UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
NEW ENGLAND
1 CONGRESS STREET
SUITE 1100
BOSTON, MASSACHUSETTS 02203

FACT SHEET

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

NPDES PERMIT NO.: **MA0100919**

NAME AND ADDRESS OF APPLICANT:

Town of Spencer
Sewer Commission
Spencer, MA 01562

NAME AND ADDRESS OF FACILITY WHERE DISCHARGE OCCURS:

Spencer Wastewater Treatment Plant
Route 9
Spencer, MA

RECEIVING WATER: **Cranberry Brook**

CLASSIFICATION: **B: warm water fishery (Chicopee Watershed)**

I. Proposed Action, Type of Facility, and Discharge Location

The above named applicant has applied to the U.S. Environmental Protection Agency for the reissuance of its NPDES permit to discharge into Cranberry Brook, a tributary to the Sevenmile River. The facility is engaged in the collection and treatment of municipal and commercial wastewater. Figure 1 shows the facility location.

The draft permit contains monthly average total phosphorus limits of 0.2 mg/l (May1- October 31) and 0.3 mg/l (November1 – April 30) which are more stringent than the limits in the existing permit. Also, seasonal average mass total phosphorus limits of 0.79 lbs/day (May 1 – October 31) and 1.19 lbs/day (November 1 – April 30) are included in the draft permit. These seasonal average mass total phosphorus limits are based on wasteload allocations established in the final phosphorus TMDLs developed by MassDEP for Quaboag and Quacumquasit Ponds (dated May 16, 2006). The basis for the new phosphorus limits are discussed in the *Phosphorus* Section of this Fact Sheet.

This draft permit continues to include detailed requirements regarding the control of inflow and infiltration (I/I) (see Section C.2. of the draft permit) and explicitly prohibits treatment process bypasses that have occasionally occurred at the treatment facility during high I/I events. The copper effluent limits in the draft permit are revised from the previous limit because of new hardness data and an updated determination of the 7Q10 low-flow (7Q10) for Cranberry Brook. Winter ammonia limits are included in the draft permit and the chronic whole effluent toxicity

limitation has been revised based on the updated 7Q10 low-flow determination for Cranberry Brook.

The draft permit includes changes to the monitoring requirements for phosphorus, winter ammonia, TKN, nitrite, nitrate, and whole effluent toxicity. Additionally, monitoring requirements for Escherichia coli and bypass events (BOD_5, TSS, and total phosphorus) have been added to the draft permit. The bases for the monitoring requirements are further discussed in the respective sections of this Fact Sheet.

Collection System, Treatment Process and other Related Operational Information:

The wastewater collection system consists of 18.5 miles of interceptor and collector sewers that serve portions of the Town of Spencer. The West Main Street (Route 9) interceptor picks up flows from the other collectors and interceptor sewers, as well as the Meadow Road force main and conveys them to the wastewater treatment facility. The collection system includes both new and old sewers. No combined sewers are believed to be connected to the collection system. Wastewater is comprised of mostly domestic sewage with some septage, commercial, and industrial sewage. There are two small discharges of industrial wastewater received at the WWTP consisting of (1) heated non-contact process water and boiler blowdown and (2) cleaning water used in the preparation of jam and jellies.

Treatment Plant Flow:

The Spencer wastewater treatment facility has a design flow of 1.08 MGD. Wastewater enters the treatment plant through a 24-inch gravity sewer directly to the screening and grit removal facilities where it receives preliminary treatment to remove large solids and grit. Flow continues to the screw pump lift station and is pumped to the aeration basins for biological treatment, including nitrification. Following aeration, the biomass flows through a chemical feed manhole where alum and lime are introduced, as needed, to enhance phosphorus removal and adjust pH, respectively. The biomass and chemicals are blended in a rapid-mix box prior to flowing into the final clarifier. Settled solids are returned to the aeration tanks. Excess sludge is removed as waste sludge. Clarifier effluent enters wetland beds for tertiary treatment and then is disinfected using ultraviolet radiation. The final effluent is aerated and replenished with dissolved oxygen as it flows down a cascade outfall to Cranberry Brook.

A review of influent and effluent flow records reveals that the influent flow typically exceeds the effluent flow at the facility, indicating that a portion of the flow that enters the facility is being lost to groundwater. The loss of flow is most likely occurring in the wetland treatment system through groundwater recharge. Table 1 and Attachment B summarize the difference in influent and effluent flows at the WWTP. The loss of flow from the wetland system to ground water has been as high as high 45 percent or 0.5 MGD (April 2005), while on average, the loss of flow to ground water has been approximately 0.2 MGD.

