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

FACT SHEET

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

NPDES PERMIT NO: **NH0100170**

PUBLIC COMMENT PERIOD START AND END DATES: July 23, 2013 thru September 20, 2013

NAME AND ADDRESS OF THE APPLICANT:

City of Nashua
Sawmill Road
Nashua, New Hampshire 03060

NAME AND ADDRESS OF FACILITY WHERE DISCHARGE OCCURS

City of Nashua Wastewater Treatment Facility
Sawmill Road
Nashua, New Hampshire 03060

And from eight combined sewer overflows (CSOs) (discharge serial numbers 002 – 009 (See Attachment A for individual outfall locations)

RECEIVING WATERS: **Merrimack River (**Wastewater Treatment Facility (outfall # 001), CSOs # 002-005)

Nashua River (CSOs # 006-009)

CLASSIFICATION: **B**

TABLE OF CONTENTS

Tables

Figures and Attachments

I. PROPOSED ACTION

The City of Nashua, New Hampshire (the "City" or "permittee"), has applied to the United States Environmental Protection Agency ("EPA") for reissuance of its National Pollutant Discharge Elimination System ("NPDES") permit to discharge to the designated receiving waters.

The discharges are from the Nashua Wastewater Treatment Facility ("WWTF"), which is a publicly owned treatment works ("POTW") that is engaged in the collection and treatment of wastewater generated by the residents, businesses and industries in the City of Nashua and the Town of Hudson, New Hampshire as well as from eight combined sewer overflow discharge points ("CSOs"). According to information supplied in the NPDES application submitted by the permittee, the facility accepts and treats wastewater from 133 industrial dischargers (users), including 23 significant industrial users, and maintains an active pretreatment program. The facility also accepts approximately 375,000 gallons of septage annually.

The most recent NPDES permit was issued to the City on May 31, 2000 and expired on May 31, 2005. This permit has been administratively continued, as a complete application for permit reissuance was filed by the City in accordance with the Administrative Procedures Act (5 U.S.C. 558(c)) and 40 CFR § 122.6. This permit is hereafter referred to as the "2000 permit" or the "existing permit".

The draft permit, upon final issuance, shall supersede the 2000 permit.

II. TYPE OF FACILITY AND DISCHARGE LOCATIONS

1. Background

The original facility was constructed in 1959, underwent an expansion in 1974, was upgraded to secondary treatment in 1989, and upgraded again in 2000 to include anaerobic digestion. Ongoing construction projects include work to mitigate the discharge of untreated wastewater through the City's eight combined sewer overflow outfalls ("CSOs") into the Merrimack and Nashua Rivers, which are discussed in more detail below.

The Nashua WWTF has one outfall (outfall number 001) through which treated effluent is discharged to the Merrimack River (See Figure 1). Blended effluent, comprised of primary and secondary effluent, is also discharged through outfall 001 during wet weather events when the flow to the WWTF exceeds the plant's secondary treatment capacity, as described below. The City also owns and operates a CSO treatment facility (Wet Weather Flow Treatment Facility, or "WWFTF"), located adjacent to the wastewater treatment facility. The discharge from this facility combines with secondary effluent (as well as combined secondary and primary effluents, when the secondary treatment process is bypassed) from the WWTF in the chlorine contact tank and is discharged through outfall 001. The operation of this facility is described in the *Wet Weather Flow* section.

Discharges of combined sanitary wastewater and stormwater occur from the eight combined sewer overflow discharge outfalls identified in Attachment A when the hydraulic capacity of the wastewater treatment facility/collection system becomes overloaded during storm events. A second CSO treatment facility is expected to commence operation within the next few years. This facility will provide screening and disinfection to combined flows which currently discharge through CSO outfalls #005 and #006. Flows from this facility will discharge to the Merrimack River. These discharges are discussed in further detail in Part VIII of this fact sheet

2. Treatment Process

The Nashua WWTF uses an activated sludge process to provide secondary treatment to wastewater flows up to its 16 million gallons per day (MGD) annual average design flow capacity and up to its peak flow capacity of 38 MGD. A description of the normal dry weather flow operation of the treatment plant is included immediately below. A process diagram is shown in Figure 2. Facility operations during wet weather events are described later in this section and a corresponding schematic is shown in Figure 3.

Dry Weather Flow

Influent flows enter the treatment works through the main influent wet well, where larger solids and debris are removed by bar screens to minimize the potential for such objects to damage equipment farther along the process train. The materials removed are washed and conveyed to a closed top container for disposal. Flows are monitored by ultrasonic flow sensors, which relay the data to the Supervisory Control and Data Acquisition (SCADA) system and are then conveyed to the grit removal building by a force main. Inside the grit chambers, the introduction of coarse bubble aeration serves to decrease the flow velocity, which in turn allows for the settling of large inorganic solids and coarse debris. The settled material is washed and loaded into trucks for disposal at the City's landfill.

Next, the wastewater flows to primary sedimentation basins where the floatable (oil and grease) and settleable solids (sludge) are removed. The floatable solids are directed to a storage tank for disposal and the sludge is pumped to gravity thickeners. The primary effluent flows to the aeration basins, where it comes into contact with activated sludge, which consists of a mixture of biological organisms. Aeration of the wastewater facilitates the growth of aerobic bacteria, which reduce the organic load in the wastewater by converting it to energy and biomass. The wastewater then flows to the secondary clarifiers where suspended material (bacteria and remaining solids) settle out from the liquid portion of the wastewater (effluent). Floatable solids are removed by a rake arm and are pumped back to the head of the aeration basins. The settled material, which forms sludge at the bottom of the clarifiers, is collected by rotating rake arms. Most of the collected sludge is pumped back to the aeration tanks as return activated sludge ("RAS") to maintain biological treatment; a smaller portion is pumped to a holding tank for disposal (waste activated sludge, or "WAS"). From the secondary clarifiers, the treated effluent flows into the chlorine contact chambers where liquid sodium hypochlorite is added to kill any pathogenic organisms. A sample of the effluent is continuously analyzed, and the disinfected

effluent is dechlorinated with a sodium metabisulfite solution prior to discharge. The effluent cascades to the outfall chamber and is discharged to the Merrimack River through outfall 001.

Solids Handling

The sludges created during the primary and secondary treatment processes are thickened by gravity thickeners and belt thickeners, respectively, to reduce the water content. The thickened sludge is then sent to the anaerobic digester complex. The hydraulic retention time in the 1.3 million gallon egg-shaped primary digester is approximately 20 days. During this time, the solids are further broken down into carbon dioxide, water and methane gas. The methane is sent to a generator to produce electricity and to a boiler to produce heat for the digestion process. The digested biosolids are then sent to three belt filter presses for dewatering, and are then loaded into trucks for distribution to farms within the state for use as a soil enhancer.

Wet Weather Flow

During wet weather events, flows up to 50 MGD are conveyed to the headworks of the wastewater treatment plant, with 38 MGD receiving full secondary treatment. The additional flow (up to 12 MGD) bypasses the secondary treatment process, receiving primary treatment before blending with secondary effluent for disinfection and dechlorination prior to being discharged through outfall 001, as discussed in further detail below.

The bypass of secondary treatment during wet weather events is considered an interim measure to control discharges of untreated wastewater through CSOs per the Consent Decree which was lodged in 2005 (see Part VIII.A. of this fact sheet for further discussion of the Consent Decree)[1]. Use of this bypass is governed by the terms of the 2005 Consent Decree, which establishes conditions, monitoring requirements and effluent limitations.

Wet weather related flows that exceed the 50 MGD primary treatment capacity of the WWTF are diverted to a 60 MGD Wet Weather Flow Treatment Facility (WWFTF), which is located adjacent to the main wastewater treatment plant and commenced operation in 2009. The Wet Weather Flow Treatment Facility effectively expanded the City's wet weather treatment capacity to 110 MGD, in accordance with the 2010 High Flow Management Plan.

Flow is diverted to the Wet Weather Flow Treatment Facility when the main influent gate to the wastewater treatment facility is lowered. This typically occurs automatically when the flow rate through the main gate reaches 50 MGD. The lowering of the main influent gate activates a diversion structure located on the 72" North Merrimack interceptor. A 60 MGD pumping

[1] CSO-related bypass of treatment during wet weather may not be authorized in NPDES permits until a long term control plan has been approved by EPA and other conditions are met. Interim approval of a CSO-related bypass may be accomplished through an administrative order which outlines the conditions under which a bypass of secondary treatment may be operated (CSO Control Policy, Federal Register, Vol. 59, No. 75, April 19, 1994. Also see 40 CFR 122.41(m)). The conditions under which bypasses of secondary treatment at the Nashua WWTF may occur are prescribed in the City's High Flow Management Plan, dated 2010, per the 2005 Consent Decree.

facility, which includes a screening facility to protect downstream equipment from being damaged by large objects and coarse debris, pumps the excess flows to the Wet Weather Flow Treatment Facility, which uses a ballasted flocculation process and consists of two 30 MGD treatment trains. The treatment process utilizes polymers in conjunction with micro sand to form a quick-settling floc. The effluent from the WWFTF is then blended with primary and secondary effluent in the wastewater treatment plant's chlorine contact chamber for disinfection prior to being discharged to the Merrimack River through outfall 001.

The solids removed during the treatment process undergo vortex separation to recover the micro sand used in the ballasted flocculation process. Any remaining sludge is thickened and introduced into the existing sludge process train, including blending with primary and secondary thickened sludges.

III. DESCRIPTION OF THE DISCHARGE

A quantitative description of the discharge from outfall 001, in terms of significant effluent parameters based on monitoring data submitted by the permittee from 2007-2012, can be found in Attachment D of this fact sheet. This data represents the quality of secondary effluent as well as combined effluent, which consists of a combination of secondary, primary, and WWFTF effluents.

As described earlier, the facility also experiences wet weather-related bypasses of secondary treatment, not authorized under the existing permit, that are provided with primary treatment and are then combined with secondary effluent ("combined effluent") for disinfection prior to discharge. Monitoring data of combined effluent is reported pursuant to a 2005 Consent Decree (*United States v. City of Nashua*, Civil Action No. 05-376-PB (December 2005, as amended)). Monitoring results for combined effluent from 2009-2011 are shown in Attachment E.

Annual discharge volumes from the City's combined sewer overflow outfalls from 2009-2011 are provided in Attachment F.

IV. LIMITATIONS AND CONDITIONS

The draft permit contains effluent limitations for outfall serial number 001 (WWTF outfall), including limits on 5-day biochemical oxygen demand (BOD_5), total suspended solids (TSS), pH, *Escherichia coli* (*E. coli*), total residual chlorine, total recoverable lead, total recoverable copper, total phosphorus and whole effluent toxicity ("WET"); as well as monitoring requirements for hardness, ammonia nitrogen, alkalinity; and total recoverable aluminum, cadmium, copper, nickel, lead, and zinc. Additionally, the draft permit includes limitations and conditions authorizing discharges from CSOs, the Wet Weather Flow Treatment Facility and the future Screening and Disinfection Facility. These proposed limitations and conditions, which are discussed in further detail throughout this fact sheet, can be found in Part I, Sections A and B, of the draft permit.

V. STATUTORY AND REGULATORY AUTHORITY

A. General Statutory and Regulatory Background

Congress enacted the Clean Water Act ("CWA" or, the "Act") "to restore and maintain the chemical, physical, and biological integrity of the Nation's waters" (CWA § 101(a)). To achieve this objective, the CWA makes it unlawful for any person to discharge any pollutant into waters of the United States from any point source, except as authorized by specified permitting sections of the CWA, one of which is Section 402 (see CWA §§ 301(a) and 402(a)). Section 402 establishes one of the CWA's principal permitting programs, the National Pollutant Discharge Elimination System ("NPDES"). Under this section of the CWA, EPA may "issue a permit for the discharge of any pollutant or combination of pollutants" in accordance with certain conditions (see CWA § 402(a)). NPDES permits generally contain discharge limitations and establish related monitoring and reporting requirements (see CWA § 402(a)(1) and (2)).

Section 301 of the CWA provides for two types of effluent limitations to be included in NPDES permits, technology-based effluent limitations and water quality-based effluent limitations (see CWA §§ 301, 303, and 304(b)). Also see 40 CFR Parts 122, 125, and 131. Technology-based limitations, generally developed on an industry-by-industry basis, reflect a specified level of pollutant reducing technology available and economically achievable for the type of facility being permitted (see CWA §301(b)). As a class, POTWs must meet performance-based requirements which are based upon secondary treatment. The secondary treatment technology guidelines (effluent limits) consist of effluent limitations for BOD_5, TSS, and pH (see 40 CFR Part 133). Water quality-based effluent limitations are developed and incorporated into NPDES discharge permits to ensure that state water quality standards are met regardless of the decision made with respect to technology and economics in establishing technology-based limits. In particular, Section 301(b)(1)(C) of the CWA requires achievement of "any more stringent limitation, including those necessary to meet water quality standards…established pursuant to any state law or regulation…" See 40 CFR §§ 122.4(d) and 122.44(d)(1) (providing that a permit must contain effluent limits as necessary to protect State water quality standards, "including State narrative criteria for water quality") (emphasis added) and 40 CFR § 122(45)(d)(5) (providing in part that a permit incorporate any more stringent limits required by Section 301(b)(1)(C) of the CWA). Under Section 301(b)(1) of the CWA, POTWs must have achieved effluent limitations based upon secondary treatment by July 1, 1977. Since all statutory deadlines for meeting technology-based effluent limitations established pursuant to the CWA have expired, the deadline for compliance with technology-based effluent limits for a POTW is the date of permit issuance (40 CFR § 125.3(a)). Extended compliance deadlines cannot be authorized by a NPDES permit if statutory deadlines have passed.

The CWA requires that states develop water quality standards for all water bodies within the state (see CWA § 303). Water quality standards consist of three elements: (1) one or more designated use for each waterbody or waterbody segment in the state; (2) water quality criteria consisting of numerical concentration levels and/or narrative statements specifying the amounts of various pollutants that may be present in each waterbody without impairing the designated use(s) of that waterbody; and (3) an antidegradation provision focused on protecting high quality

waters and protecting and maintaining the level of water quality necessary to protect existing uses (CWA § 303(c)(2)(a) and 40 CFR § 131.12). The limits and conditions contained within the draft permit reflect the goal of the CWA and EPA to achieve and then to maintain water quality standards within the receiving water. The applicable state water quality standards can be found in the New Hampshire Surface Water Quality Regulations, Chapter Env-Wq 1700 et seq. See generally, Title 50, Water Management and Protection, Chapter 485A, Water Pollution and Waste Disposal, Section 485-A. The New Hampshire Surface Water Quality Regulations are hereinafter referred to as the "NH Standards".

Receiving stream requirements are established according to numerical and narrative standards adopted under state law for each stream classification. When using chemical-specific numeric criteria from a state's water quality standards to develop permit limits, both the acute and chronic aquatic life criteria are used and expressed in terms of maximum allowable instream pollutant concentrations. Acute and chronic aquatic life criteria are generally implemented through maximum daily limits and average monthly limits, respectively. When a state has not established a numeric water quality criterion for a specific pollutant that is present in the effluent in a concentration that causes or has the reasonable potential to cause or contributes to a violation of a narrative criterion within a water quality standard, the permitting authority must establish limits in one or more of the following ways: (1) based on a calculated numeric criterion for the pollutant which the permitting authority demonstrates will attain and maintain applicable narrative water quality criteria and fully protect the designated uses; (2) on a case-by-case basis using water quality criteria published under CWA § 304(a), supplemented as necessary by other relevant information; or (3) in certain circumstances, based on an indicator parameter (40 CFR § 122.44(d)(1)(vi)(A-C)).

The federal regulations governing EPA's NPDES program are generally found at 40 CFR Parts 122, 124, and 136.

B. Development of Water Quality-based Effluent Limitations

Pursuant to 40 CFR § 122.44(d)(1), NPDES permits must contain any requirements in addition to technology-based limits necessary to achieve water quality standards established under Section 303 of the CWA. In addition, limitations "must control any pollutant or pollutant parameter (conventional, non-conventional, or toxic) 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 water quality standard, including State narrative criteria for water quality" (40 CFR § 122.44(d)(1)(i)). An excursion occurs if the actual or projected instream concentration exceeds the applicable criterion.

1. Reasonable Potential

In determining whether or not a discharge causes, has the reasonable potential to cause, or contributes to an excursion above a narrative or numeric criterion within a state water quality standard, EPA considers: (1) existing controls on point and non-point sources of pollution; (2) the variability of the pollutant or pollutant parameter in the effluent; (3) the sensitivity of the

species to toxicity testing; (4) where appropriate, the dilution of the effluent in the receiving water; and (5) the statistical approach outlined in the *Technical Support Document for Water Quality-based Toxics Control*, Section 3 (USEPA, March 1991 [EPA/505/2-90-001])(see also 40 CFR § 122.44(d)(1)(ii)). In accordance with New Hampshire's Water Quality Standards (RSA 485-A:8 VI, Env-Wq 1705.02), the available dilution for rivers and streams is based on a known or estimated value of the lowest average flow which occurs for seven (7) consecutive days with a recurrence interval of once in ten (10) years (7Q10 flow) for aquatic life and human health criteria for non-carcinogens, or the long-term harmonic mean flow for human health (for carcinogens only) in the receiving water at the point just upstream of the outfall. Furthermore, ten percent of the receiving water's assimilative capacity is held in reserve for future needs in accordance with New Hampshire's Surface Water Quality Regulations (Env-Wq 1705.01).

