not have the potential to impair uses and cause any significant lowering of water quality, or (2) the discharge qualifies for an authorization (called a variance prior to regulatory revisions promulgated in 1996) based on necessity, evaluation of alternatives, minimization of adverse impacts, and maintenance of uses and the water quality classification. Since the summer loadings will be maintained, and since the permittee is required to optimize the winter removal efficiencies in order to minimize any lowering of water quality, the MassDEP finds that the discharge from the Town of Douglas meets both of these circumstances for the increase in flow up to an annual average plant design flow of 0.6 MGD.

#### VI. SLUDGE CONDITIONS

Section 405(d) of the CWA requires that EPA develop technical standards regarding the use and disposal of sewage sludge. On February 19, 1993, EPA promulgated technical standards. These standards are to be implemented through permits. The conditions in the permit satisfy this requirement.

## VII. INDUSTRIAL USERS

The permittee is required to identify, in terms of character and volume of pollutants, any significant indirect dischargers into the POTW subject to pretreatment standards under Section 307(b) of the CWA and 40 CFR Part 403.

## VIII. MONITORING AND REPORTING

The permittee is obligated to monitor and report sampling results to EPA and the MassDEP within the time specified within the permit. Timely reporting is essential for the regulatory agencies to expeditiously assess compliance with permit conditions.

## IX. ESSENTIAL FISH HABITAT DETERMINATION (EFH)

Under the 1996 Amendments (PL 104-267) to the Magnuson-Stevens Fishery Conservation and Management Act (16 U.S.C. § 1801 et seq. (1998)), EPA is required to consult with the National Marine Fisheries Services (NMFS) if EPA's action or proposed actions that it funds, permits, or undertakes, may adversely impact any essential fish habitat, which is defined as: waters and substrate necessary to fish for spawning, breeding, feeding, or growth to maturity (16 U.S.C. § 1802 (10)). Adversely impact means any impact which reduces the quality and/or quantity of EFH (50 C.F.R. § 600.910 (a)). Adverse effects may include direct (e.g., contamination or physical disruption), indirect (e.g., loss of prey, reduction in species' fecundity), site-specific or habitat-wide impacts, including individual, cumulative, or synergistic consequences of actions. Essential fish habitat is only designated for species for which federal fisheries management plans exist (16 U.S.C. § 1855(b) (1) (A)). EFH designations for New England were approved by the U.S. Department of Commerce on March 3, 1999. The Mumford River is not covered by the EFH designation for riverine systems and thus EPA and the MassDEP have determined that a formal EFH consultation with NMFS is not required.

## X. STATE PERMIT CONDITIONS

The NPDES Permit is issued jointly by the U. S. Environmental Protection Agency and the Massachusetts Department of Environmental Protection under federal and state law, respectively. As such, all the terms and conditions of the permit are, therefore, incorporated into and constitute a discharge permit issued by the Commissioner of the Massachusetts Department of Environmental Protection pursuant to M.G.L. Chap. 21, §43.

## XI. GENERAL CONDITIONS

The general conditions of the permit are based on 40 CFR Parts 122, Subparts A and D and 40 CFR § 124, Subparts A, D, E, and F and are consistent with management requirements common to other permits.

## XII. STATE CERTIFICATION REQUIREMENTS

The staff of the MassDEP has reviewed the draft permit. EPA has requested permit certification by the State pursuant to 40 CFR § 124.53 and expects that the draft permit will be certified.

XIII. PUBLIC COMMENT PERIOD AND PROCEDURES FOR FINAL DECISION

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, MA Unit (CMP), One Congress Street, Suite-1100, Boston, Massachusetts 02114. 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 will state the nature of the issues proposed to be raised in the hearing. Public hearings may be held after at least thirty days public notice whenever the Regional Administrator finds that response to this notice indicates a significant public interest. In reaching a final decision on the draft permit, the Regional Administrator 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 a public hearing, if such a hearing is held, the Regional Administrator will issue a final permit decision and forward a copy of the final decision to the applicant and each person who has submitted written comments or requested notice. Permits may be appealed to the Environmental Appeals Board in the manner described at 40 CFR § 124.19.