Occasionally, secondary treatment process bypass events occur at the facility when influent flows exceed the capacity of the screw pump lift station (5.48 MGD). Influent flows exceeding 5.48 MGD discharge to the wet weather pump station and are pumped to the last two constructed wetland beds for treatment. Bypassed flows mix with the fully treated flows prior to disinfection. There have been four bypass events since issuance of the last permit in February of 2003. For the bypass events, flow data from the facility indicate that instantaneous peak influent flows exceeding 5.48 MGD occur for only short periods of time during the day of the event. The volumes of the bypassed flow during these events have ranged between 1.2 and 6.7 percent of the

total influent flow volume received at the WWTP on the day of that the bypass occurred. In all cases, the bypass events were caused by wet weather conditions that resulted in high I/I in the collection system.

Sludge Processing:

Waste sludge from the final clarifiers is thickened by gravity to approximately 7% solids, and then pumped to the sludge holding tank for temporary storage. The sludge is then trucked to Rhode Island for incineration by SYNAGRO.

Nutrient Removal:

Phosphorus removal is accomplished by chemical precipitation using liquid alum. Alum is stored in a 6,000-gallon tank located in the south section of the solids building. The alum is injected into the process at the chemical manhole located after the aeration tanks and then mixed at the rapid mix/splitter box.

Nitrification is accomplished biologically in the aeration tanks. Lime is stored in a 2,000 cubic foot silo located outside the solids building on the southeasterly side. Lime is used for pH control to enhance nitrification, effluent pH adjustment, and to control septage odors. Lime slurry mix tanks are located inside the solids building where lime slurry is pumped to the aerated septage tank for process addition.

Constructed Wetlands:

The wetland beds were originally constructed in as sand beds, but over time, vegetation had grown in the beds creating a wetlands type of environment. As part of the treatment plant upgrade completed in 1988, six of the beds, Bed C through Bed H, were converted into constructed wetlands by removing existing vegetation and the top layer of soil, and installing inlet and outlet structures, underdrains, six inches of top sand and wetland vegetation. Four different types of vegetation were planted for phosphorus removal. Bed D and Bed F were planted with cattails and wool grass, Bed C and Bed E with reed grass and Bed G and Bed H with reed canary grass. The wetland beds are utilized throughout the year.

Septage Treatment:

Septage facilities are located just outside the eastern mid–point of the solids building. A receiving trough with a course bar screen empties into a 10,000 gallon aerated storage tank. Lime is added to control odors and for pH adjustment. Plant water is pumped at 20 gpm to dilute and feed the septage/lime mixture into the process through the septage tank overflow pipe which empties into the aerated grit tank.

Ultraviolet Radiation - Disinfection:

Final effluent is disinfected using ultraviolet radiation. Effluent collected by the underdrain system in the wetland cells passes under ultraviolet lamps for disinfection prior to discharge to Cranberry Brook.

Staffing:

Three employees staff the treatment facility full time Monday - Friday, 7:00 a.m. - 3:30 p.m. and rotate weekend shifts of 3 hours on Saturday, Sunday and holidays. Wastewater Treatment Operator Licenses held by employees are: two Grade-7 and one Grade-5. A part time clerk works at the Sewer Department Office, Monday through Thursday, processing bills, invoices, permits and phone calls.

Outside contractors are used for engineering, electrical, mechanical, welding, machine shop services and collection system cleaning, repair and replacement.

II. Description of Discharge

Flow and effluent quality data for the Spencer WWTP are summarized below in Table 1 for the two year period (October 2003 - September 2005). Monthly average and maximum daily values for each month during this period may be found in Attachment 1. Data are summarized to demonstrate recent performance history of the facility. As indicated, the Spencer WWTF has maintained a high quality effluent and has been in compliance with effluent limitations for all parameters except for copper. During the summer of 2006, the permittee will undertake a corrosion control program within the Town's drinking water distribution system to help address the elevated copper levels.