C. Antibacksliding

Section 402(o) of the CWA generally provides that the effluent limitations of a renewed, reissued, or modified permit must be at least as stringent as the comparable effluent limitations in the previous permit. EPA has also promulgated anti-backsliding regulations, which are found at 40 CFR § 122.44(l). Unless applicable anti-backsliding requirements are met, the limits and conditions in the reissued permit must be at least as stringent as those in the previous permit. The limitations and conditions contained within the draft permit satisfy the antibacksliding requirements of 40 CFR § 122.44(l).

D. State Certification

Section 401(a)(1) of the CWA requires all NPDES permit applicants to obtain a certification from the appropriate state agency stating that the permit will comply with all applicable federal effluent limitations and state water quality standards. See CWA § 401(a)(1). The regulatory provisions pertaining to state certification provide that EPA may not issue a permit until a certification is granted or waived by the state in which the discharge originates (40 CFR § 124.53(a)). The regulations further provide that, "when certification is required…no final permit shall be issued…unless the final permit incorporated the requirements specified in the certification under § 124.53(e)" (40 CFR § 124.55(a)(2)).

VI. DESCRIPTION OF THE RECEIVING WATER

CSO outfalls #006-009 discharge into the Nashua River, which flows into the Merrimack River, with CSO outfall #008 being located the farthest upstream from the confluence of the Nashua and Merrimack Rivers. The Nashua WWTF (outfall 001) and CSOs #002-005 discharge to the Merrimack River, downstream from the confluence with the Nashua River. The Merrimack River flows for approximately 2.9 miles from the farthest CSO outfall (CSO outfall #003) to the Massachusetts border. The locations and relations of the CSO outfalls and WWTF to one another are shown in Figure 4.

Both the Nashua and Merrimack Rivers are classified by the State of New Hampshire as Class B waters. Class B waters shall be of the second highest quality and shall have no objectionable

physical characteristics, and shall contain a dissolved oxygen content of at least 75 percent saturation (see RSA 485-A:8). The following designated uses apply to Class B waters: the protection and propagation of aquatic life and wildlife, for swimming and other recreational purposes; and, after treatment, for water supplies (RSA 485-A:8).

Sections 305(b) and 303(d) of the CWA require that States complete a water quality inventory and develop a list of impaired waters. Specifically, Section 303(d) of the 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 a Total Maximum Daily Load (TMDL) for each pollutant that is prohibiting a designated use(s) from being attained. The results of the 305(b) assessments are used in the development of the State of New Hampshire's 303(d) lists, which are published every two years and identify the water bodies which are not meeting (or are not expected to meet) water quality standards, identify the designated use(s) which is impaired and also the pollutant(s) causing the impairment(s).

The segment of the Merrimack River into which the Nashua WWTF and the CSOs discharge (Assessment Unit ID: NHRIV700061206-24) is identified in the *State of New Hampshire Final 2010 Section 303(d) Surface Water Quality List* (NHDES 2010) as not meeting the following designated uses (i.e., the uses are impaired and require the development of a TMDL for the identified causes of the impairment(s)): (1) aquatic life use for aluminum and pH; (2) primary contact recreation use for chlorophyll-a and *Escherichia coli* (*E. coli*); and (4) secondary contact recreation use for *E. coli*.

The segments of the Nashua River into which CSOs # 007 and #008 discharge (Assessment Unit ID: NHRIV700040402-08), and CSOs # 006 and #009 discharge (Assessment Unit ID: NHRIV700040402-09), as well and the intervening segment (Assessment Unit ID: NHIMP700040402-05) are not meeting the following designated uses, as identified in the *State of New Hampshire Final 2010 Section 303(d) Surface Water Quality List* (NHDES 2010), as follows: (1) primary contact recreation use for *E. coli* and (2) secondary contact recreation use for *E. coli (*segment NHRIV700040402-08 only).

CSOs are listed as the source of the pollutant causing impairment of the primary contact designated use in the segments of the Merrimack and Nashua Rivers affected by the CSOs. A TMDL for the Merrimack and Nashua Rivers for *E. coli* has been completed (2010) and the requirements in the draft permit are consistent with the TMDL. TMDLs for the Merrimack River are scheduled to be completed as follows: aluminum-2019, pH-2016 and chlorophyll-a- 2019 (*See State of New Hampshire Final 2010 Section 303(d) Surface Water Quality List* (NHDES 2010)).

With respect to the pollutants identified as causing or contributing to impairments of designated uses for which a TMDL has yet to be developed, EPA is required to use available information to establish water quality-based limits when issuing NPDES permits to facilities which discharge to impaired waters. See generally 40 CFR §122.44 (d).

The Nashua WWTF (outfall 001) and CSOs #002-005 discharge to the last segment of the Merrimack River in New Hampshire. Therefore, the impacts of the discharges from the Nashua's WWTF and CSOs on the quality of the Merrimack River in Massachusetts were also considered during the development of the draft permit. The first segment of the Merrimack River in Massachusetts (segment 84A-01) is listed as impaired due to metals and pathogens in the final *Massachusetts Year 2010 Integrated List of Waters* (MassDEP 2010), which includes the 303(d) listing of waters not meeting or expected to meet water quality standards.

Based on the most current information available, EPA believes that the limitations and conditions contained in the draft permit represent the minimum level of control necessary to ensure protection of all designated uses in the receiving waters.

VII. PERMIT BASIS AND EXPLANATION OF EFFLUENT LIMITATION DERIVATION

A. Flow

The annual (long-term) average design flow of the Nashua WWTF (16 MGD) was used to determine the available dilution, which was used to calculate effluent limitations for total residual chlorine and whole effluent toxicity as well as the mass-based limits for BOD_5 and TSS, in accordance with the requirements found at 40 CFR § 122.45(b).

The draft permit maintains the requirement in the 2000 permit for the permittee to submit to EPA and NHDES a projection of loadings, a program for maintaining satisfactory treatment levels, and plans for facility improvements whenever the effluent flow exceeds 80 percent of the facility's design flow capacity (12.8 MGD) for three consecutive months. The draft permit also maintains the average monthly and maximum daily flow reporting requirements in the 2000 permit.

B. Conventional Pollutants

1. Five-Day Biochemical Oxygen Demand (BOD5) and Total Suspended Solids (TSS)

The average monthly and average weekly effluent limitations for BOD_5 and TSS of 30 mg/l and 45 mg/l, respectively in the draft permit are based on the secondary treatment regulations for POTWs found at 40 CFR § 133.102(a) and (b). The 50 mg/l maximum daily limitations for BOD_5 and TSS in the existing permit, which were based on state certification requirements, have been maintained in the draft permit. The draft permit also contains average monthly (4006 lbs/day), average weekly (6008 lbs/day), and maximum daily (6676 lbs/day) mass-based limits for BOD_5 and TSS, in accordance with the requirements of 40 CFR § 122.45(f). See Attachment C for the equations used to calculate these mass-based limits**.**

The draft permit also carries forth the requirement in the 2000 permit for obtaining an 85% reduction of BOD_5 and TSS, in accordance with the requirements of 40 CFR § 133.102(a)(4)(iii).

The provisions of 40 CFR § 133.103(a) allows for the application of an exception to the 85% BOD_5 and TSS removal requirement in the event that a treatment works receiving flow from combined sewers is not able to achieve this level of BOD_5 and TSS reduction during wet weather events. Achieving such reductions is difficult during such periods when influent flows are diluted and the secondary treatment capacity at the plant is exceeded.

Therefore, an exception to the 85% BOD_5 and TSS removal requirement during wet weather events has been incorporated into the draft permit in accordance with 40 CFR § 133.103(a). Specifically, the draft permit requires that the 30-day average percent removal of BOD_5 and TSS be no less than 85% during periods of dry weather, which is defined as any calendar day on which there is less than 0.1 inch of rainfall and no snow melt.

The limitations and requirements pertaining to BOD_5 and TSS in the draft permit are the same as those in the existing permit and are therefore consistent with the antibacksliding requirements of 40 CFR § 122.44(l).

2. pH

The limitation for pH in the draft permit is based on the State's water quality standards for Class B waters established at RSA 485-A:8 II, requiring that "The pH range for said (Class B) waters shall be 6.5-8.0 except when due to natural causes" and is required by the state as a condition for obtaining state certification. The pH limitation in the draft permit is the same as that in the existing permit in keeping with the antibacksliding requirements of 40 CFR § 122.44(l) and is at least as stringent as the requirements of 40 CFR § 133.102(c).

The special condition in the 2000 permit, which allows for a change in the pH limitation to outside of the range of 6.5 to 8.0 Standard Units (SU) upon meeting certain conditions, has not been included in the draft permit because of the listing of the aquatic life designated use for the segment of the Merrimack River in the vicinity of the discharge as impaired due to pH in the *State of New Hampshire Final 2010 Section 303(d) Surface Water Quality List* (NHDES 2010)).

3. *Escherichia coli (E. coli)*

The limitations for *E. coli* at outfall 001 in the draft permit are an average monthly limit of 126 colonies per 100 milliliters (ml) and a maximum daily limit of 406 colonies per 100 ml. These limitations are based on requirements in the State's Statutes for Class B waters (non-designated beach areas) found at RSA 485-A:8 II, and Env-Wq 1703.06 (b), which requires that bacteria criteria shall be applied at the end of a wastewater treatment facility's discharge pipe.

The average monthly value shall be reported as the geometric mean of the sampling results for the reporting month. The draft permit requires the concurrent collection of *E. coli* and total residual chlorine samples. Compliance with the average monthly value shall be determined from the reported geometric mean. These limitations are identical to those in the existing permit in keeping with the anti-backsliding requirements of 40 CFR § 122.44(l).

C. Non-conventional and Toxic Pollutants

Water quality-based effluent limitations for specific toxic pollutants are based on numeric chemical-specific criteria derived from extensive scientific studies. EPA has summarized and published toxicity criteria for specific toxic pollutants in the *Quality Criteria for Water* (USEPA 1986 [EPA440/5-86-001]), commonly referred to as the "Gold Book". The Gold Book includes acute aquatic life criteria (to protect against the effects of short-term exposure, such as death) and chronic aquatic life criteria (to protect against the effects of long-term exposure, such as impaired growth). The State of New Hampshire adopted the Gold Book criteria (with certain exceptions) into the state's surface water quality regulations on December 3, 1999 (see Env-Wq 1703.21). EPA uses the pollutant-specific criteria contained within the Gold Book (and adopted by the State of New Hampshire) along with the available dilution in the receiving water and other relevant information in the development of pollutant-specific water quality-based effluent limitations.

7Q10 Flow and Available Dilution

Water quality-based effluent limitations are established using a calculated dilution factor that represents the available dilution in the receiving water at the point of discharge. The dilution factor is derived from the design flow of the facility and the annual seven consecutive day mean low flow of the receiving water with a recurrence interval of once in every ten years ("7Q10 flow") (see Env-Wq 1702.44). In calculating water quality-based effluent limitations, the available dilution is reduced by 10% to account for the State's assimilative capacity reserve rule (see Env-Wq 1705.01).

The dilution factor used in the development of the 2000 permit was 28.0, which was based on an estimate of the 7Q10 flow at outfall 001 of 745.8 cubic feet per second (cfs) and the design flow of the facility, 16 mgd (24.8 cfs). The 7Q10 flow value was determined from flow measurements in the Merrimack River and estimates of the drainage basin area above the outfall.

For this draft permit, the dilution factor was recalculated to be 28.5, based on a revised estimate of the 7Q10 flow at outfall 001 of 784.1 cfs.

The revised 7Q10 value at the point of discharge resulted from recalculated 7Q10s for the upstream U.S Geological Survey (USGS) gage at Goffs Falls, Manchester, NH, and for several downstream USGS gages using more recent periods of record. Also, rather than using the ratio of the drainage areas to estimate the 7Q10 for the intervening drainage area between the USGS gages and the outfall, the new 7Q10 estimate uses the ratio of the flows calculated using the empirical equation for estimating flows in ungaged streams developed by Dr. Lawrence S. Dingman of UNH (Dingman Ratio Proration Method or DRPM). The calculations supporting the revised 7Q10 flow estimate and the derivation of dilution factor are shown in Attachment B.

1. Total Residual Chlorine (TRC)

The New Hampshire water quality standards include freshwater chronic and acute aquatic-life criteria for chlorine which are established as 0.011 mg/l and 0.019 mg/l, respectively.

Chlorine and chlorine compounds, such as "organochlorines", produced by the chlorination of wastewater can be extremely toxic to aquatic life. Section 101(a)(3) of the Act, and the New Hampshire standards at Env-Wq 1703.21(a), prohibit the discharge of toxic pollutants in toxic amounts. Therefore, to reduce the potential for the formation of chlorinated compounds during the wastewater disinfection process and to be protective of the States' narrative standards, EPA-Region I has, historically, established a maximum Total Residual Chlorine (TRC) limitation of 1.0 mg/l for both the average monthly and the maximum daily limitations. These limitations may be more stringent, after considering the available dilution, than the limits determined using the State's numeric water quality criteria.

The average monthly and maximum daily limitations for total residual chlorine (TRC) in the 2000 permit (0.308 mg/l and 0.532 mg/l, respectively) were based upon the acute and chronic aquatic life criteria specified in the state's water quality standards and a dilution factor of 28.

The average monthly and maximum daily limits for TRC proposed in the draft permit are 0.31 mg/l and 0.54 mg/l, respectively. These limits are based on the revised dilution factor of 28.5, which reflects a 10% reduction in the available dilution to account for the State's assimilative capacity reserve rule (see Env-Wq 1705.01), and the acute and chronic aquatic life criteria for TRC specified in the State's water quality standards (19 µg/l and 11 µg/l, respectively [see Env-Wq. 1703.21, Table 1703.1]). These limits were calculated by multiplying the dilution factor by the criteria, as shown below.

Acute TRC Limit = 19 µg/l x 28.5 = 540 µg/l (0.54 mg/l)
Chronic TRC Limit = 11 µg/l x 28.5 = 314 µg/l (0.31 mg/l)

The draft permit requires the concurrent collection of total residual chlorine samples with *E. coli* samples.

2. Metals

The release of metals into surface waters from anthropogenic activities such as discharges from municipal waste water treatment facilities can result in their accumulation to levels that are highly toxic to aquatic life. Therefore, it is imperative to evaluate the downstream effects of discharges of metals from POTWs. The existing permit requires bimonthly effluent monitoring for copper. In addition, the existing permit requires concurrent analyses for aluminum, copper, lead, zinc, nickel, cadmium, and chromium on samples of the receiving water collected upstream from the discharge for use as dilution water in whole effluent toxicity (WET) tests, as well as on samples of the effluent, in conjunction with quarterly WET tests. The results of metals analyses conducted on samples of the effluent and upstream receiving water from 2007-2012 are shown in Attachment D.

The risk of toxicity associated with copper, lead, zinc, nickel, cadmium and chromium in freshwater systems are hardness-dependent, with an increase in water hardness resulting in a decrease in the toxicity of the metal. The water quality criteria for these metals accounts for this relationship and are specific to the hardness of the water in which the criteria are being applied (see Env-Wq 1703.21, Table 1703.1).

A downstream hardness value of 16 mg/l as $CaCO_3$ was determined by applying a median upstream hardness value of 14 mg/l as $CaCO_3$ and a median effluent hardness value of 65 mg/l as CaCO3, as reported in WET tests from 2007-2012 (Attachment D); the design flow of the facility and the receiving water 7Q10 flow to a mass balance equation. Since this downstream hardness is below 25 mg/l, a default value of 25 mg/l was used to determine the total recoverable metals criteria, in accordance with the New Hampshire Water Quality Standards (see Env-Wq 1703.22(f)). The factors used to determine the acute and chronic total recoverable criteria for each metal are presented in Table 1.

Table 1 Freshwater Metals Criteria (Total Recoverable)

Metal	Parameter				Total Recoverable Criteria	
	ma*	ba**	mc*	bc**	Acute (CMC) (ug/l)	Chronic (CCC) (ug/l)
Aluminum	–	–	–	–	750	87
Cadmium	1.1280	-3.6867	0.7852	-2.7150	0.95	0.83
Chromium III	0.819	3.7256	0.819	0.6848	579.32	27.69
Copper	0.9422	-1.7000	0.8545	-1.702	3.79	2.85
Lead	1.273	-1.46	1.273	-4.705	13.98	0.54
Nickel	0.846	2.255	0.846	0.0584	145.21	16.14
Zinc	0.8473	0.884	0.8473	0.884	37.02	37.02

*Acute Criteria (CMC) = exp{ma*ln(hardness)+ba}
**Chronic Criteria (CCC) = exp{mc*ln(hardness)+bc}

Determining Reasonable Potential

The effluent was characterized using a statistical analysis of effluent metals data, as reported in monthly discharge monitoring reports and in WET tests from 2007-2012 (see Attachment D), to establish the 95th percentile of the lognormal distribution of the effluent data, which represents the maximum effluent concentration that can be expected to occur 95 percent of the time (i.e., the upper bound of the lognormal distribution of the data). These values are presented in Table 2. The statistical approach to characterizing the effluent is described in Attachment G.

As indicated in Table 2, the upper bound effluent concentrations of nickel, chromium, and aluminum are below the relevant criteria, even without accounting for any dilution provided by the receiving water (100% effluent), suggesting that reasonable potential does not exist for the discharge of these metals to cause or contribute to excursions above the criteria, and no further analysis is necessary. Although the segment of the Merrimack River into which outfall 001 discharges is not meeting the aquatic life designated use for aluminum (*State of New Hampshire Final 2010 Section 303(d) Surface Water Quality List* (NHDES 2010)), EPA has determined that the discharge does not present reasonable potential to cause or contribute to this impairment, as the upper bound concentration of aluminum detected in samples of pure effluent from 2007-2012 is significantly less than both the chronic and acute criteria (see Table 2 and Appendix D).