XIV. EPA and MassDEP CONTACTS

Additional information concerning the draft permit may be obtained between the hours of 9:00 a.m. and 5:00 p.m., Monday through Friday, excluding holidays, from the EPA and MassDEP contacts below:

Janet Labonte  
Chemical/Environmental Engineer  
U.S. Environmental Protection Agency  
Office of Ecosystem Protection (CMP)  
One Congress Street - Suite-1100  
Boston, MA 02114  
Telephone: (617) 918-1667

Paul Hogan  
Massachusetts Department of Environmental Protection  
Division of Watershed Management, Surface Water Discharge Permit Program  
627 Main Street, 2nd Floor Worcester, MA 01608  
Telephone: (508) 767-2796, Fax: (508) 791-4131

\_\_\_\_\_  
Date

Linda M. Murphy, Director  
Office of Ecosystem Protection  
U.S. Environmental Protection Agency

ATTACHMENT A  
 EFFLUENT MONITORING DATA  
 NPDES Permit No. MA0101095  
 Douglas, MA

DESCRIPTION OF DISCHARGE: Secondary Treated Wastewater  
 (Note: The effluent data below reflects pre-upgrade conditions.)

DISCHARGE: Outfall 001 (The receiving water is the Mumford River)  
 The monthly average and daily maximum values listed below were reported from February 1, 2003 to September 30, 2005, unless otherwise noted.

EFFLUENT CHARACTERISTICS AT THE POINT OF DISCHARGE:

<u>Parameter</u>	<u>Monthly Average (range)</u>	<u>Daily Maximum (range)</u>
Flow, MGD	0.148 - 0.315	0.18 - 0.504
pH, std. units	6.83 (minimum)	7.62 (maximum)
BOD, mg/l	9 - 12	10 - 15
BOD, lbs/d	12 - 22	13 - 49
TSS, mg/l	9 - 15	10 - 24
TSS, lbs/d	10 - 25	14 - 55
Total Chlorine Residual, mg/l	0.1 - 0.29	0.15 - 1.3
Total Fecal Coliform, cfu/100 ml	0 - 52	0 - 140
Ammonia-Nitrogen, mg/l	0.29 - 18	—
Nitrogen, Nitrite (as N), mg/l	0.01 - 3.1	—
Nitrogen, Nitrate (as N), mg/l	0 - 6.5	—
Nitrogen, Kjeldahl (as N), mg/l	0.11 - 21	—
Phosphorus, Total, mg/l	—	—
(May 1 - Oct. 31)	0.42 - 0.73	0.6 - 1.13
(November 1 - April 30)	1.3 - 6.6	0.33 - 6.6
Copper, Total, mg/l	—	0.009 - 0.035
Lead, Total, mg/l	—	0 - 0.003
Aluminum, mg/l	—	0.022 - 0.333
Zinc, Total, mg/l	—	0.036 - 0.083

Whole Effluent Toxicity (WET) Tests:

The LC<sub>50</sub> (*Ceriodaphnia dubia*) test results from August 2000 - September 2005 were all passing at  $\geq 100\%$

ATTACHMENT B  
CALCULATIONS FOR BIOCHEMICAL OXYGEN  
DEMAND, TOTAL SUSPENDED SOLIDS, PHOSPHORUS,  
COPPER, LEAD, ALUMINUM, AND ZINC  
NPDES Permit No. MA0101095  
Douglas, MA

Determination of Dilution Factor:

Plant Design Flow = 0.6 MGD

Instream 7Q10 = 15 cfs x 0.646272 MGD/cfs = 9.694 MGD

(The instream 7Q10 is based on the minimum instream flow requirements for Interface Fabrics Group Finishing, Inc. in East Douglas, NPDES permit number MA0001538.)

Dilution Factor = (Instream 7Q10 + Design Flow) / Design Flow

= (9.694 MGD + 0.6 MGD)/(0.6 MGD)

= 17 (Medium/High Risk Toxicity - Acute limit and Chronic monitoring is required.)

Instream Hardness = (24 mg/l + 20 mg/l + 12 mg/l) ÷ 3 = 18.67 mg/l = 19 mg/l

(The instream hardness value above, is based on the following instream hardness values from toxicity test reports: July 9, 2003 = 24 mg/l, July 13, 2004 = 20 mg/l, August 9, 2005 = 12 mg/l.)