Table 1. Summary of flow and effluent quality for Spencer WWTP (October 2003 – September 2005)

Parameter	**Average monthly average (range of monthly averages)**	**Average daily maximum (range of daily maximums)**
Influent flow (MGD)	0.75 (0.47 – 1.28)	1.48 (0.55 - 2.90)
Effluent Flow (MGD)	0.55 (0.15 – 1.36)	1.34 (0.30 - 2.85)
BOD_5 (mg/l)	1.98 (0.90 – 3.50)	2.78 (1.40 – 5.60)
TSS (mg/l)	0.39 (0.20 – 1.90)	0.84 (0.20 – 6.80)
Total Phosphorus (mg P/l)	0.17 (0.13 – 0.24)	-----
Ammonia (mg N/l)	0.07 (0.03 – 0.29)	-----
Copper (µg/l)	55 (28 – 130)	-----
Effluent toxicity (%) (number of tests)		
LC50	-----	>100 (7)
C-NOEC	-----	89 (1), >100 (6)

III. Permit Limitations and Conditions

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

IV. Permit Basis and Explanation of Effluent Limitation Derivation

Waterbody Classification and Usage:

The effluent from the Spencer WWTP discharges into Cranberry Brook approximately 500 feet upstream from its confluence with the Sevenmile River. Further downstream, the Sevenmile

River joins the East Brookfield River and then eventually discharges into Quaboag Pond which, at times, is hydraulically connected to Quacumquasit Pond. Cranberry Brook, Sevenmile River, East Brookfield River, Quaboag Pond and Quacumquasit Pond are all classified in the Massachusetts Surface Water Quality Standards (314 CMR 4.00) as Class B-warm water fisheries. Class B waters are designated as habitat for fish, other aquatic life, and wildlife and for primary and secondary contact recreation. Where designated, Class B waters shall be suitable as a source of public water supply with appropriate treatment. They shall be suitable for irrigation and other agricultural uses and for compatible industrial cooling and process uses. These waters shall have consistently good aesthetic value.

Municipal Waste Water Treatment Facility [also referred to as "Publicly Owned Treatment Works" (POTW Discharges)] Effluent Limits Regulatory Basis

EPA is required to consider technology and water quality requirements when developing permit effluent limits. Technology-based treatment requirements represent the minimum level of control that must be imposed under Sections 402 and 301(b) of the Clean Water Act (CWA) (see 40 CFR 125 Subpart A). For publicly owned treatment works, technology based requirements are effluent limitations based on secondary treatment as defined in 40 CFR Part 133.

Under Section 301(b)(1)(C) of the CWA, discharges are subject to effluent limits based on water quality standards. The Massachusetts Surface Water Quality Standards (314 CMR 4.00) include requirements for the regulation and control of toxic constituents, and also require that EPA criteria, established pursuant to Section 304(a) of the CWA, shall be used unless a site-specific criteria are established. The state will limit or prohibit discharge of pollutants to surface waters to assure that water quality of the receiving waters are protected and maintained and consistent with Massachusetts Surface Water Quality Standards.

The permit must limit any pollutant or pollutant parameter (conventional, non-conventional, toxic, and whole effluent toxicity) that is or may be discharged at a level that causes, or has reasonable potential to cause, or contribute to an excursion above any water quality criterion. An excursion occurs if the projected or actual receiving water concentrations do not comply with the applicable criterion. In determining reasonable potential, EPA considers existing controls on point and non-point sources of pollution, variability of the pollutant in the effluent, sensitivity of the species to toxicity and where appropriate, the dilution of the effluent in the receiving water.

A permit may not be renewed, reissued, or modified with less stringent limitations or conditions than those contained in the previous permit unless in compliance with the anti-backsliding requirements of the CWA. Anti-backsliding provisions are found in Sections 402(o) and 303(d)(4)of the Clean Water Act and at 40 CFR 122.44(l) and require that the limits in a reissued permit be at least as stringent as those in the previous permit, except under certain circumstances. Effluent limits based on technology standards, water quality, and state certification requirements must all meet anti-backsliding provisions.

Flow:

The stream flow information used to calculate effluent limits in the draft permit is presented below in Table 2. The 7-day, 10-year low flow (7Q10) and the seasonal (December 1 – April 30) 30-day, 10-year low flow (30Q10) used in the draft permit are based on continuous flow data collected at the USGS gage located on the Sevenmile River and adjusted for the drainage area at the discharge location. Flow factors, expressed as flow per square mile, for 7Q10 and 30Q10 were derived using data collected at the Sevenmile River gage. These flow factors were then

multiplied by the drainage area at the Spencer WWTP to determine 7Q10 and 30Q10 low-flow conditions at the point of discharge. As indicated in Table 2, the 7Q10 used in the draft permit is 0.15 cfs at the Spencer WWTP. The 7Q10 flow value is updated from the previous permit and reflects the daily flow record (1962-2004) for the Sevenmile gage. The 7Q10 flow value was used to calculate effluent limits for copper and chronic whole effluent toxicity, while the seasonal 30Q10 flow was used to calculate the winter ammonia effluent limit for the period of December 1 to April 30.