In order to determine whether the effluent presents reasonable potential to cause or contribute to an exceedance above the in-stream water quality criteria for lead, copper, cadmium and zinc, the following mass balance equation, which accounts for ambient metals concentrations as reported in WET test reports submitted from 2007-2012 (see Appendix D), was used to project instream metal concentrations downstream from the discharge under 7Q10 flow conditions.

$$Q_d C_d + Q_S C_S = Q_r C_r$$

rewritten as:

$$C_r = (Q_d C_d + Q_s C_s)/Q_r$$

where:

C_r = resultant downstream metals concentration in ug/L
Q_d = effluent flow (design flow = 16 mgd = 24.75 cfs)
C_d = effluent metals concentration in ug/L (95th percentile)
Q_S = upstream 7Q10 flow (759.4 cfs)
C_S = median instream metals concentration, upstream from the discharge in ug/L
Q_r = 7Q10 flow just downstream from the discharge (784.1 cfs)

Reasonable potential is then determined by comparing this resultant in-stream concentration (for both acute and chronic conditions) with the criteria for each metal multiplied by the factor 0.9 to reserve 10% of the assimilative capacity of the receiving water in accordance with the requirements of Env-Wq 1705.01. If there is reasonable potential (the projected downstream concentration is greater than either an acute or chronic criterion multiplied by 0.9), the appropriate limit is then calculated by rearranging the above mass balance to solve for the effluent concentration (C_d) using the criterion multiplied by 0.9 as the resultant in-stream concentration (C_r). The results of these analyses are provided Table 2. An example reasonable potential determination is provided in Attachment H.

Table 2 Mass Balance Equations for Determining Reasonable Potential and Effluent Limitations

Metal	Qd	Cd[1] (95th Percentile)	Qs	Cs[2] (Median)	Qr = Qs + Qd	Cr[3] = (QdCd+QsCs) /Qr	Criteria * 0.9		Reasonable Potential	Limit[4] = (QrCr*0.9-QsCs)/Qd	
	cfs	ug/l	cfs	ug/l	cfs	ug/l	Acute (ug/l)	Chronic (ug/l)	Cr > Criteria	Acute (ug/l)	Chronic (ug/l)
Aluminum	24.75	52.51	759.4	81	784.1	NA	NA	NA	NA	N/A	NA
Cadmium		0.90		0		0.029	0.851	0.746	N	N/A	N/A
Chromium III		3.156		0		NA	NA	NA	NA	N/A	N/A
Copper		32.42		2		2.96	3.41	2.57	Y (chronic)	N/A	20.0
Lead		2.59		0.500		0.566	12.68	0.490	Y (chronic)	N/A	0.54[5]
Nickel		8.76		0		NA	NA	NA	NA	N/A	N/A
Zinc		125.54		9		12.68	33.31	33.31	N	N/A	N/A

[1]Values calculated from the results of metals analyses conducted on samples of the effluent in conjunction with whole effluent toxicity tests from 2007-2012 as well as the results of bi-monthly copper monitoring (see Attachment D).
[2]Median upstream data from analyses conducted on samples of the Merrimack River collected just upstream from the discharge for use as dilution water in Whole Effluent Toxicity (WET) tests from 2007-2012. (see Attachment D).
[3]Cr = instream metals concentration, downstream from the discharge
[4]Cr = Criteria * 0.9
[5]Establishing a limit equal to the criterion would be appropriate because the median upstream concentration exceeds 90% of this value.

As shown in the table above, reasonable potential exists for the discharge to cause or contribute to excursions above the chronic criteria for total recoverable copper and total recoverable lead, and limits for these metals are proposed in the draft permit.

However, there is no reasonable potential (under either acute or chronic conditions) that the discharge of aluminum, cadmium, chromium, nickel, or zinc will cause or contribute to an exceedance of applicable water quality criteria, and limitations for these metals are not included in the draft permit. The draft permit maintains the requirement in the existing permit for the monitoring for all of the aforementioned metals with the exception of chromium, as the current WET test protocol no longer requires its analysis. The results of copper and lead analyses conducted in conjunction with WET tests may be used to satisfy one of the twice per month monitoring requirements for copper and lead for the particular month in which the sampling is conducted.

3. Phosphorus

Phosphorus is both an essential and limiting nutrient in freshwater systems which, when present in excess quantities, stimulate plant productivity within the system. The excessive growth of aquatic plants and algae within freshwater systems negatively impacts water quality and can interfere with the attainment of designated uses by (1) increasing the oxygen demand within the water body (to support an increase in both plant respiration and the biological breakdown of dead organic (plant) matter); (2) causing an unpleasant appearance and odor; (3) interfering with navigation and recreation; (4) reducing water clarity; and (5) reducing the quality and availability of suitable habitat for aquatic life. Cultural (or accelerated) eutrophication is the term used to describe excessive plant growth in a water body in response to excess nutrients entering the system as a result of human activities. Discharges from municipal and industrial wastewater treatment plants, agricultural runoff, and stormwater are examples of human-derived (i.e., anthropogenic) sources of nutrients in surface waters.

The New Hampshire Surface Water Quality Regulations do not contain numeric criteria for phosphorus and instead include a narrative criterion requiring that the phosphorus contained in an effluent shall not impair a water body's designated use. Specifically, Env-Wq 1703.14(b) states that "Class B waters shall contain no phosphorus or nitrogen in such concentrations that would impair any existing or designated uses, unless naturally occurring". Env-Wq 1703.14(c) further states that "Existing discharges containing either phosphorus or nitrogen which encourage cultural eutrophication shall be treated to remove phosphorus or nitrogen to ensure attainment and maintenance of water quality standards". Cultural eutrophication is defined at Env-Wq 1702.15 as "….the human-induced addition of wastes containing nutrients to surface waters which results in excessive plant growth and/or a decrease in dissolved oxygen".

In the absence of numeric criteria for phosphorus, EPA uses nationally-recommended criteria and other technical guidance to develop effluent limitations for the discharge of phosphorus. EPA has published national guidance documents which contain recommended instream criteria for total phosphorus. EPA's 1986 *Quality Criteria for Water* (the "Gold Book") (USEPA 1986 [EPA 440/5-86-001]) 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 into lakes or impoundments, and 0.025 mg/l within the lake or reservoir.

EPA released recommended ecoregional nutrient criteria in December 2000, which were established as part of an effort to reduce problems associated with excess nutrients in water bodies in specific areas of the country. The published criteria represent conditions in waters within ecoregions that are minimally impacted by human activities (reference conditions), and thus free from the effects of cultural eutrophication. Nashua is located within Ecoregion VIII, Nutrient Poor Largely Glaciated Upper Midwest and Northeast. The recommended criteria for this ecoregion is a total phosphorus concentration of 10 µg/l (0.01 mg/l) and a chlorophyll *a* concentration of 0.63 µg/l (0.00063 mg/l) (*Ambient Water Quality Criteria Recommendations, Information Supporting the Development of State and Tribal Nutrient Criteria, Rivers and Streams in Ecoregion VIII* (USEPA December 2001 [EPA 822-B-01-015]).

In conjunction with the New England States, Mitchell, Liebman, Ramseyer, and Card developed potential nutrient criteria for rivers and streams in New England (in draft 2004). Using several river examples representative of typical conditions for New England streams and rivers, they investigated several approaches for the development of river and stream nutrient criteria that would be dually protective of designated uses in both upstream reaches and downstream impoundments. Based on this investigation, an instream total phosphorus concentration of 0.020 mg/l – 0.022 mg/l was identified as being protective of designated uses for New England rivers and streams. The development of these New England-wide total phosphorus criteria was based on more recent data than that used in the development of the Ecoregional nutrient criteria, and has been subject to quality assurance measures. Additionally, the development of the New England-wide criteria included the use of reference conditions presumed to be protective of designated uses.

EPA has decided to apply the Gold Book criterion (0.100 mg/l) when developing effluent limitations for NPDES permits because it was developed from an effects-based approach rather than the reference conditions-based approach used in the derivation of the ecoregional criteria. The effects-based approach is preferred in this case because it is more directly associated with an impairment of a designated use (i.e., recreation, aquatic life, etc.). The effects-based approach provides a threshold value above which adverse effects (i.e., water quality impairments) are likely to occur. It applies empirical observations of a causal variable (i.e., phosphorus) and a response variable (i.e., algal growth) associated with impairment of designated uses. Reference-based values are statistically derived from a comparison within a population of rivers in the same ecoregional class. They are a quantitative set of river characteristics (physical, chemical, and biological) that represent minimally impacted conditions.

While phosphorus is a causal indicator of eutrophication (its presence in excess quantities in freshwater systems results in accelerated macrophyte growth), chlorophyll *a* and dissolved oxygen are response indicators whose quantities may be correlated with the amount of phytoplankton (suspended plant biomass) present within the system (USEPA 2000, Chapra 1997, Thomann & Mueller 1987). Elevated concentrations of chlorophyll *a*, excessive algal and macrophyte growth, and low levels of dissolved oxygen are all effects of nutrient enrichment. The relationship between these factors and high instream total phosphorus concentrations is well documented in scientific literature, including guidance developed by EPA to address nutrient over-enrichment (*Nutrient Criteria Technical Guidance Manual – Rivers and Streams* (USEPA July 2000 [EPA-822-B-00-002])). The values used to correlate mean chlorophyll *a* concentrations with the trophic status of freshwater systems have been summarized from the scientific literature and are presented in Table 3.

As previously discussed, Chlorophyll *a* is identified as causing impairment of the primary contact recreation designated use in the segment of the Merrimack River into which the Nashua WWTF discharges in the *State of New Hampshire Final 2010 Section 303(d) Surface Water Quality List* (Assessment Unit ID: NHRIV700061206-24; see *State of New Hampshire Final 2010 Section 303(d) Surface Water Quality List* (NHDES 2010)). A TMDL for chlorophyll *a* for this segment

Table 3 Freshwater System Trophic Status Based on Mean Chlorophyll *a* Concentration[1]

Trophic Status	Wetzel (2001)	Ryding and Rast (1989)	Smith (1998)	Novotny and Olem (1994)
Eutrophic	> 10 µg/l	6.7-31 µg/l	----------	> 10 µg/l
Mesotrophic	2-15 µg/l	3-7.4 µg/l	3.5-9 µg/l	4-10 µg/l
Oligotrophic	0.3-3 µg/l	0.8-3.4 µg/l	----------	< 4 µg/l

1. Adapted from *Ambient Water Quality for Dissolved Oxygen, Water Clarity, and Chlorophyll a for Chesapeake Bay and its Tidal Tributaries* (USEPA 2003)

of the Merrimack River is scheduled to be completed by 2019 (*State of New Hampshire Final 2010 Section 303(d) Surface Water Quality List* (NHDES 2010)). In the absence of a TMDL, EPA is required to use available information to establish water quality-based limits when issuing NPDES permits to facilities which discharge to impaired waters. See generally 40 CFR §122.44(d). Although the New Hampshire water quality standards do not include numeric criteria for chlorophyll *a,* NHDES applies a threshold chlorophyll *a* concentration of 15 µg/l when determining whether to list a fresh water body as impaired for the primary contact recreation designated use (*State of New Hampshire 2010 Section 305(b) and 303(d) Consolidated Assessment and Listing Methodology (CALM)*, (NHDES 2010). It should be noted that the 15 µg/l threshold value is only a guidance value used for determining support/non-support of recreational uses, not for determining support/non-support of aquatic life uses.

Although the Merrimack River is not listed as impaired due to phosphorus at the segment beginning at the Massachusetts border, total phosphorus is identified as causing impairment of water quality in the next downstream segment (segment MA84A-02) in Massachusetts. This segment of the Merrimack River is impounded by the Pawtucket Dam, approximately 9 miles downstream from the discharge. The various physical, chemical, and biological processes occurring within or at an impoundment affects the flux of nutrients in the water column. Phosphorus that has sequestered by aquatic plants and/or in sediments may be released into and/or re-suspended in the water column, rendering it available for biological uptake either within the impoundment or in downstream waters (see *Water Quality Criteria for Water*, pg. 241 (USEPA 1986) and *Nutrient Criteria Technical Guidance Manual – Rivers and Streams*, Chapt. 1, pg. 3 (USEPA 2000 [EPA822-B-00-002]). Therefore, phosphorus loadings to the receiving water from upstream sources, including the Nashua WWTF, might negatively impact water quality in the downstream segments as a function of the dynamics of the impoundment.

The results of phosphorus and chlorophyll *a* analyses conducted on samples collected within the segment of the receiving water into which the Nashua WWTF discharges (both upstream and downstream from the discharge) between 2005-2011 by NHDES as part of their Ambient River Monitoring Program (ARMP), and in 2010 by the Unites States Army Corps of Engineers (USACE) as part of the *Upper Merrimack and Pemigewasset River Study* (U.S. Army Corps of

Engineers, January 2011 (prepared by CDM))[2], are summarized in Table 4. The results suggest that the ecoregional chlorophyll *a* criterion of 0.63 µg/l as well as threshold chlorophyll *a* value of 15 ug/l used by NHDES in listing surface waters as impaired for the primary contact recreation designated uses are being exceeded in the receiving water in the vicinity of the discharge. These results are also within the ranges identified in the literature as indicative of mesotrophic-eutrophic conditions (see Table 3). The data presented also indicate that the instream phosphorus concentrations downstream from the discharge exceeded the recommended target of 0.090 mg/l (the Gold Book Criterion of 0.100 mg/l multiplied by a factor of 0.9 to reserve 10% of the assimilative capacity of the receiving water in accordance with the New Hampshire Water Quality Standards found at Env-Wq 1705.02) on two occasions, and that the ecoregional criterion of 0.63 µg/l (0.00063 mg/l) was exceeded on all occasions.

While these sampling events were conducted during the months of the year in which the Merrimack River typically experiences lower flows. it should be noted that from 2005-2011, the flows recorded at the nearest United States Geological Survey (USGS) gaging station located upstream from the Nashua WWTF (USGS gaging station No. 01092000, Merrimack River near Goffs Falls, below Manchester) on the sampling dates for the data presented in Table 4, were on average five times the 7Q10 flow for that gage (638.7 cfs).

Table 4 Instream Chlorophyll *a* and Total Phosphorus Concentrations Upstream and Downstream From the Nashua WWTF

Station[1]	Date	Chlorophyll *a*[2] (µg/l)	Total Phosphorus (µg/l)
Upstream of Nashua WWTF			
03-MER	10/05/2007	0.2	110
02M-MER	07/27/2010	20.85	36
Min.		**0.2**	**36**
Max.		**20.85**	**110**
Avg.		**10.53**	**73**
Median		**10.53**	**73**

Station[1]	Date	Chlorophyll *a*[2] (µg/l)	Total Phosphorus (µg/l)
Downstream From Nashua WWTF			
01-MER	06/21/2007	9.539	48
01-MER	07/19/2007	3.966	63
01-MER	08/23/2007	9.629	91
01-MER	08/23/2007	10.29	90
01-MER	10/05/2007	1.977	12

[2] *Upper Merrimack and Pemigewasset River Study* by the U.S. Army Corps of Engineers, January 2011 (prepared by CDM) ftp://ftp.usace.army.mil/pub/nae/UMRB-REPORTJAN2011/UMPRS_Year1%20Data%20Report%20Appendix_Jan2011.pdf

01-MER	06/19/2008	11.433	64
01-MER	07/17/2008	13.395	67
01-MER	08/25/2008	3.439	37
01-MER	06/24/2009	2.164	51
01-MER	07/21/2009	2.7972	35
01-MER	06/22/2010	11.6329	57
01-MER	07/20/2010	22.54	40
02K-MER	07/27/2010	16.09	46
01X-MER	07/27/2010	19.26	55
01X-MER	07/27/2010	17.45	51
01-MER	08/17/2010	15.02	91
01-MER	06/21/2011	12.47	47
01-MER	07/19/2011	15.23	55
01-MER	08/23/2011	6.24	55
Min.		**1.98**	**12**
Max.		**22.54**	**91**
Avg.		**10.77**	**55.53**
Median		**11.43**	**55**

[1]NHDES Sampling Stations – 03-MER, 1.2 miles upstream of Nashua WWTF, Rt. 111 bridge, E. Hollis St., Nashua; and 01-MER, 5.7 miles downstream of Nashua WWTF, Rt. 113 bridge, Tyngsborough MA. ACOE Sampling Stations – 02M-MER, approximately 100 feet upstream of Nashua WWTF; 01X-MER and 02K-MER, approximately 500 feet and 8,250 ft downstream of Nashua WWTF, respectively.