Biochemical Oxygen Demand (BOD) Limit: (Summer limit = S, and Winter limit = W)

Average Monthly Mass Limit <sup>(S)</sup> = (0.18 MGD x 30 mg/l x 8.345) = 45 lbs/day

Average Weekly Mass Limit <sup>(S)</sup> = (0.18 MGD x 45 mg/l x 8.345) = 68 lbs/day

Average Monthly Concentration Limit <sup>(S)</sup> = (45 lbs/day / (0.6 MGD x 8.345)) = 9 mg/l (proposed limit = 10 mg/l)

Average Weekly Concentration Limit <sup>(S)</sup> = (1.5 x 10 mg/l) = 15 mg/l

Average Monthly Mass Limit <sup>(W)</sup> = (45 lbs/day x 2) = 90 lbs/day

Average Weekly Mass Limit <sup>(W)</sup> = (68 lbs/day x 2) = 136 lbs/day

(The winter seasonal BOD limitations are based on anti-degradation.)

Continued on page 2.

ATTACHMENT B  
CALCULATIONS

Attachment B (continued);

Total Suspended Solids (TSS) Limits: (Summer limit = S, and Winter limit = W)

$$\text{Average Monthly Mass Limit}^{(S)} = (0.18 \text{ MGD} \times 30 \text{ mg/l} \times 8.345) = 45 \text{ lbs/day}$$

$$\text{Average Weekly Mass Limit}^{(S)} = (0.18 \text{ MGD} \times 45 \text{ mg/l} \times 8.345) = 68 \text{ lbs/day}$$

$$\text{Average Monthly Concentration Limit}^{(S)} = (45 \text{ lbs/day} / (0.6 \text{ MGD} \times 8.345)) = 9 \text{ mg/l (proposed limit = 10 mg/l)}$$

$$\text{Average Weekly Concentration Limit}^{(S)} = (1.5 \times 10 \text{ mg/l}) = 15 \text{ mg/l}$$

$$\text{Average Monthly Mass Limit}^{(W)} = (45 \text{ lbs/day} \times 2) = 90 \text{ lbs/day}$$

$$\text{Average Weekly Mass Limit}^{(W)} = (68 \text{ lbs/day} \times 2) = 136 \text{ lbs/day}$$

(The winter seasonal TSS limitations are based on anti-degradation.)

Copper Limitations: (Copper requirements are not proposed for the draft permit.)

Copper is dependent on the hardness of the receiving water.

$$\text{Acute Copper Limit} = e^{(0.9422 * \ln 19) + (-1.7)} \times \text{dilution factor} = (2.927 \text{ } \mu\text{g/l} \times 17) = 49.7 \text{ } \mu\text{g/l} = 0.05 \text{ mg/l}$$

$$\text{Chronic Copper Limit} = e^{(0.8545 * \ln 19) + (-1.702)} \times \text{dilution factor} = (2.256 \text{ } \mu\text{g/l} \times 17) = 38.35 \text{ } \mu\text{g/l} = 0.038 \text{ mg/l}$$

Lead Limitations: (Lead requirements are not proposed for the draft permit.)

Lead is dependent on the hardness of the receiving water.

$$\text{Acute Lead Limit} = e^{(1.273 * \ln 19) + (-1.46)} \times \text{dilution factor} = (9.857 \text{ } \mu\text{g/l} \times 17) = 167.56 \text{ } \mu\text{g/l} = 0.168 \text{ mg/l}$$

$$\text{Chronic Lead Limit} = e^{(1.273 * \ln 19) + (-4.705)} \times \text{dilution factor} = (0.384 \text{ } \mu\text{g/l} \times 17) = 6.52 \text{ } \mu\text{g/l} = 0.0065 \text{ mg/l}$$

Aluminum Limitations: (Aluminum requirements are not proposed for the draft permit.)

$$\text{Acute Aluminum Limit} = (\text{acute criteria} \times \text{dilution factor}) = (750 \text{ } \mu\text{g/l} \times 17) = 12750 \text{ } \mu\text{g/l} = 12.75 \text{ mg/l}$$

$$\text{Chronic Aluminum Limit} = (\text{chronic criteria} \times \text{dilution factor}) = (87 \text{ } \mu\text{g/l} \times 17) = 1479 \text{ } \mu\text{g/l} = 1.48 \text{ mg/l}$$

Zinc Limitations: (Zinc requirements are not proposed for the draft permit.)