Table 2. Low-flow statistics for the Sevenmile River gage (1962-2004) and Spencer WWTP.

	Sevenmile River USGS Gage 01175670	Spencer WWTP Cranberry Brook
Drainage Area (square miles)	8.81	6.4
7Q10 flow (cfs)	0.2	0.15
7Q10 flow factor (cfs/square mile)	0.023	0.023
Seasonal 30Q10 flow (cfs) (December – April)	3.9	2.8
30Q10 flow factor (cfs/square mile)	0.443	0.443

Dilution factors, which account for the magnitude of the Spencer WWTP discharge (1.08 MGD or 1.67 cfs) and the available dilution in Cranberry Brook at the discharge location, were calculated for both 7Q10 and 30Q10 flow conditions. As discussed below, the dilution factors are used with applicable criteria to determine allowable effluent limits for ammonia and copper. The dilution factors for the Spencer WWTP are calculated as follows.

Monthly average dilution factor for 7Q10 conditions (DF_{7Q10})

DF_{7Q10} = (7Q10 $_{\text{Cranberry Brook}}$ + WWTP flow)/WWTP flow

DF_{7Q10} = (0.15 cfs + 1.67 cfs)/1.67 cfs

DF_{7Q10} = 1.09

Monthly average dilution factor for seasonal 30Q10 conditions (DF_{30Q10})

DF_{30Q10} = (30Q10 $_{\text{Cranberry Brook}}$ + WWTP flow)/WWTP flow

DF_{30Q10} = (2.8 cfs + 1.67 cfs)/1.67 cfs

DF_{30Q10} = 2.68

The effluent limits for the various parameters are discussed below:

BOD_5 and total suspended solids: The limits are based upon the previous permit and vary according to seasons. During the colder weather season (November – April) the limits are technology based requirements while during the warmer weather season (May – October) the limits are water quality based. In previous permits, the limits have been reduced since the 1975 Massachusetts Water Quality Management Plan waste load allocation (WLA) based upon facility planning efforts and updates of the WLA.

pH: The limit is based upon the previous permit and reflects the ambient Class B standard in Massachusetts Surface Water Quality Standard (MASWQS).

Minimum dissolved oxygen concentration: The limit is based upon the previous permit and is necessary to maintain an in-stream dissolved oxygen level above the MASWQS of 5.0 mg/l particularly during low flow periods.

Fecal coliform: The limit is based upon the previous permit and reflects the in-stream Class B standard. This is a seasonal limit (April – October).

Escherichia coli: The seasonal monthly monitoring requirement is based on the Escherichia coli (E. Coli) criteria proposed in the revisions to MASWQS. Massachusetts intends to adopt proposed revisions to the SWQS including changing the indicator bacteria organism from fecal coliform to E. coli by the end of 2006. Concurrent fecal coliform and E. coli data collected from the effluent are needed to ensure that MASWQS will be attained during the period between final adoption of the revised SWQS and reissuance of Spencer's permit to include an E. coli limit.

Ammonia: The seasonal limit for May to October is based upon the previous permit and reflects the need to reduce the oxygen demanding component of the nitrogen cycle during nitrification and also reflects the need to reduce ammonia to prevent toxicity. The November ammonia limit is also based on the previous permit to prevent toxicity in Cranberry Brook. The draft permit includes a new winter season (December 1 – April 30) ammonia limit to prevent in-stream toxicity. EPA has promulgated water quality criteria which address ammonia toxicity including "winter" conditions. The determination of the winter ammonia ambient criterion for Cranberry Brook is dependent on pH and temperature as explained in the 1999 Update of Ambient Water Quality Criteria for Ammonia, 64 Federal Register 71973-71980.