The results of phosphorus analyses conducted on samples of the Nashua WWTF's effluent in conjunction with the USACE's *Upper Merrimack and Pemigewasset River Study* (U.S. Army Corps of Engineers, January 2011) were 2.10 mg/l (July 2010) and 2.16 mg/l (September 2010). The median of the upstream data and the maximum of the effluent data were factored into the equation shown below to project the instream phosphorus concentration that can be expected to occur downstream from the discharge under critical (7Q10) stream flow conditions.

$$Q_d C_d + Q_s C_s = Q_r C_r$$

Where:

C_r = resultant downstream phosphorus concentration (mg/l)
Q_d = effluent flow (design flow = 16 mgd = 24.75 cfs)
C_d= maximum effluent phosphorus concentration (2.16 mg/l)
Q_s = upstream 7Q10 flow (759.4 cfs)
C_s = median instream phosphorus concentration, upstream from the discharge (0.073 mg/l)
Q_r = 7Q10 flow just downstream from the discharge (784.1 cfs)

$$C_r = (Q_s C_s + Q_d C_d) / Q_r$$

C_r = [(759.4 cfs *0.073 mg/l) + (24.75 cfs * 2.55 mg/l)] / 784.1cfs = 0.139 mg/l

The projected downstream concentration of 0.139 mg/l is greater than the recommended target of 0.090 mg/l (the Gold Book Criterion of 0.100 mg/l multiplied by a factor of 0.9 to reserve

10% of the assimilative capacity of the receiving water in accordance with the New Hampshire Water Quality Standards found at Env-Wq 1705.02). This indicates that reasonable potential exists for the discharge of phosphorus from the Nashua WWTF to cause or contribute to violations of water quality standards in the downstream receiving water.

Given that reasonable potential exists for the discharge to cause or contribute excursions above the in stream phosphorus criterion as well as the impairment in this segment of the receiving water due to chlorophyll *a*, which is indicative of nutrient enrichment, the draft permit includes proposes a monthly average phosphorus effluent limitation of 0.600 mg/l, which was calculated as shown below.

$$C_d = (Q_r C_r - Q_s C_s)/Q_d$$

Where:

C_r = resultant downstream phosphorus concentration, equal to Gold Book criterion * 0.9 (0.090 mg/l)
Q_d = effluent flow (design flow = 16 mgd = 24.75 cfs)
C_d= maximum effluent phosphorus concentration (limit) (mg/l)
Q_s = upstream 7Q10 flow (759.4 cfs)
C_s = median instream phosphorus concentration, upstream from the discharge (0.073 mg/l)
Q_r = 7Q10 flow just downstream from the discharge (784.1 cfs)

C_d = [(784.1 cfs *0.090 mg/l) - (759.4 cfs * 0.073 mg/l)]/24.75 cfs = 0.600 mg/l

This is a seasonal limitation, which shall be in effect from April 1st – October 31st.

D. Whole Effluent Toxicity (WET)

EPA's *Technical Support Document for Water Quality Based Toxics Control* (USEPA 1991 [EPA/505/290-001]) recommends using an "integrated strategy" containing both pollutant (chemical) specific approaches and whole effluent (biological) toxicity approaches to control toxic pollutants in effluent discharges from entering the nation's waterways. EPA-Region I adopted this "integrated strategy" on July 1, 1991, for use in permit development and issuance. These approaches are designed to protect both aquatic life and human health. Pollutant-specific approaches such as those found in the Gold Book and state regulations address individual chemicals, whereas whole effluent toxicity (WET) approaches evaluate interactions between pollutants, thus rendering an "overall" or "aggregate" toxicity assessment of the effluent. Furthermore, WET measures the "additive" and/or "antagonistic" effects of individual chemical pollutants, which pollutant-specific approaches do not; thus, the need for both approaches. In addition, the presence of an unknown toxic pollutant can be discovered and addressed through this process.

Section 101(a)(3) of the CWA specifically prohibits the discharge of toxic pollutants in toxic amounts and New Hampshire law states that, "all waters shall be free from toxic substances or

chemical constituents in concentrations or combination that injure or are inimical to plants, animals, humans, or aquatic life; ....” (NH RSA 485-A:8, VI and the New Hampshire Code of Administrative Rules, Part Env-Wq 1703.21). The federal NPDES regulations found at 40 CFR §122.44(d)(1)(v) require whole effluent toxicity limits in a permit when reasonable potential exists for a discharge to cause or contribute to an excursion above state narrative criteria for toxicity. Furthermore, the results of toxicity tests may be used to demonstrate compliance with the “no toxics in toxics amounts” requirement found in both the CWA and in the State of New Hampshire’s regulations.

The current policy of EPA-Region I is to require toxicity testing in all NPDES permits issued to POTWs, with the type of whole effluent toxicity test(s) (acute and/or chronic) and the effluent limitation(s) required by the permit being based on the available dilution. NPDES permits issued to municipal (i.e., POTWs) discharges having a dilution factor between 20 and 100 typically include an acute (LC_{50}) WET limit. The acute limit (LC_{50}) is the percentage of effluent in a sample that must not cause more than a 50% mortality rate in the test organisms. Therefore, an acute (LC_{50}) limit of 100% means that a sample of 100% effluent (no dilution) shall be lethal to no more than 50% of the test organisms. The results of WET tests conducted from 2007-2012 are shown in Attachment D.

The draft permit includes an acute (LC_{50}) limit of 100 % which was based on the revised dilution factor of 28.5. This limit is the same as the WET limit in the 2000 permit, in keeping with the antibacksliding requirements of 40 CFR § 122.44(1).

The existing permit contains a provision which would allow for a reduction in the frequency of WET testing if specific conditions are met. In response to a request submitted by the City requesting such a reduction, WET test reports for tests conducted from December through March 2012 were evaluated. This evaluation found consistent compliance with the WET limits in the 2000 permit and that test acceptability criteria were consistently achieved. Therefore, the quarterly WET testing frequency that is required under the 2000 permit has been reduced to twice per year in the draft permit. Samples for use in WET tests shall be collected and the tests completed by the calendar quarters ending March 31st and September 30th, using the daphnid, *Ceriodaphnia dubia* (*C. dubia*) and the fathead minow, *Pimephales promelas* (*P. promelas*) as test organisms.

If the results of WET tests indicate that the discharge presents a risk of toxicity, the monitoring frequency and/or testing requirements may be increased. The permit may also be modified, or alternatively revoked and reissued, to incorporate additional toxicity testing requirements or chemical-specific limits. These actions will occur if the Regional Administrator determines that the New Hampshire water quality standards are not adequately enforced and users of the receiving water are not adequately protected during the remaining life of the permit. Results of development”; therefore, the permitting authority is allowed to use said information to modify an issued permit under the authority granted in 40 CFR §122.62(a)(2).

Additional Analyses

The draft permit maintains the requirement in the 2000 permit for the reporting of several selected parameters, including ammonia nitrogen (as N); hardness; alkalinity; and total recoverable aluminum, cadmium, copper, lead, nickel, and zinc, the results of which are determined through analyses conducted on samples of the 100 % effluent sample in conjunction with WET tests. The requirement in the existing permit for the analysis of chromium in addition to the aforementioned parameters has not been included in the draft permit, as it is no longer required in accordance with the current WET test protocol (see Attachment B, *Freshwater Acute Toxicity Test Procedure and Protocol,* USEPA February 2011). The results of additional analyses conducted in conjunction with WET tests from 2007-2012 are shown in Attachment D.

As discussed in Part VII.C.2. of this fact sheet, limitations for total recoverable aluminum, zinc, nickel, cadmium, and chromium are not included in the draft permit because the potential for the discharge of these metals from the Nashua WWTF to cause or contribute to an excursion above water quality criteria does not exist. However, the draft permit does include limitations and monitoring requirements for total recoverable copper and lead because potential does exist for the discharge of these metals to result in excursions above water quality criteria (also see Part VII.C.2. of this fact sheet). The results of the copper and lead analyses conducted in conjunction with WET tests may be used to satisfy one of the monthly sampling requirements specified in Part I.A. of the draft permit for the particular month in which sampling is conducted.

VIII. COMBINED SEWER OVERFLOWS

A. Nashua's Combined Sewer System

The City of Nashua owns and operates a wastewater collection system comprised of 75 percent sanitary sewers, which carry domestic, industrial, and commercial wastewater; and 25 percent combined sewers, which carry domestic, industrial, and commercial wastewater plus stormwater runoff. Under normal flow conditions, wastewater is conveyed to the POTW through three interceptor sewers: the North Merrimack Interceptor, the South Merrimack Interceptor and the Salmon Brook Interceptor. During certain wet weather events, discharges of untreated sanitary wastewater and stormwater occur from the City's eight combined sewer overflow outfalls (CSOs) listed in Attachment A into the Nashua and Merrimack Rivers, as shown in Figure 4. Discharges from CSOs have been identified as significant sources of pollution to the Nashua and Merrimack Rivers (*State of New Hampshire Final 2010 Section 303(d) Lists* (NHDES 2010)).

The current permit authorizes these eight CSOs subject to technology-based requirements (the nine minimum controls described in Part VIII.B. of this fact sheet) and to requirements that the discharges may not cause violations of water quality standards.

Since the issuance of the 2000 permit, the City entered into a Consent Decree with EPA and NHDES concerning sanitary sewer overflows (SSOs) and CSOs (Civil Action No. 05-376-PB, December 26, 2005; as amended on March 31, 2009; "Consent Decree"). The overall goal of the Consent Decree is to ultimately bring all wet weather discharges from CSOs into compliance with the requirements of the CWA and applicable state water quality standards. The main elements of the Consent Decree include: milestones for achieving levels of CSO control which

are expected to result in no discharges of untreated CSOs during a typical year[3], the development and implementation of a High Flow Management Plan (HFMP) for optimizing the treatment of wet-weather flows as well as interim limits and conditions for flows that bypass secondary treatment; the development and implementation of a program for the preventative maintenance of the collection system; and investigation into the sources and quantities of excessive infiltration and inflow (I/I) to the collection system. Ongoing wastewater-related construction projects in the City include the construction and implementation of the following controls that will reduce discharges of untreated wastewater through the CSOs in accordance with the Consent Decree: Partial separation of the combined system, increasing the capacity for the off line storage of combined flows, screening and disinfection, system optimization measures, and the Wet Weather Flow Treatment Facility.

CSO discharges have been significantly reduced since 2009, which appears to correlate with the implementation of the CSO controls described above, particularly the operation of the Wet Weather Flow Treatment Facility (see Attachment F).

B. Regulatory Framework

As noted above, Section 301(b)(1)(C) of the CWA of 1977 mandated compliance with water quality standards by July 1, 1977. Technology-based permit limits must be established for CSOs for best conventional pollutant control technology (BCT) and best available technology economically achievable (BAT) based on best professional judgment (BPJ) in accordance with Section 301(b) and Section 402(a) of the Water Quality Act Amendments of 1987 (WQA). Additionally, permit conditions must also achieve compliance with applicable state water quality standards.

The framework for compliance with Clean Water Act requirements for CSOs is set forth in EPA's National CSO Control Policy ("CSO Policy"), which was published in the Federal Register on April 19, 1994 (59 Fed. Reg. 18688) and sets forth the following objectives:

(1) To ensure that if the CSO discharges occur, they are only as a result of wet weather,

(2) To bring all wet weather CSO discharge points into compliance with the technology-based requirements of the Clean Water Act (CWA) and applicable federal and state water quality standards, and

(3) To minimize water quality, aquatic biota, and human health impacts from wet weather flows.

Among the elements established to achieve these objectives, the CSO Policy set forth the minimum BCT/BAT controls (i.e., technology-based limits) that represent the BPJ of the Agency

[3] The MOUSE hydrologic model was used in determining levels of CSO control that will ultimately achieve no discharges of untreated CSOs during the largest storm in a typical year. The specific levels of CSO control for each outfall are described in the Long Term Control Plan (LTCP) submitted by the City in 2003, as amended in 2004.

on a consistent, national basis. These are the Nine Minimum Controls ("NMCs") defined in the CSO Policy and set forth in Part I.B. of the draft permit: (1) proper operation and regular maintenance programs for the sewer system and the combined sewer overflows; (2) maximum use of the collection system for storage; (3) review and modification of the pretreatment programs to assure CSO impacts are minimized; (4) maximization of flow to the POTW for treatment; (5) prohibition of dry weather overflows; (6) control of solid and floatable materials in CSOs; (7) pollution prevention programs which focus on contaminant reduction activities; (8) public notification to ensure that the public receives adequate notification of CSO occurrences and CSO impacts; and (9) monitoring to effectively characterize CSO impacts and the efficacy of CSO controls.

The City of Nashua submitted documentation of its plan for implementing the Nine Minimum Controls, titled "High Flow Management Plan for the Nashua Wastewater Treatment Plant", in November 1999. This document has since undergone several revisions, with the most recent revision occurring in April 2010 to include updated bypass procedures which incorporate the use of the Wet Weather Flow Treatment Facility.

The CSO Policy also recommended that each combined sewer system develop and implement a long-term CSO control plan ("LTCP") that will ultimately result in compliance with the requirements of the CWA. The City submitted a draft LTCP to EPA in September of 1997, which was revised in January of 2003. A re-evaluation of the CSO controls selected for CSOs #005 and 006 in the 2003 LTCP was submitted to EPA in 2009. The controls identified in the re-evaluation study were incorporated into the 2005 Consent Decree through a modification in 2009.

Pursuant to the Clean Water Act and the CSO Policy, the untreated CSOs, Screening and Disinfection Facility ("SDF") and the Wet Weather Flow Treatment Facility ("WWFTF") are CSOs, meaning they are not subject to the secondary treatment standards that apply to the POTW treatment plant, but are required to achieve technology based requirements as defined in the CSO policy (the nine minimum controls) and limitations necessary to achieve water quality standards. Therefore, the draft permit includes applicable technology and water quality based limitations on discharges from the Wet Weather Flow Treatment Facility and from the Screening and Disinfection Facility. In addition, the draft permit includes monitoring requirements which will provide information necessary for evaluating the effectiveness of the WWFTF's and screening and disinfection facility's use as CSO control measures. Water quality-based limits apply to the combined effluent at outfall 001.

C. Permit Requirements

In accordance with the National CSO Policy, the draft permit contains the following conditions for the CSO discharges:

(i) Dry weather discharges from CSO outfalls are prohibited. Dry weather discharges must be immediately reported to EPA and NHDES.

(ii) During wet weather, the discharges must not cause any exceedance of water quality standards.

(iii) The permittee shall meet the technology-based Nine Minimum Controls described above and shall comply with the implementation levels as set forth in Part I.B. of the draft permit.

(iii) Discharges from CSO outfalls to non-tidal waters shall not exceed 1,000 colonies per 100 ml of *Escherichia coli* bacteria in accordance with the New Hampshire Surface Water Quality Regulations (See Env-Wq 1703.06(c)).

(iv) The permittee shall review its entire NMC program and revise it as necessary. Documentation of this review and any resultant revisions made to the NMC program shall be submitted to EPA and NHDES **within 6 months of the effective date of the permit.** An annual report shall be provided by March 1st of each year which describes any subsequent revisions made to the NMC program and shall also include monitoring results from CSO discharges, and the status of CSO abatement projects.

In addition to the requirements described above, the operation of the SDF and the WWFTF are subject to additional technology-based effluent limitations and monitoring requirements. These CSO treatment facilities represent enhancements of the Nine Minimum Controls, allowing for greater use of the collection system for storage (NMC #2) and return of the flow to the POTW for treatment (NMC #4), removal of floatable and solid materials (NMC #6), and reduction of pathogenic bacteria through disinfection (NMC #7).

EPA has determined additional BCT/BAT effluent limitations using its best professional judgment (BPJ) that are consistent with the design parameters for the WWFTF as provided to NHDES and EPA. In making this determination EPA considered the factors identified in 40 C.F.R § 125.3(d), including the cost and benefits of the facility (analyzed in connection with the development of the city's LTCP); the newness of the facility, and the fact that the facility was engineered to meet the design parameters. The proposed BPJ limits in the draft permit are an average monthly TSS concentration of 30 mg/l and a minimum of 80 % reduction. The draft permit also proposes monitoring requirements for flow and BOD_5 for the WWFTF.

Water quality-based limitations for *E. coli* and total residual chlorine apply to the discharge from the Screening and Disinfection Facility, and are based on state water quality standards (see Env-Wq 1703.6(c) and Env-Wq. 1703.21, Table 1703.1, respectively). The proposed *E. coli* limit in the draft permit is 1,000 colonies/100 mL. The proposed limits for total residual chlorine are an average monthly concentration of 0.055 mg/l and a maximum daily concentration of 0.095 mg/l, respectively. These limits were derived from the TRC criteria established in the New Hampshire Water Quality Standards at Env-Wq 1700.21, Table 1703.1, and the available dilution in the vicinity of the discharge. The derivations of the dilution factor and the proposed TRC limits are provided in Attachment I.

The draft permit requires the permittee to notify EPA and NHDES in writing 60 days prior to the commencement of operation of the SDF and to include the outfall discharge number in this notification. The authorization to discharge and associated conditions which apply to the SDF shall become effective on the first day of the calendar month immediately following the date on this notification. EPA recognizes that the permittee will not have established an operational history of the SDF upon its commencement of operation which would allow for the identification and implementation of any operational changes that may be necessary for optimizing the treatment process so as to meet the effluent limitations proposed in the draft permit. The New Hamphshire Water Quality Standards do not include a provision for the incorporation of schedules for achieving compliance with permit limits in NPDES permits. Such schedules may be implemented through an Administrative Consent Order ("ACO"), and the permittee may contact the EPA Region I Compliance Office to explore this option.

Effluent from the WWFTF flows to the chlorine contact chamber of the WWTF, where it is combined with secondary effluent (and primary effluent, in the case of a bypass of secondary treatment) before being discharged to the Merrimack River through outfall 001 (Figure 3). Therefore, the "combined effluent" must meet the water quality-based limitations which apply to outfall 001.

In order to ensure the collection of data which will allow for a determination to be made regarding whether the operation of the WWFTF facility is consistent with the objectives and assumptions underlying the LTCP, the draft permit also requires the reporting of flow (treated flow as well as flow drained back to the POTW for secondary treatment), BOD_5, TSS, and precipitation data. Similarly, reporting of flow, BOD_5, activation frequency and duration is proposed for the screening and disinfection facility.