Zinc is dependent on the hardness of the receiving water.

$$\text{Acute (Maximum Daily)} = (e^{(0.8473 * \ln 19) + (0.884)} \times \text{dilution factor}) = (29.336 \text{ } \mu\text{g/l} \times 17) = 498.7 \text{ } \mu\text{g/l} = 0.5 \text{ mg/l}$$

$$\text{Chronic (Monthly Average)} = (e^{(0.8473 * \ln 19) + (0.884)} \times \text{dilution}) = (29.336 \text{ } \mu\text{g/l} \times 17) = 498.7 \text{ } \mu\text{g/l} = 0.5 \text{ mg/l}$$

Continued on page 3.

ATTACHMENT B  
CALCULATIONS

Attachment B (continued);

Total Phosphorus Limit (May 1 - Oct. 31):

The EPA Gold Book national guidance recommended instream phosphorus concentration for a point where a stream enters a lake or reservoir (i.e., and for receiving waters in close proximity to impounded areas): 50 µg/l

Monthly average flow from the Interface Fabrics Group Finishing, Inc., a downstream source: 1.0 MGD

The Interface Fabrics Group Finishing, Inc.'s phosphorus limit: 2.7 lbs/day

Estimated instream phosphorus concentration (ambient background): 10 µg/l

Douglas WWTP's effluent phosphorus limit, that will result in 50 µg/l instream, based on a loading calculation:

Total loading allowed:

Minimum Stream Flow Downstream of Interface <sup>1</sup> (11.3 MGD)	Instream P Goal (0.05 mg/l)	Conversion Factor (8.34) = 4.7 lbs/day
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The expected phosphorus loading from Guilford's discharge : 2.7 lbs/day

Ambient background (instream) phosphorus loading:

Ambient P Concentration (0.01 mg/l)	Minimum Stream flow (11.3 MGD -	Guilford Average Flow 1.0 MGD -	Douglas WWTP Flow 0.6 MGD)	Conversion Factor (8.345) = 0.8 lbs/day
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Therefore, the average monthly mass limit for the Douglas WWTP discharge is:

Total Loading Allowed (4.7 lbs/day -	Interface's Expected P Load 2.7 lbs/day -	Ambient P Load 0.8 lbs/day)	= 1.2 lbs/day (proposed permit limit)
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Footnote:

<sup>1</sup> This is the instream 7Q10 flow of 10.3 MGD and the monthly average plant flow from the Interface Fabrics Group Finishing, Inc. which is assumed to be 1.0 MGD.

ATTACHMENT C  
MUMFORD RIVER AT GILBOA DAM  
MINIMUM INSTREAM FLOW  
NPDES Permit No. MA0101095  
Douglas, MA

Date <sup>1</sup>	Minimum Instream Flow (cfs)	Date	Minimum Instream Flow (cfs)
1/97	27.8	7/98	24.7
2/97	27.8	8/98	15.4
3/97	20.1	9/98	15.9
4/97	49.9	10/98	17.9
5/97	27.8	11/98	49.5
6/97	20.1	12/98	17.9
7/97	15.4	1/99	54
8/97	24.6	2/99	49.5
9/97	15.9	3/99	47.9
10/97	16.8	4/99	26.3
11/97	29.3	5/99	19.9
12/97	29.3	6/99	17
1/98	27.8	7/99	17
2/98	38.6	8/99	17
3/98	99.9	9/99	17
4/98	35.8	10/99	17
5/98	26.3	11/99	27.8
6/98	100.5	12/99	27.8

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<sup>1</sup> The winter months are defined as: November - April.

ATTACHMENT C  
MUMFORD RIVER AT GILBOA DAM  
MINIMUM INSTREAM FLOW

Attachment C (continued);

Date	Minimum Instream Flow (cfs)	Date	Minimum Instream Flow (cfs)
1/00	44	7/01	18
2/00	36	8/01	17
3/00	26	9/01	17
4/00	26	10/01	17
5/00	28	11/01	18
6/00	28	12/01	17
7/00	18	1/02	20
8/00	18	2/02	17
9/00	17	3/02	17
10/00	17	4/02	20
11/00	18	5/02	35
12/00	45	6/02	20
1/01	38	7/02	16
2/01	20		
3/01	20		
4/01	20		
5/01	17		
6/01	18		