The winter limit for ammonia is included in the draft permit to insure that the Spencer WWTP continues to maintain nitrification throughout the winter season. A review of effluent data for the discharge indicates that the Spencer WWTP does an excellent job of maintaining very low ammonia levels in its discharge throughout the year. However, if nitrification were to cease during the winter season, the discharge could potentially cause ammonia toxicity in Cranberry Brook. Therefore, as a precaution, an ammonia winter limit is included in the draft permit. Based on an in-stream pH of 7.1 and temperature of 5° C, the winter ammonia criterion to prevent chronic toxicity in Cranberry Brook at the discharge is 5.67 mg N/l. Using the seasonal (December – April) 30Q10 dilution factor, the monthly average winter effluent limit for ammonia is 15.2 mg N/l or 136 lbs N/day.

Monthly average ammonia concentration limit ($C\text{-}NH_3$)

$C\text{-}NH_3$ = chronic criterion x 30Q10 dilution factor
$C\text{-}NH_3$ = 5.67 mg N/l x 2.68
$C\text{-}NH_3$ = 15.2 mg N/l

Monthly average ammonia mass limit ($M\text{-}NH_3$)

$M\text{-}NH_3$ = $C\text{-}NH_3$ x monthly average permit flow x conversion factor
$M\text{-}NH_3$ = 15.2 mg N/l x 1.08 MGD x 8.28
$M\text{-}NH_3$ = 136 lbs N/day

While the draft permit includes winter ammonia limits, the frequency of monitoring for ammonia during the winter season (December 1 to April 30) is reduced from once per week in the existing permit to twice per month in the draft permit. Monitoring for ammonia twice per month during this period will be sufficient to determine whether the facility has continued to nitrify and remove ammonia.

Total Nitrogen: The need for monitoring requirements for nitrogen is based on the previous permit. It has been determined that excessive nitrogen loadings are causing significant water quality problems in Long Island Sound, including low dissolved oxygen. The State of Connecticut has begun to impose nitrogen limitations on Connecticut River discharges to Long Island Sound and its tributaries. EPA believes there is a need to determine the loadings of nitrogen from sources in Massachusetts which are tributary to Long Island Sound, to determine whether these loadings are impacting the water quality in Long Island Sound, and to help determine what limits, if any, should ultimately be imposed on discharges in Massachusetts. During operation under the existing permit, the permittee monitored for TKN, nitrite, and nitrate nitrogen once per month. The draft permit reduces the frequency of this monitoring to four times per year (February, May, August, and November). The new quarterly data along with the monthly data collected under the existing permit will be sufficient to characterize the total nitrogen loading being discharged by the Spencer WWTP. The nitrogen data will help to establish a database of nitrogen loadings, which can be used to quantitatively assess the impact of loading and transport of nitrogen to Long Island Sound. The data will be used in future decisions relating to nitrogen loadings to the Sound. No numerical limitations for these pollutants are established in the draft permit.

Metals

Relatively low concentrations of trace metals in receiving waters can be toxic to resident aquatic life species. Effluent metals data submitted with toxicity test results were reviewed to determine if any of the metals in the discharge have the potential to exceed aquatic life criteria in Cranberry Brook. The data indicate that the discharge has the potential during low flow conditions to cause/and or contribute to exceedances of the ambient copper criteria as adopted in MASWQS. The copper criteria adopted in the MASWQS are set at levels to protect aquatic life from both acute and chronic toxicity. The limits for copper in the draft permit are changed from the existing permit and are based on a revised 7Q10 flow and more current hardness data. Hardness data for the effluent and Cranberry Brook submitted with toxicity test results indicate an in-stream hardness of 100 mg/l just downstream of the discharge during 7Q10 flow conditions. Based on this hardness, the acute and chronic copper criteria for Cranberry Brook used to calculate the maximum daily and monthly average copper limits are 14.0 µg/l and 9.3 µ/l, respectively. Based on the 7Q10 dilution factor, the draft permit includes a daily maximum limit equal to15.3 µg/l and a monthly average limit of 10.3 µg/l.

Maximum daily copper limit ($C\text{-}CU_{MD}$)

$C\text{-}CU_{MD}$ = acute criterion x 7Q10 dilution factor
$C\text{-}CU_{MD}$ = 14.0 µg/l x 1.09
$C\text{-}CU_{MD}$ = 15.3 µg/l

Monthly average copper limit ($C\text{-}CU_{MA}$)

$C\text{-}CU_{MA}$ = acute criterion x 7Q10 dilution factor
$C\text{-}CU_{MA}$ = 9.3 µg/l x 1.09
$C\text{-}CU_{MA}$ = 10.3 µg/l