This monitoring will provide information necessary for understanding the operation of the collection system during wet weather and will allow for determinations to be made with respect to the effectiveness of its operation consistent with the Nine Minimum Controls.

D. Reopener/Additional CSO Control Measures

The draft permit requires an annual certification no later than January 15th of each year that states that all discharges from combined sewer outfalls were recorded, and other appropriate records and reports maintained for the previous calendar year.

In accordance with Part II.A.4. of the draft permit, this permit may be modified or reissued upon the completion of a long-term CSO control plan. Such modification may include performance standards for the selected controls, a post construction water quality assessment program, monitoring for compliance with water quality standards, and a reopener clause to be used in the event that the selected CSO controls fail to meet water quality standards. Section 301(b)(1)(C) requires that a permit include limits that may be necessary to protect federal and state water quality standards.

IX. OPERATION AND MAINTENANCE

Regulations regarding proper operation and maintenance are found at 40 CFR § 122.41(e). These regulations require, "that the permittee shall at all times operate and maintain all facilities and systems of treatment and control (and related appurtenances) which are installed or used by the permittee to achieve compliance with the conditions of the permit." The treatment plant and the collection system are included in the definition "facilities and systems of treatment and control" and are therefore subject to proper operation and maintenance requirements.

Similarly, a permittee has a "duty to mitigate" pursuant to 40 CFR § 122.41(d), which requires the permittee to "take all reasonable steps to minimize or prevent any discharge in violation of the permit which has a reasonable likelihood of adversely affecting human health or the environment."

General requirements for proper operation and maintenance and mitigation have been included in Part II of the permit. Specific permit conditions have also been included in Parts I.B., I.C., and I.D. of the draft permit. These requirements include mapping of the wastewater collection system, reporting of unauthorized discharges including SSOs, maintaining an adequate maintenance staff, performing preventative maintenance, controlling inflow and infiltration to separate sewers to the extent necessary to prevent SSOs and I/I-related effluent violations at the wastewater treatment plant, and for maintaining alternate power where necessary.

X. INDUSTRIAL USERS

The permittee is required to administer a pretreatment program based on authority granted under 40 CFR Part 403 and Section 307 of the CWA. The permittee's pretreatment program received EPA approval on July 17, 1990 and, as a result, appropriate pretreatment program requirements were incorporated into the existing permit which were consistent with the approval and federal pretreatment regulations in effect when the permit was issued.

Periodically, the Federal Pretreatment Regulations in 40 CFR Part 403 are amended. Those amendments establish new requirements for implementation of the pretreatment program. Upon reissuance of this NPDES permit, the permittee is obligated to modify its pretreatment program to be consistent with the current Federal regulations. Those activities that the permittee must address include, but are not limited to, the following: (1) develop and enforce EPA approved specific effluent limits (technically-based local limits); (2) revise the local sewer use ordinance or regulation, as appropriate, to be consistent with Federal regulations; (3) develop an enforcement response plan; (4) implement a slug control evaluation program; (5) track significant noncompliance for industrial users; and (6) establish a definition of and track significant industrial users. These requirements are necessary to ensure continued compliance with the NPDES permit.

In addition to the requirements described above, the draft permit requires the permittee to submit to EPA in writing, within 180 days of the effective date of the permit, a description of proposed changes to the permittee's pretreatment program deemed necessary to assure conformity with

current federal pretreatment regulations. These requirements are included in the draft permit to ensure that the pretreatment program is consistent and current with all pretreatment requirements in effect. Lastly, the permittee must continue to submit an annual pretreatment report by **March 1st**, detailing the activities of the program for the twelve month period ending 60 days prior to the due date.

XI. SLUDGE

Section 405(d) of the Clean Water Act (CWA) requires that EPA develop technical standards regulating the use and disposal of sewage sludge. These regulations were signed on November 25, 1992, published in the Federal Register on February 19, 1993, and became effective on March 22, 1993. Domestic sludge which is land applied, disposed of in a surface disposal unit, or fired in a sewage sludge incinerator is subject to Part 503 technical standards and to State Env-Wq 800 standards. Part 503 regulations have a self-implementing provision, however, the CWA requires implementation through permits. Domestic sludge which is disposed of in municipal solid waste landfills are in compliance with Part 503 regulations provided the sludge meets the quality criteria of the landfill and the landfill meets the requirements of 40 CFR Part 258.

The draft permit has been conditioned to ensure that sewage sludge use and disposal practices meet the CWA Section 405(d) Technical Standards. In addition, EPA-Region I has prepared a 72-page document entitled "*EPA Region I NPDES Permit Sludge Compliance Guidance* (USEPA 1999)" for use by the permittee in determining their appropriate sludge conditions for their
chosen method of sewage sludge use or disposal practices. This guidance document is available upon request from EPA Region 1 and may also be found at:
http://www.epa.gov/region1/npdes/permits/generic/sludgeguidance.pdf .

The permittee is required to submit an annual report to EPA-Region I and NHDES-WD, by February 19th each year, containing the information specified in the *Sludge Compliance Guidance* document for their chosen method of sewage sludge use or disposal practices.

XII. ESSENTIAL FISH HABITAT

Under the 1996 Amendments (PL 104-267) to the Magnuson-Stevens Fishery Conservation and Management Act (16 U.S.C. § 1801 et seq. (1998)), EPA is required to consult with the National Marine Fisheries Services (NMFS) if EPA's action or proposed actions that it funds, permits, or undertakes, may adversely impact any essential fish habitat (16 U.S.C. § 802(10)).

The Amendments broadly define "essential fish habitat" (EFH) as: waters and substrate necessary to fish for spawning, breeding, feeding, or growth to maturity" (16 U.S.C. § 1802(10)). "Adverse impact" means any impact which reduces the quality and/or quantity of EFH (50 CFR § 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 or actions.

Essential fish habitat is only designated for species for which federal fisheries management plans exist (16 U.S.C. § 1855(b)(a)(A)). EFH designations for New England were approved by the U.S. Department of Commerce on March 3, 1999.

Atlantic salmon (*Salmo salar*) is the only species for which EFH has been designated in the Merrimack River. According to the New Hampshire Fish and Game Department (NHF&G), no salmon fry are stocked in the Nashua River. In addition, NHF&G has reported that Atlantic salmon are not stocked in the Merrimack River in the area influenced by the discharge from the WWTF. This species is stocked further upstream in the Merrimack River watershed. The stretch of the river in the vicinity of the WWTF is used by salmon smolts in spring months for downstream passage to the sea. Adult Atlantic salmon returning to the river from the ocean do not travel upstream as far as the WWTF discharge area. They are collected at a dam in Lawrence, Massachusetts, primarily for use as broodstock.

EPA has determined that the draft permit has been conditioned in such a way so as to minimize any adverse impacts to EFH for the following reasons:

- This permit action is a reissuance of an existing NPDES permit;
- The WWTF has a dilution factor of 28.5;
- The WWTF withdraws no water from the Merrimack River; therefore, no life stages of EFH species are vulnerable to impingement or entrainment from this WWTF;
- The draft permit prohibits the WWTF discharge from causing a violation of State water quality standards;
- The draft permit contains water quality-based limits for total residual chlorine;
- The draft permit prohibits the discharge of pollutants or combinations of pollutants in toxic amounts;
- The permit requires toxicity testing two times per year to ensure that the discharge does not present toxicity problems;

EPA believes that the conditions and limitations contained within the proposed permit adequately protect all aquatic life, including those with designated EFH in the receiving water, and that further mitigation is not warranted. If adverse impacts to EFH are detected as a result of this permit action, or if new information is received that changes the basis for these conclusions, EPA will contact NMFS Habitat Division.

XIII. ENDANGERED SPECIES ACT

Section 7(a) of the Endangered Species Act (ESA) of 1973, as amended (the "Act"), grants authority to and imposes requirements upon federal agencies regarding endangered or threatened species of fish, wildlife, or plants ("listed species") and the habitats of such species that have been designated as critical ("critical habitat").

Section 7(a)(2) of the Act requires every federal agency, in consultation with and with the assistance of the Secretary of the Interior, to ensure that any action it authorizes, funds, or carries out, in the United States or upon the high seas, is not likely to jeopardize the continued existence

of any listed species or result in the destruction or adverse modification of critical habitat. The National Marine Fisheries Service (NMFS) administers Section 7 consultations for marine species and anadromous fish. The United States Fish and Wildlife Service (USFWS) administers Section 7 consultations for freshwater species.

EPA has reviewed the federal endangered or threatened species of fish and wildlife to determine if any such listed species might potentially be impacted by the re-issuance of this NPDES permit. Shortnose sturgeon (*Acipenser brevirostrum*) and Atlantic sturgeon (*Acipenser oxyrinchus*) are the only two federally-protected fish species that have been documented in the Merrimack River. However, the upstream movement of these two species is restricted by the Essex Dam, in Lawrence, Massachusetts. This dam is approximately 13 river miles downstream of the influence of the Nashua WWTF discharge. Based on the normal distribution of these species, it is highly unlikely that they would be present in the vicinity of this discharge. Therefore, no Section 7 consultation with NMFS is required.

XIV. ANTIDEGRADATION

The New Hampshire water quality standards include an antidegradation provision which states that the existing designated uses and the level of water quality necessary to protect the existing uses shall be maintained and protected (Env-Wq 1708).

The draft permit contains limitations and conditions which are at least as stringent as those contained in the existing permit. The State of New Hampshire has indicated that there will be no lowering of water quality and no loss of existing designated uses in the receiving water as a result of this permit action, and that additional antidegradation review is not warranted at this time.

XV. MONITORING AND REPORTING REQUIREMENTS

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

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

NetDMR is a national web-based tool for regulated CWA permittees to submit DMRs electronically via a secure internet application to EPA through the Environmental Information Exchange Network. NetDMR allows participants to discontinue mailing in hard copy forms under 40 CFR §§ 122.41 and 403.12. NetDMR is accessed from: http://www.epa.gov/netdmr. EPA currently conducts free training on the use of NetDMR, and anticipates that the availability of this training will continue to assist permittees with the transition to use of NetDMR. To

participate in upcoming trainings, visit http://www.epa.gov/netdmr for contact information for New Hampshire.

The draft permit requires the permittee to report monitoring results obtained during each calendar month using NetDMR, no later than the 15th day of the month following the completed reporting period. All reports required under the permit shall be submitted to EPA as an electronic attachment to the DMR. Once a permittee begins submitting reports using NetDMR, it will no longer be required to submit hard copies of DMRs or other reports to EPA or to NHDES.

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

Until electronic reporting using NetDMR begins, or for those permittees who receive written approval from EPA to continue to submit hard copies of DMRs, the draft permit requires that submittal of DMRs and other reports required by the permit continue in hard copy format. Hard copies of DMRs shall be postmarked no later than the 15th day of the month following the completed reporting period.

XVI. STATE CERTIFICATION REQUIREMENTS

EPA may not issue a permit unless the State Water Pollution Control Agency with jurisdiction over the receiving water(s) either 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 waives its right to certify as set forth in 40 CFR §124.53. State Water Quality Standards contain three major elements: Beneficial uses; Water Quality Criteria; and an Antidegradation Policy, all of which are part of the State's Water-Quality Certification under Section 401 of the Act. The only exception to this is that sludge conditions/requirements are not part of the Section 401 State Certification.

The staff of the NHDES-WD has reviewed the draft permit and advised EPA-Region I that the limitations are adequate to protect water quality. EPA-Region I has requested permit certification by the State and expects that the draft permit will be certified. Regulations governing state certification are set forth in 40 CFR §§124.53 and §124.55.

XVII. COMMENT PERIOD, REQUESTS FOR PUBLIC HEARINGS 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:

Meridith Timony
U.S. Environmental Protection Agency
5 Post Office Square, Suite 100 (Mail Code OEP06-01)
Boston, Massachusetts 02109-3912
Telephone: (617) 918-1533
Fax: (617) 918-0533

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 issue proposed to be raised at the hearing. A public hearing may be held after at least thirty (30) days public notice whenever the Regional Administrator finds that response to this notice indicates 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 the EPA office listed above.

Following the close of the comment period, and after a public hearing (if applicable), 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.

Information concerning the draft permit may be obtained between the hours of 9:00 am and 5:00 pm (8:00 a.m. and 4:00 p.m. for the state), excluding holidays.

July 11, 2013
Date:

_____
Ken Moraff, Acting Director
Office of Ecosystem Protection
U.S. Environmental Protection Agency

Figures and Attachments

Figure 1 Nashua WWTF and Outfall 001

Aerial Image obtained from Google Maps (http://maps.google.com)

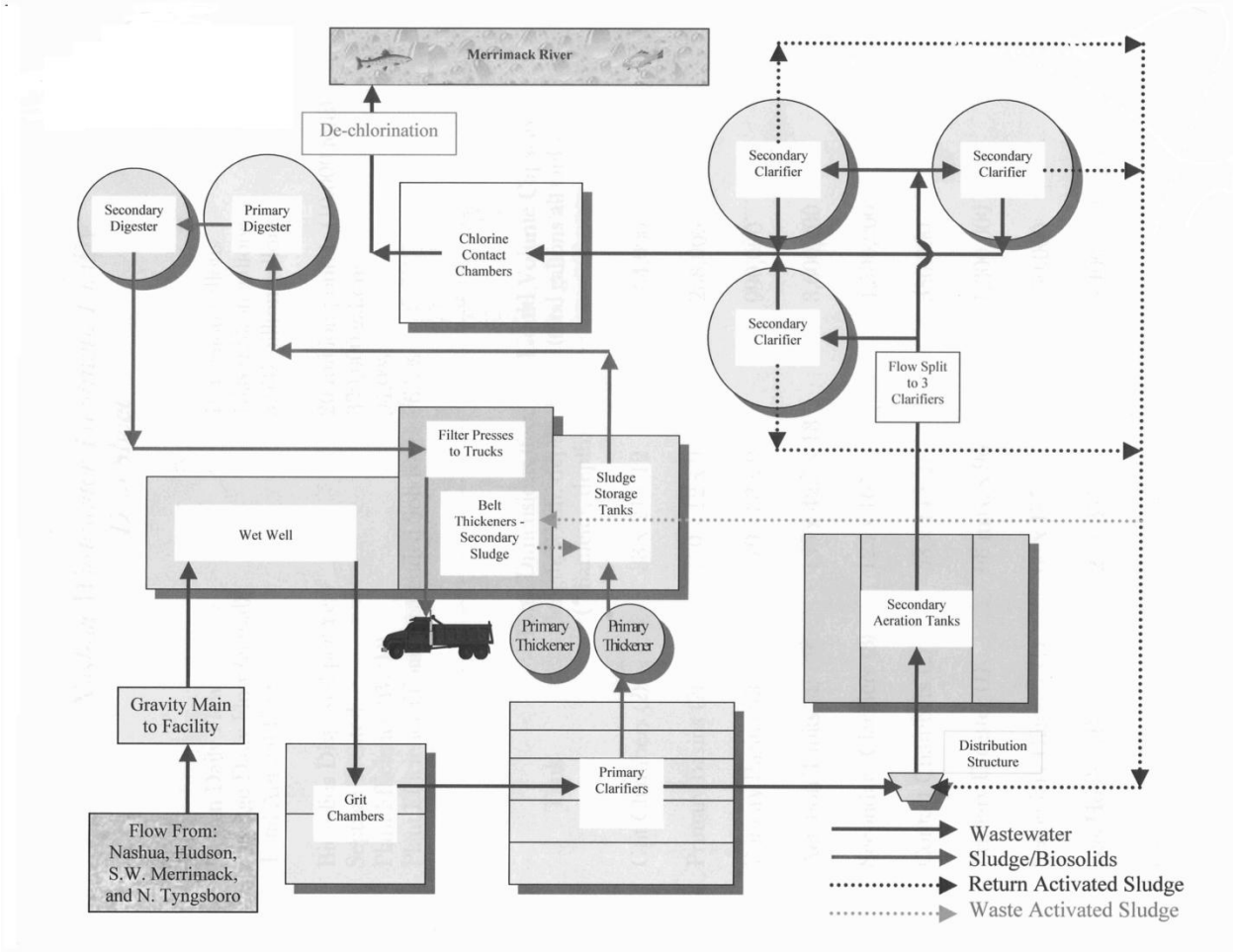

Figure 2 Nashua WWTF Process Flow Diagram

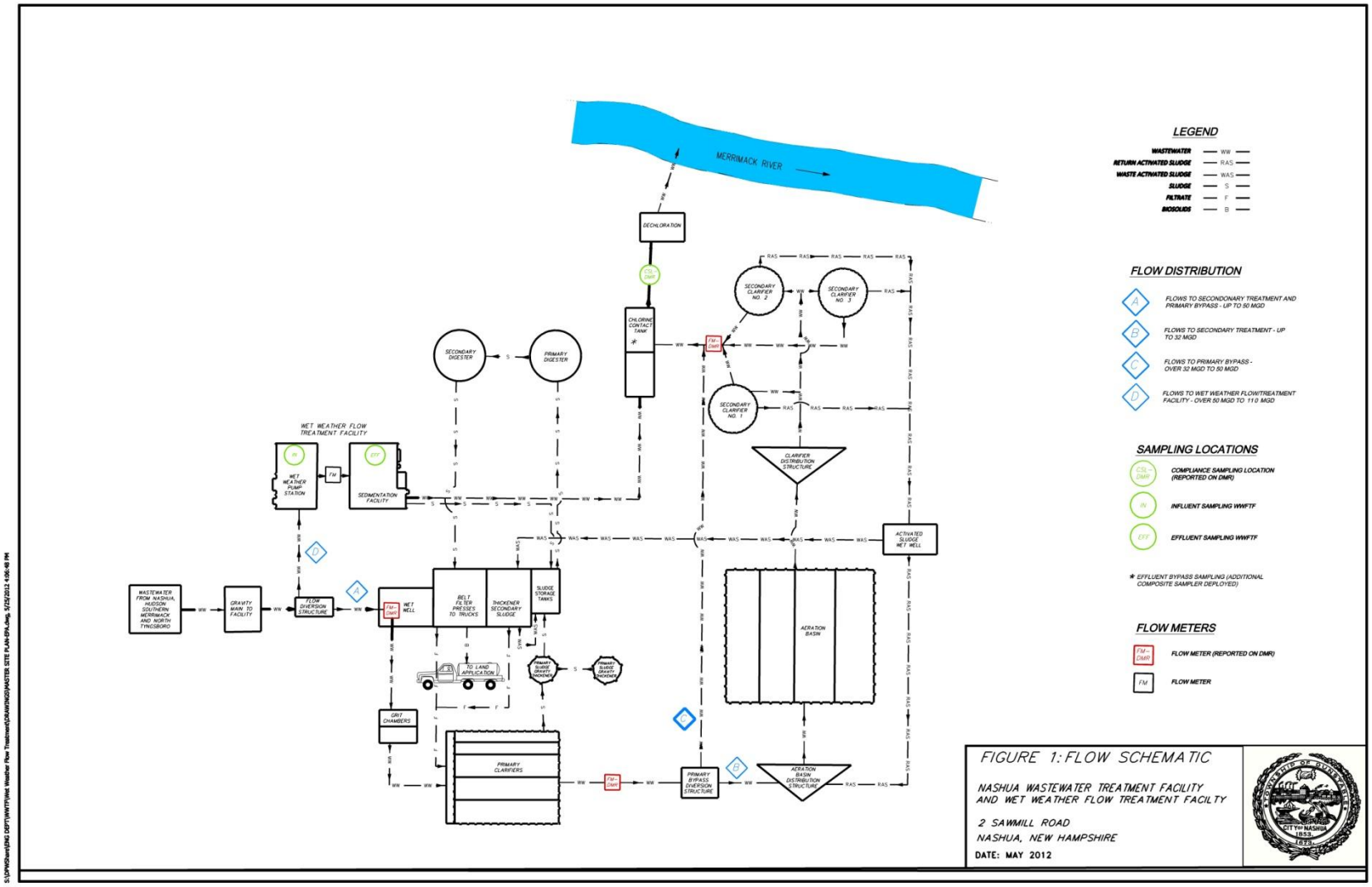

Figure 3 Wet Weather Flow Schematic

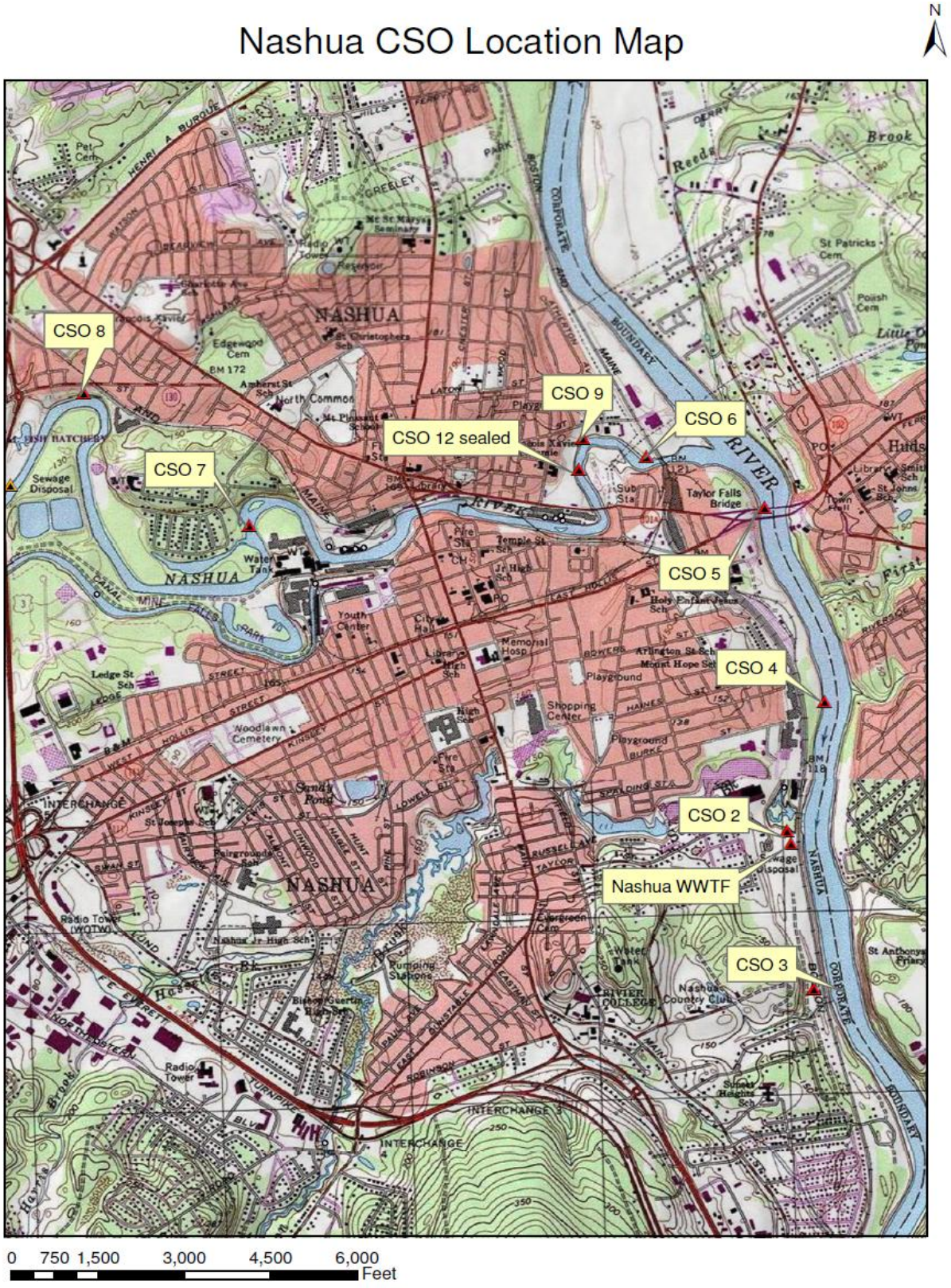

Figure 4 Nashua CSO Discharge Outfall Locations

Attachment A

Combined Sewer Overflow Outfalls (CSOs)

CSO Outfall No.	Location	Interceptor Sub-System	Receiving Water
002	Salmon Brook	Salmon Brook Interceptor	Merrimack River
003	Farmington Road	South Merrimack Interceptor	Merrimack River
004	Burke Street	North Merrimack River Interceptor	Merrimack River
005	East Hollis Street	North Merrimack River Interceptor	Merrimack River
006	Nashua River	North Merrimack River Interceptor	Nashua River
007	Tampa Street	Nashua River Interceptor	Nashua River
008	Broad Street	Nashua River Interceptor	Nashua River
009	Lock Street	North Merrimack River Interceptor	Nashua River

Attachment B

Derivation of 7Q10 Flow and Dilution Factor

A dilution factor equal to 28.5 was used in the development of the draft permit. This dilution factor is based on a revised estimate of the 7Q10 flow at outfall 001, which was calculated by NHDES using the Dingman[1] equation. This equation estimates the flow in ungaged, unregulated streams based upon watershed (basin) area, mean basin elevation, and the percent of the basin underlain by coarse-grained stratified drift in contact with streams. The 7Q10 just downstream of the Nashua WWTP was estimated using U.S. Geological Survey (USGS) gaging station flow records. The Nashua WWTP is upstream of the USGS gaging station on the Merrimack River in Lowell, Massachusetts, and is downstream of the following three (3) stream gaging stations: Merrimack River near Goffs Falls below Manchester, New Hampshire; Souhegan River at Merrimack, New Hampshire; and Nashua River at East Pepperell, Massachusetts. Another gage is located on the Concord River at Lowell, Massachusetts, just upstream of the Merrimack River Lowell gage.

The 7Q10 flows at the USGS gaging station sites were calculated using Log-Pearson Type III statistics, based on gaging station records for years during which flow regulation was the same as is occurring today. The selected periods of record for each of the USGS gages, gage station identification numbers, and corresponding 7Q10 flow values, are listed below.

Gaging Station Name	Gage Id. No.	7Q10 (cfs)
Merrimack River in Lowell, MA (1943-2009)	01100000	870.986
Merrimack River near Goff's Falls below Manchester (1943-2006)	01092000	638.652
Souhegan River at Merrimack (1911-2006)	01094000	13.001
Nashua River at East Pepperell (1937-2006)	01096500	44.347
Concord River Below R Meadow Brook at Lowell (1962-2009)	01099500	33.8

The resulting upstream 7Q10 flow values were subtracted from the 7Q10 flow value at the Merrimack River Lowell gage to estimate the 7Q10 contribution from the intervening watershed area between the Merrimack River Lowell gage and the upstream gages. The resulting

[1] Dingman, S.L., and S.C. Lawlor, 1995. Estimating Low-Flow Quantiles from Drainage-Basin Characteristics in New Hampshire and Vermont, American Water Resources Association, Water Resources Bulletin, pp. 243-256. This empirical equation estimates 7Q10 stream flow in un-gaged, unregulated streams in New Hampshire and Vermont as a function of watershed characteristics. The formula variables are watershed (basin) area, mean basin elevation, and the percent of the basin underlain by coarse-grained stratified drift in contact with streams.

Attachment B (Continued)

"intervening area" 7Q10 estimated flow is 141.2 cfs (870.986 cfs - 638.652 cfs - 13.001 cfs - 44.347 cfs - 33.8 cfs = 141.2 cfs).

Next, the Dingman equation was used to estimate the proportion of the intervening area 7Q10 stream flow that is tributary to the Merrimack River upstream from the Nashua WWTF. This proportion is assumed to be equal to the ratio of the Dingman equation 7Q10 flow for the watershed area lying between the upstream gages and Nashua (20.03 cfs) to the Dingman equation 7Q10 flow for the watershed area lying between the upstream gages and the Merrimack River Lowell gage (32.12 cfs). The resulting ratio is 0.6237 (20.02 / 32.12).

Finally, the 7Q10 flow at the Nashua WWTP was calculated by multiplying the 7Q10 for the intervening watershed area between the upstream gages and the Merrimack River Lowell gage (141.2 cfs) by the ratio 0.6237, and then adding in all upstream gaged flows (Merrimack River at Goffs Falls, Souhegan River at Merrimack, and Nashua River at East Pepperell). The resulting 7Q10 stream flow is 784.1 cfs.

Dilution Factor

The following equation was used to calculate a dilution factor of 28.5.

$$\text{Dilution Factor} = \frac{Q_{001} \times 0.646}{Q_D} \times 0.9$$

Where:
Q_{001} = Estimated 7Q10 low flow of the Merrimack River just downstream of the Nashua WWTF (outfall 001) (784.1 cfs)
0.90 = Factor to reserve 10 % assimilative capacity
Q_D = Nashua WWTF's Design Flow (16 MGD)
0.646 = Factor to convert cfs to MGD.

Attachment C

Calculation of Mass-based Limits

Calculations of maximum allowable loads for average monthly BOD_5 and TSS are based on the following equation.

$$L = C \times QPDF \times 8.345$$

where:

L = Maximum allowable load, in lbs/day, rounded to nearest 1 lbs/day.
C = Maximum allowable effluent concentration for reporting period, in mg/L.
QPDF = Treatment plant's design flow, in mgd
8.345 = Factor to convert effluent concentration (mg/L) times design flow (mgd) to lbs/day

Attachment D

Data Summary (2007-2012)

Outfall 001

Monitoring Period End Date	BOD5						TSS					
	MO AVG		WKLY AVG		DAILY MX	MO AV MN	MO AVG		WKLY AVG		DAILY MX	MO AV MN
	4,006 lb/d	30 mg/L	6,008 lb/d	45 mg/L	50 mg/L	85%	4,006 lb/d	30 mg/L	6,008 lb/d	45 mg/L	50 mg/L	85%
03/31/2007	1356	14	1834	18	26	93	1047	10	1292	12	18	92.8
04/30/2007	1258	9	1958	11	16	92.9	1125	8	1641	10	15	92.2
05/31/2007	1103	10	1677	14	21	93.1	770	7	1268	11	22	95.2
06/30/2007	1157	11	1540	11	18	94.1	623	6	815	7	12	97
07/31/2007	1916	19	2205	21	28	90.2	496	5	576	6	9	97.4
08/31/2007	1406	15	2057	21	25	93	478	5	509	5	10	97.6
09/30/2007	953	12	1383	15	19	94.3	553	7	629	8	14	96.7
10/31/2007	1072	12	1187	14	22	94.8	498	6	689	7	12	97.5
11/30/2007	1390	15	1485	16	25	93.2	616	7	774	7	12	96.5
12/31/2007	693	8	1425	16	15	96.9	541	6	737	8	12	96.8
01/31/2008	775	7	1508	12	30	96.3	1012	9	2275	16	69	95.2
02/29/2008	2202	15	3348	23	34	87.9	4233	23	11863	55	210	81
03/31/2008	1617	10	2252	14	21	91.4	1402	8	2053	11	32	91.9
04/30/2008	1405	10	1213	10	41	93.2	1142	8	1463	9	27	93.8
05/31/2008	825	8	2497	15	14	95.3	489	5	1699	10	8	97.1
06/30/2008	1215	14	1346	17	26	92.4	627	7	974	11	51	96.6
07/31/2008	929	9	1935	15	20	94	566	6	1149	10	17	97.1
08/31/2008	980	9	1334	11	19	94.1	521	5	663	6	8	97.2
09/30/2008	1482	13	1791	15	27	91.3	786	7	1013	8	18	96
10/31/2008	1540	16	3174	30	95	91.5	1709	17	4166	38	191	91.4
11/30/2008	1076	14	1393	17	27	93.7	1702	14	2049	13	164	91.5
12/31/2008	1484	13	2123	19	42	91.9	1092	9	3937	29	55	94.1
01/31/2009	1097	11	1288	14	19	94.5	596	6	1003	11	16	96.2
02/28/2009	1126	12	1342	16	25	94.2	818	8	992	9	17	95.5
03/31/2009	767	7	931	7	10	96.1	845	8	1307	13	49	94.8
04/30/2009	959	8	1544	11	19	95.1	702	6	897	7	13	96.1
05/31/2009	808	8	1215	11	20	95.7	618	6	1051	8	11	96.6
06/30/2009	1129	12	1265	13	25	94.2	839	8	1007	9	17	95.8
07/31/2009	1419	12	2207	15	36	92.6	1334	12	1725	15	64	93.7
08/31/2009	1766	18	6398	56	86	91.7	2609	28	5667	60	161	88.7
09/30/2009	847	11	1491	18	22	94.6	381	5	540	7	10	97.7
10/31/2009	1298	17	1607	18	26	93.2	1162	13	3386	36	200	93.3
11/30/2009	1290	15	1536	16	22	93.3	649	7	818	10	17	96.4
12/31/2009	1485	17	1561	18	26	92.3	658	7	750	8	13	96
01/31/2010	1926	23	2435	29	48	89.2	510	6	905	9	14	96.7
02/28/2010	2170	22	3581	25	35	87.5	1163	11	2783	22	43	92.9
03/31/2010	2030	11	3478	16	22	89.8	1044	6	1784	8	13	94.1
04/30/2010	1773	13	2799	16	20	90.7	674	5	1332	6	8	95.7
05/31/2010	1634	17	2193	23	26	91.7	551	6	693	7	12	96.8

Attachment D (Continued)

Outfall 001

Monitoring Period End Date	BOD5						TSS					
	MO AVG		WKLY AVG		DAILY MX	MO AV MN	MO AVG		WKLY AVG		DAILY MX	MO AV MN
	4,006 lb/d	30 mg/L	6,008 lb/d	45 mg/L	50 mg/L	85%	4,006 lb/d	30 mg/L	6,008 lb/d	45 mg/L	50 mg/L	85%
06/30/2010	1075	13	1271	16	19	94.5	575	7	716	9	26	96.9
07/31/2010	1265	18	2224	32	53	92.1	601	9	849	12	20	96.5
08/31/2010	1272	19	1752	23	26	92.8	639	10	794	10	19	96.1
09/30/2010	2051	30	2833	38	48	88.6	813	12	1481	22	40	95.6
10/31/2010	2180	28	2859	34	44	87.8	697	9	866	11	17	95.2
11/30/2010	2672	35	3864	54	56	85.5	796	10	1322	18	27	94.8
12/31/2010	938	11	1441	20	28	95.3	698	8	1025	10	18	95.9
01/31/2011	775	11	789	11	16	95.8	779	11	845	12	18	95
02/28/2011	1173	13	1291	14	36	94	1190	13	1181	13	49	93.3
03/31/2011	2114	14	3891	22	38	88.8	1874	12	3273	18	30	87.9
04/30/2011	1224	11	1338	12	16	93.6	1244	11	1722	15	48	93.3
05/31/2011	1037	10	1377	13	22	94.4	729	7	952	9	20	95.8
06/30/2011	867	10	1121	11	21	95	783	8	1149	11	28	96.2
07/31/2011	910	12	1154	15	25	94.1	384	5	465	5	9	97.8
08/31/2011	1222	14	1385	15	28	93.6	1572	13	2623	19	51	93.1
09/30/2011	1645	16	2064	20	54	90.9	1988	19	3472	32	95	90
10/31/2011	1384	12	2398	23	26	91.4	1228	11	2667	25	42	92.4
11/30/2011	1223	11	1448	12	17	93.4	1138	10	1275	11	16	93.2
12/31/2011	1619	12	2664	15	30	92.2	1442	11	2616	15	37	91.5
01/31/2012	936	10	1135	13	15	94.6	824	9	1222	10	21	95
02/29/2012	622	7	880	9	18	96.5	502	6	858	8	21	97
03/31/2012	545	7	590	8	9	96.7	391	5	459	6	9	97.4
Min	545	7	590	7	9	85.5	381	5	459	5	8	81
Max	2672	35	6398	56	95	96.9	4233	28	11863	60	210	97.8
Avg.	1322.60	13.70	1972.90	18.57	29.32	92.84	994.95	9.24	1794.10	14.41	40.37	94.58
Median	1224	12	1544	16	25	93.2	779	8	1149	10	18	95.7