The reasonable potential analysis for other trace metals did not indicate that Spencer's discharge has a reasonable potential to cause or contribute to exceedences of metals criteria in Cranberry Brook. Metals data submitted with toxicity test reports were evaluated against potential water quality-based effluent limits based on the respective water quality criteria for each metal. The criteria were determined based on a hardness of 100 mg/l $CACO_3$ and potential effluent limits

were calculated using the 7Q10 instream dilution (dilution factor of 1.09) for Cranberry Brook. The data show that metals levels in the discharge are low and consistently below the respective potential limits for this discharge. For example, Table 3 summarizes the criteria, potential water quality-based limits, and discharge quality for three trace metals (aluminum, lead, and zinc) that are commonly present in the effluent of POTWs. As indicated, the arithmetic means of the data are well below the criteria and there was only one reported value for each of these metals that exceeded a criterion. A review of the data indicates that the high values are outliers of the data sets and are not representative of the typical quality of the effluent.

Table 3. Summary of Reasonable Potential Analysis for selected Trace Metals

Metal	Acute Criterion (µg/l)	Chronic Criterion (µg/l)	Maximum Daily Limit (µg/l)	Average Monthly Limit (µg/l)	Effluent		
					Mean (µg/l) reported	Range(µg/l)	no. of exceedences
Aluminum	750.0	87.0	817.0	94.8	54.7	20 - 410	1 of 15
Lead	81.7	3.2	89.0	3.5	2.6	0.5 - 6	1 of 15
Zinc	119.8	119.8	130.6	130.6	64.6	30 - 140	1 of 15

Whole Effluent Toxicity Testing

Under Section 301(b)(1) of the CWA, discharges are subject to effluent limitations based on water quality standards. The State Surface Water Quality Standards (314 CMR 4.05(5)(e.)), include the following narrative statements and require that EPA criteria established pursuant to Section 304(a)(l) of the CWA be used as guidance for interpretation of the following narrative criteria:

All surface waters shall be free from pollutants in concentrations or combinations that are toxic to humans, aquatic life or wildlife. Where the State determines that a specific pollutant not otherwise listed in 3.14 CMR 4.00 could reasonably be expected to adversely affect existing or designated uses, the State shall use the recommended limit published by EPA pursuant to 33 U.S.C. 1251 §304(a) as the allowable receiving water concentrations for the affected waters unless a site-specific limit is established. Site specific limits, human health risk levels and permit limits will be established in accordance with 314 CMR 4.05(5)(e)(1)(2)(3)(4).

National studies conducted by the EPA have demonstrated that domestic sources contribute toxic constituents to POTWs above those, which may be contributed from industrial users. These pollutants include metals, chlorinated solvents, aromatic hydrocarbons and other constituents. As a result, EPA New England and the MassDEP have developed toxicity control policies. These policies require wastewater treatment facilities to perform toxicity bioassays on their effluent. Discharges having a dilution of less than 10:1 require acute and chronic toxicity limits.

The principal advantages of biological techniques are: (1) the effects of complex discharges of many known and unknown constituents can be measured only by biological analysis; (2) bioavailability of pollutants after discharge is measured by toxicity testing including any synergistic effect of pollutants; and (3) pollutants for which there are inadequate analytical methods or criteria can be addressed. Therefore, toxicity testing is being used in connection with pollutant-specific control procedures to control the discharge of toxic pollutants.

The draft permit continues to require toxicity testing for one specie, the daphnid, (**Ceriodaphnia dubia**). However, the frequency of testing is reduced from four times per year to two times per year. Whole effluent toxicity testing of the effluent during the past five years indicate that the discharge from the facility has exhibited no acute toxicity and has been in compliance with chronic limits. However, as a contingency, the draft permit proposes to require that if any future toxicity test should fail to comply with the limits, the permittee must re-test the effluent within fourteen days of the original test.

Differing from the existing permit, the draft permit proposes to require the permittee to use the receiving water sample collected upstream of the discharge as the test control and dilution water. A review of toxicity test results on samples collected from Cranberry Brook show that water from Cranberry Brook does not exhibit toxicity and is suitable for use as dilution water. Tests are to be conducted the second week in May and August using the protocol in the Toxicity Testing attachment.

The Chronic - No Observed Effect Concentration (C-NOEC) limitation of 92% in the draft permit prohibits chronic adverse effects (e.g., on survival, growth, or reproduction) when aquatic organisms are exposed to the POTW discharge at the calculated available dilution. This limit has changed from the existing permit because of the revised 7Q10 flow used to calculate the limit. The limit is derived by calculating the in-stream waste concentration using 7Q10 flow conditions and WWTP design flow (1.67 cfs).