Attachment D (Continued)

Outfall 001

Monitoring Period End Date	Flow - Influent		Flow - Effluent		E. Coli		pH		TRC		Copper	
	MO AVG	DAILY MX	MO AVG	DAILY MX	MO GEO	DAILY MX	MIN	MAX	MO AVG	DAILY MX	MO AVG	DAILY MX
	MGD	MGD	MGD	MGD	126 #/100mL	406 #/100mL	6.5 SU	8 SU	0.308 mg/l	0.532 mg/l	Report mg/l	Report mg/l
03/31/2007	11.7	21.4	11.6	21.4	4	32	7.15	7.56	0.03	0.13	0.03	0.03
04/30/2007	18.7	44.5	16.1	30.6	2	28	6.86	7.41	0.05	0.28	0.02	0.02
05/31/2007	13.6	20.3	13.6	17.1	4	1414	6.93	7.41	0.05	0.17	0.02	0.02
06/30/2007	11.2	17.1	12.6	19.9	6	45	7.12	7.56	0	0.16	0.01	0.01
07/31/2007	10.7	17.8	11.9	15.1	10	325	6.84	7.53	0	0.17	0.01	0.01
08/31/2007	8.7	11.7	11.3	14	17	2419	7.29	7.67	0.02	0.19	0.01	0.01
09/30/2007	8.5	13.8	9.8	14.2	17	1046	7.11	7.65	0.02	0.08	0.01	0.01
10/31/2007	9	13.9	10.6	13.8	10	148	7.14	7.57	0.05	0.21	0.02	0.02
11/30/2007	9.4	15.6	11	15.7	11	93	7.14	7.62	0.06	0.3	0.02	0.02
12/31/2007	12	14.6	10.3	14.6	6	152	7.19	7.68	0	0.15	0.02	0.02
01/31/2008	10.6	23.6	11.9	20.7	6	2419	7	7.63	0.04	0.22	0.01	0.01
02/29/2008	17	32.3	17	32.3	10	1046	7.05	7.4	0.08	0.3	0.01	0.01
03/31/2008	19.9	31.4	20	31.4	2	66	6.92	7.33	0	0.19	0.01	0.01
04/30/2008	15.5	27.3	15.6	27.3	9	517	7.05	7.4	0	0.184	0.01	0.01
05/31/2008	12.1	16.5	12.1	16.5	2	54	7.07	7.53	0.05	0.27	0.01	0.01
06/30/2008	10.2	15.7	10.2	15.7	2	68	7.13	7.46	0	0.13	0.01	0.01
07/31/2008	11.1	19	11.1	19	3	22	7.03	7.54	0.08	0.34	0.03	0.03
08/31/2008	12.9	23.3	12.9	23.3	3	151	6.9	7.49	0.07	0.41	0.01	0.01
09/30/2008	13.4	26.9	13.4	26.3	3	63	6.76	7.56	0.13	0.52	0.011	0.012
10/31/2008	10.8	14.8	10.8	14.8	15	1732	7.06	7.47	0.14	0.47	0.01	0.01
11/30/2008	10	25.4	10	25.4	5	93	7.17	7.6	0.05	0.26	0.014	0.02
12/31/2008	13.6	22.5	13.6	22.5	5	79	6.75	7.43	0	0.27	0.01	0.01
01/31/2009	11.9	17.8	11.9	17.8	2	12	7.16	7.59	0	0.24	0.006	0.006
02/28/2009	11.7	16.7	11.7	16.7	2	88	6.93	7.65	0.06	0.39	0.012	0.013
03/31/2009	13.5	18.7	13.5	18.7	2	55	7.07	7.47	0.06	0.46	0.01	0.01
04/30/2009	13.9	22	13.9	22	1	14	7.08	7.4	0	0.31	0.01	0.01
05/31/2009	12.2	19.2	12.2	19.2	2	43	7.11	7.56	0	0.26	0.01	0.01
06/30/2009	11.8	18.6	11.8	18.6	4	87	7.12	7.52	0.04	0.48	0.01	0.01
07/31/2009	12.6	22.1	12.6	22.1	6	2419	7.07	7.48	0.04	0.22	0.01	0.01
08/31/2009	10.4	20.5	10.4	20.5	5	248	7.07	7.58	0.02	0.2	0.01	0.01
09/30/2009	8.9	18	8.9	18	4	61	6.59	7.5	0	0.34	0.01	0.01
10/31/2009	9.2	18.1	9.2	18.1	2	29	6.73	7.39	0.02	0.11	0.013	0.019
11/30/2009	9.8	23.3	9.8	23.3	3	73	6.52	7.08	0.06	0.28	0.01	0.01
12/31/2009	11	20.2	11	20.2	2	20	6.93	7.61	0.05	0.48	0.1	0.1
01/31/2010	10.5	25.4	10.5	25.4	1	6	7.18	7.68	0	0.29	0.011	0.013
02/28/2010	11.6	28.2	11.6	28.2	1	12	7.03	7.53	0.06	0.36	0.007	0.007
03/31/2010	21.1	42.8	21.1	42.8	2	166	6.83	7.74	0.06	0.46	0.01	0.01
04/30/2010	16.9	31.6	16.9	31.6	2	64	6.84	7.75	0.02	0.225	0.02	0.02
05/31/2010	11.5	16.1	11.5	16.1	1	6	6.59	7.48	0	0.12	0.02	0.029
06/30/2010	9.6	13.6	9.6	13.6	1	4	6.51	7.17	0	0	0.02	0.02

Attachment D (Continued)

Outfall 001

Monitoring Period End Date	Flow - Influent		Flow - Effluent		E. Coli		pH		TRC		Copper	
	MO AVG	DAILY MX	MO AVG	DAILY MX	MO GEO	DAILY MX	MIN	MAX	MO AVG	DAILY MX	MO AVG	DAILY MX
	MGD	MGD	MGD	MGD	126 #/100mL	406 #/100mL	6.5 SU	8 SU	0.308 mg/l	0.532 mg/l	Report mg/l	Report mg/l
07/31/2010	8.3	10.5	8.3	10.5	7	48	6.5	7.38	0	0.1	0.025	0.03
08/31/2010	8.1	17.4	8.1	17.4	13	122	6.65	7.29	0.07	0.34	0.015	0.02
09/30/2010	7.9	11.4	8.2	17.2	16	149	6.61	7.25	0.05	0.32	0.013	0.019
10/31/2010	9.1	17.2	9.1	17.2	10	1046	6.51	7.19	0	0.14	0.025	0.03
11/30/2010	9.4	19	9.3	16	3	25	6.76	7.26	0	0.42	0.02	0.02
12/31/2010	9.4	22.3	9.4	22.3	4	88	6.55	7.18	0.015	0.17	0.035	0.04
01/31/2011	8.5	10.9	8.5	10.9	2	6	6.73	7.16	0	0.42	0.015	0.02
02/28/2011	9.7	16	9.7	16	2	167	6.67	7.49	0.1	0.5	0.023	0.03
03/31/2011	16.5	23	16.5	23	2	1299	6.72	7.42	0.07	0.48	0.015	0.02
04/30/2011	13.8	19	13.8	19	3	133	6.91	7.8	0.03	0.38	0.014	0.02
05/31/2011	12.3	17.6	12.3	17.6	3	816	6.41	7.49	0.03	0.42	0.02	0.02
06/30/2011	10.8	20.1	10.8	20.1	3	20	6.52	7.67	0.03	0.32	0.015	0.02
07/31/2011	9.3	11.9	9.2	11.9	4	60	7.01	7.42	0	0.24	0.02	0.02
08/31/2011	11.3	29.2	11.3	29.2	7	228	6.7	7.4	0.08	0.52	0.022	0.025
09/30/2011	11.4	19.7	11.4	19.7	6	107	6.65	7.65	0	0.46	0.01	0.01
10/31/2011	12.9	22.5	12.9	22.5	4	44	6.59	7.37	0.06	0.51	0.015	0.02
11/30/2011	13.4	19.1	13.4	19.1	3	151	6.5	6.98	0	0.27	0.01	0.011
12/31/2011	13.8	34.5	13.8	34.5	2	186	6.51	7.43	0.06	0.3	0.01	0.01
01/31/2012	11.1	20.7	11.1	20.7	2.1	107.8	6.6	7.38	0.08	0.31	0.02	0.02
02/29/2012	10	17.1	10	17.1	2.2	104.1	6.72	7.31	0.02	0.07	0.019	0.02
03/31/2012	9.9	13.3	9.9	13.3	3	1986.3	6.77	7.31	0.037	0.319	0.01	0.01
Min	7.9	10.5	8.1	10.5	1	4	6.41	6.98	0	0	0.006	0.006
Max	21.1	44.5	21.1	42.8	17	2419	7.29	7.8	0.14	0.52	0.1	0.1
Avg	11.73	20.57	11.84	20.32	4.86	365.77	6.86	7.47	0.035	0.289	0.016	0.018
Median	11.2	19	11.4	19	3	88	6.9	7.48	0.03	0.28	0.012	0.013

Attachment D (Continued)

Outfall 001 – WET test and associated analytical results

Monitoring Period End Date	Al	Cd	Cr	Cu	Pb	Ni	Zn	Hardness	Ammonia-N	LC_{50} *C. dubia*	LC_{50} *P. promelas*
	DAILY MX	DAILY MX	DAILY MX	DAILY MX	DAILY MX	DAILY MX	DAILY MX	DAILY MX	DAILY MX	DAILY MN	DAILY MN
	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	100 %	100 %
03/31/2007	0.06	0.001	0.003	0.027	0	0.006	0.18	73	35	100	62
06/30/2007	0.02	0.001	0.002	0.017	0.005	0.003	0.063	57	33	100	90.6
09/30/2007	0	0	0	0.007	0	0.008	0.068	58	40	100	69.4
12/31/2007	0.026	0	0	0.015	0	0.007	0.087	58.6	36.3	84.2	49.6
03/31/2008	0	0	0	0.021	0	0.005	0.086	82	18	100	100
06/30/2008	0	0	0	0.017	0.00082	0.003	0.096	74	25	100	100
09/30/2008	0.03	0	0	0.012	0.001	0.005	0.048	69	20	100	100
12/31/2008	0.02	0	0.003	0.011	0	0	0	64	29	100	71.8
03/31/2009	0	0	0	0.011	0.001	0.002	0.063	76	21	100	100
06/30/2009	0.02	0	0	0.009	0.002	0.004	0.066	65	31	100	100
09/30/2009	0	0	0.003	0.01	0.001	0.006	0.051	60	13	100	100
12/31/2009	0.031	0	0	0.019	0.0012	0.004	0.052	48	16	100	100
03/31/2010	0	0	0	0.013	0.001	0.005	0.053	68	33	100	100
06/30/2010	0.047	0	0	0.029	0.002	0.007	0.079	59	18	100	100
09/30/2010	0.038	0	0.003	0.019	0.001	0.009	0.084	56	19	100	100
12/31/2010	0.04	0	0	0.024	0.001	0.006	0.096	57	13	100	100
03/31/2011	0.047	0	0.002	0.019	0.002	0.006	0.12	70	23	100	100
06/30/2011	0.029	0	0	0.01	0.001	0.004	0.06	68	22	100	100
09/30/2011	0.038	0.0005	0.002	0.025	0.001	0.005	0.072	66	8.7	100	100
12/31/2011	0.032	0	0	0.011	0.0006	0.004	0.057	66	11	100	100
03/31/2012	0.021	0	0	0.018	0.0009	0.004	0.087	64	23	100	100
Min	0	0	0	0.007	0	0	0	48	8.7	84.2	49.6
Max	0.06	0.001	0.003	0.029	0.005	0.009	0.18	82	40	100	100
Avg	0.0238	0.0001	0.0009	0.0164	0.0011	0.0049	0.0747	64.6952	23.24	99.25	92.54
Median	0.026	0	0	0.017	0.001	0.005	0.068	65	22	100	100

Results reported as not detected (“ND”) assigned a value = 0.

Attachment D (Continued)

Merrimack River – Upstream of Nashua WWTF

Monitoring Period End Date	Al	Cd	Cr	Cu	Pb	Ni	Zn	Hardness
	DAILY MX	DAILY MX	DAILY MX	DAILY MX	DAILY MX	DAILY MX	DAILY MX	DAILY MX
	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
3/30/2007	0.095	0	0	0.002	0	0	0.02	20
6/30/2007								
9/30/2007	0	0	0	0	0	0	0.016	18
12/31/2007	0.14	0	0	0	0	0	0.0067	13.3
3/31/2008	0.038	NA	NA	0	0	0	0.02	14
6/30/2008	0.051	NA	NA	0	0	0	0.052	17
9/30/2008	0.15	0	0	0	0.001	0	0.011	14
12/31/2008	0.07	0	NA	0.002	0	0	0.019	17
3/31/2009	0.14	0	NA	0.003	0.0007	0	0.015	13
6/30/2009	0.11	0	0	0.002	0.0006	0	0.017	14
9/30/2009	0.06	0	0	0.003	0	0	0.009	15
12/31/2009	0.075	0	0	0.006	0.0008	0	0.005	14
3/31/2010	0	0	0	0.006	0.0005	0	0.009	15
6/30/2010	0.082	0	0	0.011	0.0007	0	0.006	15
9/30/2010	0.043	0	0	0.003	0.0005	0	0.004	18
12/31/2010	0.49	0	0	0.004	0.001	0	0.008	8.8
3/31/2011	0.082	0	0	0	0	0	0.005	17
06/30/2011	0.4	0	0	0	0.0008	0	0.004	8.3
09/30/2011	0							
12/31/2011	0.085	0	0	0	0	0	0.004	13
03/31/2012	0.08	0	0	0	0.0005	0	0.004	14
Min	0	0	0	0	0	0	0.004	8.3
Max	0.49	0	0	0.011	0.001	0	0.052	20
Avg	0.10955	0	0	0.002	0.0004	0	0.0124	14.65
Median	0.081	0	0	0.002	0.0005	0	0.009	14

Values reported as not detected ("ND") assigned a value = 0.

NPDES Permit No. NH0100170 2013 Reissuance
Nashua Wastewater Treatment Facility

Attachment E Bypass Events[1] (2007-2012)

Monitoring Period End Date	Flow	Bypass		*E. Coli*	TRC	pH		BOD5			BOD5		TSS			TSS	
	DAILY MX	DAILY MX	MO Total	DAILY MX	DAILY MX	MIN	MAX	MO AVG	WKLY AVG	DAILY MX	MO AVG	DAILY MX	MO AVG	WKLY AVG	DAILY MX	MO AVG	DAILY MX
	MGD	hrs/day	# days/month	406 #/100mL	0.31 mg/l	SU	SU	mg/l	mg/l	mg/l	lbs/day	lbs/day	mg/l	mg/l	mg/l	lbs/day	lbs/day
03/31/2007	1.5	4	1		0.31	6.93	6.93	65	65	65	786	786	82	82	82	992	992
04/30/2007	11.6			4	0.28	6.54	6.89	34	48	48	1786	2709	39	46	46	2163	3193
11/30/2007	**0.42**	**2.5**	**1**		**0**	**6.97**	6.97	54	54	54	189	189	41	41	41	144	144
02/29/2008	0.9	11.7	1	40	0.260	6.85	6.85	75	75	75	550	550	159	159	159	1167	1167
03/31/2008	13.1	93	5	66	0.210	6.72	7.2	50	50	54	2979	5877	55	57	62	3296	6748
07/31/2008	4.9	4	2	7	0.290	6.68	6.86	25	20	30	822	826	22	20	24	739	817
08/31/2008	5	6.3	3		0.000	6.72	6.91	29	31	33	708	1170	22	24	27	525	836
09/30/2008	11.4	9.5	4	79	0.330	6.82	7.18	36	38	38	1695	1944	29	32	36	1580	1629
11/30/2008	15.3	12	1	52	0.270	7.16	7.16	47	47	47	5997	5997	20	20	20	2552	2552
12/31/2008	9.8	6.5	2	1	0.220	7.09	7.81	34	34	34	2768	2768	43	43	46	1920	3256
04/30/2009	11	6.1	5	4	0.300	6.94	7.81	45	35	68	3137	6068	55	51	66	3754	5890
05/31/2009	4.4	3.8	3	18	0.000	6.95	7.15	46	46	46	1458	1458	54	54	61	1458	2238
06/30/2009	10.3	6	3	1	0.280	6.83	6.98	39	39	52	2692	3166	48	48	50	3419	4037
07/31/2009	5.7	5.5	2	49	0.150	7.06	7.17	42	53	53	1428	2511	55	59	59	1685	2795
08/31/2009	6.5	11	3	157	0.160	6.58	7.03	72	72	96	3770	5180	90	96	138	3578	7446
10/31/2009	8	10	1	9	0.300	7	7	48	48	48	3203	3203	50	50	50	3336	3336
11/30/2009	0.6	2	1	29	0.000	6.84	6.84	24	24	24	128	128	26	26	26	139	139
12/31/2009	4.1	2.5	1	16	0.140	7.06	7.06	32	32	32	1094	1094	47	47	47	1607	1607
01/31/2010	15.7	7.8	1		0.000	7.18	7.18	58	58	58	7594	7594	86	86	86	11261	11261
02/28/2010	21.2	12	2	1	0.310	7.09	7.12	49	49	64	7501	11316	79	79	128	13492	22631
03/31/2010	14	24	7	43	0.000	6.54	7.27	47	52	56	2264	3736	38	48	46	1935	3269
06/30/2010	1.22	2.3	1		0.000	6.63	6.63	78	78	78	794	794	72	72	72	733	733
08/31/2010	9.6	5	1	41	0.000	6.69	6.69	40	40	40	3203	3203	40	40	40	3203	3203
10/31/2010	9.9	5.4	2		0.010	6.81	6.81	31	32	32	1734	2642	36	38	38	1927	2807

[1]Monitoring results of wet weather related bypasses are reported pursuant to a 2005 Consent Decree (*United States v. City of Nashua, NH,* Civil Action No. 05-376-PB (December 2005)). No bypasses occurred/data reported during the following monitoring periods: 05/2007-10-2007; 12/2007-01/2008; 04/2008-06/2008; 10/2008; 01/2009-03/2009; 09/2009; 04/2010-05/2010; 07/2010; 09/2010; 11/2010-05/2011; 09/2011-10/2011; 01/2012; 03/2012.

NPDES Permit No. NH0100170 2013 Reissuance
Nashua Wastewater Treatment Facility

Attachment E (Continued)

Monitoring Period End Date	Flow	Bypass		*E. Coli*	TRC	pH		BOD5			BOD5		TSS			TSS	
	DAILY MX	DAILY MX	MO Total	DAILY MX	DAILY MX	MIN	MAX	MO AVG	WKLY AVG	DAILY MX	MO AVG	DAILY MX	MO AVG	WKLY AVG	DAILY MX	MO AVG	DAILY MX
	MGD	hrs/day	# days/month	406 #/100mL	0.31 mg/l	SU	SU	mg/l	mg/l	mg/l	lbs/day	lbs/day	mg/l	mg/l	mg/l	lbs/day	lbs/day
06/30/2011	6.3	3.5	1	62	0.290	6.56	6.56	21	21	21	1103	1103	16	16	16	841	841
07/31/2011	5.2	2.6	1	3	0.060	6.96	6.96	25	25	25	1076	1076	8	8	8	344	344
08/31/2011	12	16	2	145	0.000	6.59	6.71	59	78	78	5338	7806	56	61	61	4846	6105
11/30/2011	9.7	6	3		0.150	6.62	6.7	52	54	54	2428	4368	51	49	56	2332	3964
12/31/2011	6.3	11	2		0.240	6.64	6.78	45	58	58	2278	3023	33	40	40	1572	2085
02/29/2012	8.39	4.1	1		0.000	6.79	6.79	62	62	62	4338	4338	80	80	80	5598	5598
Min	0.42	2	1	1	0	6.54	6.56	21	20	21	128	128	8	8	8	139	139
Max	21.2	93	7	157	0.33	7.18	7.81	78	78	96	7594	11316	159	159	159	13492	22631
Avg	8.13	10.21	2.17	39.38	0.152	6.828	7	45.47	47.27	50.77	2494.70	3220.77	51.07	52.4	57.03	2737.93	3722.1
Median	8.195	6	2	29	0.155	6.825	6.965	45.5	48	52.5	2025	2738.5	47.5	48	48.5	1923.5	2801

[1]Monitoring results of wet weather related bypasses are reported pursuant to a 2005 Consent Decree (*United States v. City of Nashua, NH,* Civil Action No. 05-376-PB (December 2005)). No bypasses occurred/data reported during the following monitoring periods: 05/2007-10-2007; 12/2007-01/2008; 04/2008-06/2008; 10/2008; 01/2009-03/2009; 09/2009; 04/2010-05/2010; 07/2010; 09/2010; 11/2010-05/2011; 09/2011-10/2011; 01/2012; 03/2012.

Attachment F

Combined Sewer Overflow Data

Annual Overflow Volumes (2009-2011)

			Annual Overflow Volume(MG)		
CSO Outfall No.	**Location**	**Receiving Stream**	**2009**	**2010**	**2011**
002	Salmon Brook	Merrimack River	0	0	0
003	Farmington Road	Merrimack River	7.14	0	0
004	Burke Street	Merrimack River	3.634	2.364	9.427
005	East Hollis Street	Merrimack River	159.51	65.903	29.631
006	Nashua River	Nashua River	48.9	22.646	46.065
007	Tampa Street	Nashua River	0.33	0	1.139
008	Broad Street	Nashua River	1.8	0	0
009	Lock Street	Nashua River	1.291	0.187	0.466
		Total	**222.605**	**91.1**	**86.728**

CSO Bacteria Data (2007-2011)

CSO #	**002**	**003**	**004**	**005**	**006**	**007**	**008**
Monitoring Period End Date	***E. Coli***	***E. Coli***	***E. Coli***	***E. Coli***	***E. Coli***	***E. Coli***	***E. Coli***
	DAILY MX	**DAILY MX**	**DAILY MX**	**DAILY MX**	**DAILY MX**	**DAILY MX**	**DAILY MX**
	406 #/100mL	**406 #/100mL**	**406 #/100mL**	**406 #/100mL**	**406 #/100mL**	**406 #/100mL**	**406 #/100mL**
12/31/2007		1600	100	8000			8000
12/31/2008		2419	2419	2419			
12/31/2009				2419			
12/31/2010				1119			
12/31/2011							

Attachment G

Statistical Approach to Characterizing the Effluent for Determining Reasonable Potential

EPA bases its determination of "reasonable potential" on a characterization of the upper bound of expected effluent concentrations based on a statistical analysis of the available monitoring data. As noted in the *Technical Support Document for Water Quality Based Toxics Control* (EPA 1991) ("TSD"), "[a]ll monitoring data, including results for concentrations of individual chemicals, have some degree of uncertainty associated with them. The more limited the amount of test data available, the larger the uncertainty." Thus with a limited data set, the maximum concentration that has been found in the samples may not reflect the full range of effluent concentration.

To account for this, EPA has developed a statistical approach to characterizing effluent variability when the monitoring dataset includes 10 or more samples.[2] As "experience has shown that daily pollutant discharges are generally lognormally distributed," *TSD* at App. E, EPA uses a lognormal distribution to model the shape of the observed data, unless analysis indicates a different distributional model provides a better fit to the data. The model parameters (mean and variance) are derived from the monitoring data. The model parameter μ is the mean of the natural logs of the monitoring data values, while σ is the standard deviation of the natural logs of the monitoring data values.

The lognormal distribution generally provides a good fit to environmental data because it is bounded on the lower end (i.e. you cannot have pollutant concentrations less than zero) and is positively skewed. It also has the practical benefit that if an original lognormal data set X is logarithmically transformed (i.e. Y = ln[X]) the resulting variable Y will be normally distributed. Then the upper percentile expected values of X can be calculated using the z-score of the standardized normal distribution (i.e. the normal distribution with mean = 0 and variance = 1), a common and relatively simple statistical calculation. The p^{th} percentile of X is estimated by

$X_p = \exp(\mu_y + z_p \times \sigma_y)$, where μ_y = mean of Y
σ_y = standard deviation of Y
Y = ln[X]
z_p = the z-score for percentile "p"

For the 95^{th} percentile, $z_{95} = 1.645$, so that

$$X_{95} = \exp(\mu_y + 1.645 \times \sigma_y)$$

The 95th percentile value is used to determine whether a discharge has a reasonable potential to cause or contribute to an exceedance of a water quality standard. The combination of the upper bound effluent concentration with dilution in the receiving water is calculated to determine whether the water quality criteria will be exceeded.

Datasets including non-detect values

[2] A different statistical approach is applied where the monitoring data set includes less than 10 samples.

Attachment G (Continued)

The *TSD* also includes a procedure for determine such percentiles when the dataset includes non-detect results, based on a delta-lognormal distribution. In the delta-lognormal procedures, nondetect values are weighted in proportion to their occurrence in the data. The values above the detection limit are assumed to be lognormally distributed values.

The statistical derivation of the delta-lognormal upper bounds is quite complex and is set forth in the TSD at Appendix E. Calculation of the 95th percentile of the distribution, however, involves a relatively straightforward adjustment of the equations given above for the lognormal distribution, as follows.

For the deltalognormal, the pth percentile of X, referred to here as X_p*, is given by

$$X_p^* = \exp(\mu_y^* + z_p^* \times \sigma_y^*),$$

where μ^*= mean of Y values for data points above the detection limit;
σ_y^*= standard deviation of Y for data points above the detection limit;
$Y = \ln[X^*]$;
X^*= monitoring data above detection limit; and
z_p^* = an adjusted z score that is given by the equation:

$$z_p^* = \text{z-score}[(p - \delta)/(1 - \delta)]$$

where δ is the proportion of nondetects in the monitoring dataset.

k = total number of dataset
r = number of nondetect values in the dataset
$\delta = r/k$

Attachment G (Continued)

For the 95th percentile, this takes the form of z_p^* = z-score[(.95 – δ)/(1 - δ)]. The resulting values of z_p^* for various values of δ is set forth in the table below; the calculation is easily performed in excel or other spreadsheet programs.

Example calculations of z_p^* for 95th percentile

δ	**(0.95 - δ)/ (1 - δ)**	**z_p^***
0	0.95	1.645
0.1	0.94	1.593
0.3	0.93	1.465
0.5	0.90	1.282
0.7	0.83	0.967

Attachment H

Example Calculation of Reasonable Potential Determination

The following is an example of the methodology used for determining reasonable potential, using copper and the relevant chronic water quality criterion.

The downstream concentration (Cr) of copper that is expected to occur as a result of the discharge is calculated as follows:

$$C_r = \frac{Q_d C_d + Q_S C_S}{Q_r}$$

where:

Q_d = effluent flow (design flow = 16 mgd = 24.75 cfs)
C_d = effluent metals concentration in µg/L (95^{th} percentile = 32.42 µg/l)
Q_S = stream flow upstream (7Q10 upstream = 759.4 cfs)
C_S = background (ambient) in-stream metals concentration in µg/L (median = 2 g/l)
Q_r = resultant in-stream flow, after discharge ($Q_S + Q_d$ = 784.1 cfs)
C_r = resultant downstream concentration, in ug/L

Following the methodology set forth in Box 3-2 and Attachment E of the *Technical Support Document for Water Quality-based Toxics Control* (US EPA, March 1991 [505/2-90-001]), the 95^{th} percentile estimated effluent daily maximum concentration (C_d) was determined from a statistical analysis of aluminum data submitted with WET test reports from 2007-2012 (see **Attachment A** and Table 6). Values reported as being either not detected or below the detection limit were assigned a value of 0.

Applying this maximum effluent concentration to the mass balance equation results in a projected downstream concentration of 2.96 ug/l, as shown below.

C_r = [(27.75 cfs)(32.42 ug/l) + (759.4 cfs)(2 ug/l)] / 784.1 cfs = **2.96 ug/l**

Reasonable potential is then determined by comparing this resultant downstream concentration with the relevant criterion multiplied by a factor of 0.9 to reserve 10% of the assimilative capacity of the receiving water, in accordance with Env-Wq 1705.01. In this case, the chronic criterion (87 ug/l) multiplied by 0.9 results in a value equal to 78.3 ug/l. Since 79.09 ug/l is greater than 78.3 ug/l, there is reasonable potential for the discharge to cause or contribute to

Attachment H (Continued)

exceedances of the chronic criterion. Therefore, a chronic effluent limitation is necessary to ensure attainment of water quality standards.

A chronic effluent limitation was determined by rearranging the mass balance equation to solve for the maximum concentration of aluminum that may be present in the effluent (C_d) without resulting in the downstream criterion being exceeded, as follows:

$$C_d = \frac{Q_r C_r - Q_S C_S}{Q_d}$$

The terms would be the same as those described above with the exception of the resultant in-stream concentration (C_r) being replaced with the relevant criterion multiplied by 0.9 (2.85 ug/l * 0.9 = 2.57 ug/l).

C_d = [(784.1)(2.57 ug/l) - (759.4 cfs)(2 ug/l)]/24.75 cfs = **20.0 ug/l**

Therefore, a chronic effluent limit of 20.0 ug/l has been included in the draft permit.

Attachment I

Screening and Disinfection Facility-Dilution Factor and Total Residual Chlorine Limitation Calculations

According to information submitted to EPA and NHDES, the screening and disinfection facility (SDF) is designed to treat flows up to 141 cfs (91 MGD). A dilution factor of 5 was derived from the design flow of the facility and the 7Q10 stream flow that was established for the Merrimack River upstream from the Nashua WWTF (784.1 cfs) (see AttachmentB).

Limitations for total residual chlorine were calculated by multiplying the dilution factor by the acute and chronic criteria. These calculations are shown below.

Dilution Factor

The following equation was used to calculate a dilution factor of 5:

$$\text{Dilution Factor} = \frac{Q_{MR} + Q_D}{Q_D} \times 0.9$$

Where:
Q_{MR} = Estimated 7Q10 low flow of the Merrimack River (759.4 cfs)
0.90 = Factor to reserve 10 % assimilative capacity
Q_{SDF} = Design Flow of the SDF (141 cfs)

Dilution Factor = (759.4 cfs +141 cfs/ 141 cfs)X 0.9 = 5.747

Total Residual Chlorine Limitations

Acute criterion = 19 µg/l
Chronic criterion = 11 µg/l

Limit = criteria x dilution factor

Acute Limit = 19 µg/l X 5.747 = 109 µg/l = 0.109 mg/l

Chronic Limit = 11 µg/l X 5.747 = 63.2 µg/l = 0.063 mg/l

NEW HAMPSHIRE DEPARTMENT OF ENVIRONMENTAL SERVICES
WATER DIVISION
P.O. BOX 95
CONCORD, NEW HAMPSHIRE 03302-0095

U.S. ENVIRONMENTAL PROTECTION AGENCY
OFFICE OF ECOSYSTEM PROTECTION
REGION I
BOSTON, MASSACHUSETTS 022030001

JOINT PUBLIC NOTICE OF A DRAFT NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM (NPDES) PERMIT TO DISCHARGE INTO THE WATERS OF THE UNITED STATES UNDER SECTIONS 301 AND 402 OF THE CLEAN WATER ACT (THE "ACT"), AS AMENDED, AND REQUEST FOR STATE CERTIFICATION UNDER SECTION 401 OF THE ACT, AND ISSUANCE OF A STATE SURFACE WATER PERMIT UNDER NH RSA 485-A:13, I(a).

DATE OF NOTICE: **July 23, 2013**

PERMIT NUMBER: **NH0100170**

PUBLIC NOTICE NUMBER: **NH-005-13**

NAME AND MAILING ADDRESS OF APPLICANT:

City of Nashua
Sawmill Road
Nashua, New Hampshire 03060

NAME AND LOCATION OF FACILITY WHERE DISCHARGE OCCURS:

Nashua Wastewater Treatment Facility
Sawmill Road
Nashua, New Hampshire 03060

RECEIVING WATER(S): Merrimack River and Nashua River

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

PREPARATION OF THE DRAFT PERMIT:

The U.S. Environmental Protection Agency (EPA) and the New Hampshire Department of Environmental Services, Water Division have cooperated in the development of a draft permit for the above identified facility. The effluent limits and permit conditions imposed have been drafted to assure that State Water Quality Standards and provisions of the Clean Water Act will be met. EPA has formally requested that the State certify the draft permit pursuant to Section 401 of the Clean Water Act and expects that the draft permit will be certified. However, sludge conditions in the draft permit are not subject to State certification requirements.

INFORMATION ABOUT THE DRAFT PERMIT:

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

Meridith Timony
U.S. Environmental Protection Agency – Region 1
5 Post Office Square, Suite 100 (OEP06-1)
Boston, MA 02109-3912
Telephone: (617) 918-1533

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

PUBLIC COMMENT AND REQUEST FOR PUBLIC HEARING:

All persons, including applicants, who believe any condition of the draft permit is inappropriate, must raise all issues and submit all available arguments and all supporting material for their arguments in full by **September 20, 2013,** to the U.S. EPA, 5 Post Office Square, Boston, Massachusetts 02109-3912. Any person, prior to such date, may submit a request in writing to EPA and the State Agency for a public hearing to consider the draft permit. Such requests shall state the nature of the issues proposed to be raised in the hearing. A public hearing may be held after at least thirty days public notice whenever the Regional Administrator finds that response to this notice indicates significant public interest. In reaching a final decision on 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.

FINAL PERMIT DECISION:

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

HARRY T. STEWART, P.E., DIRECTOR
WATER DIVISION
NEW HAMPSHIRE DEPARTMENT OF
ENVIRONMENTAL SERVICES

KEN MORAFF, ACTING DIRECTOR
OFFICE OF ECOSYSTEM PROTECTION
U.S. ENVIRONMENTAL PROTECTION
AGENCY - REGION I