C-NOEC (percent) = In-stream waste concentration= (flow WWTP/(flow WWTP + 7Q10 flow)) x 100
C-NOEC = (1.67 cfs/(1.67 cfs + 0.15 cfs)) x 100
C-NOEC = 92%

Chlorine:

The Spencer WWTP now uses ultraviolet radiation to disinfect the effluent and no longer uses chlorine in any of the treatment processes. As a result, total residual chlorine limits are no longer necessary and are not included in the draft permit

Phosphorus

Phosphorus is an essential nutrient for aquatic plant growth in receiving waters. When in excess, phosphorus contributes to excessive growth of aquatic plants that can interfere with the attainment of recreational and aquatic life uses. High levels of aquatic plants (phytoplankton or algae and rooted plants) cause aesthetic impairments by reducing water clarity, imparting color, and choking water ways with excessive vegetative matter. Aquatic life uses in receiving waters are impacted by from excessive plant growth which can cause low dissolved oxygen levels because of dissolved oxygen consumption from plant respiration and biological decay of dead plant matter. Additionally, the excessive growth of certain phytoplankton species can exhibit toxicity to aquatic life, as well as bad odors. The process of producing high amounts of plant biomass in waters is referred to as eutrophication. When nutrients such as phosphorus are discharged because of human activities (e.g., WWTPs, and storm water), the process is referred to cultural or accelerated eutrophication. MASWQS specifies in 314 CMR: 4.05 that nutrients shall not exceed the site-specific limits necessary to control accelerated or cultural eutrophication in receiving waters.

Massachusetts Water Quality Standards also require that any existing point source discharge containing nutrients in concentrations which encourage eutrophication or growth of weeds or algae shall be provided with the highest and best practical treatment to remove such nutrients (see 314 CMR 4.04 (5)). MassDEP has determined that an effluent total phosphorus concentration of 0.2 mg/l (200 µg/l) represents highest and best practical treatment for municipal wastewater treatment facilities. This limit was derived from a literature search and generally accepted treatment technology for phosphorus. Furthermore, EPA's Technical Transfer guidance published in 1987 (EPA/625/6–87/017) concludes that 0.2 mg/l is achievable with existing treatment technology.

The existing permit contains monthly average phosphorus limits of 0.3 mg/l and 0.75 mg/l for the growing season (May 1 – October 31) and winter season (November 1 – April 30), respectively, in order to address cultural eutrophication in receiving waters downstream of the discharge. Quaboag Pond, located downstream from the Spencer WWTF, is a highly used recreational pond that continues to experience excessive growth of plants and algae, and as a result, is in nonattaiment with MASWQS. Quaboag Pond is currently included on Massachusetts' final 2004 Clean Water Act Section 303(d) list of waters requiring the development of Total Maximum Daily Loads (TMDLs).

To address the cultural eutrophication of Quaboag Pond, MassDEP has recently conducted a TMDL study of the pond. In accordance with Section 303(d) of the Clean Water Act, States are required to establish TMDLs for all listed waters where existing required pollution controls are not stringent enough to attain water quality standards. The TMDL must define the maximum amount of a pollutant load that a waterbody can receive and still attain water quality standards. Moreover, the TMDL must allocate the total allowable load to the contributing sources. The final TMDL for Quaboag Pond is included in the MassDEP report entitled *Total Maximum Daily Loads of Phosphorus for Quaboag & Quacumquasit Pond*, and dated May 16, 2006. The final report has undergone public review and has been submitted to EPA for approval. The TMDL report is now under review at EPA.

The technical analysis used in the development of the TMDL is based on extensive water quality monitoring of Quaboag and Quacumquasit Ponds and the tributary drainage areas, and the use of empirical loading and lake models. The monitoring data and technical analysis performed for the TMDL confirm that the pond is undergoing cultural eutrophication due to excessive phosphorus loading and that reductions in phosphorus loadings are needed. Phosphorus allocations were established for the Spencer WWTP, permitted storm water sources in the Spencer including Mass Highway, and nonpoint sources in the watershed based on land cover categories (e.g. agriculture). The TMDL sets an overall allowable load of phosphorus for Quaboag Pond of 2588 kg/yr or 7.09 kg/day. The wasteload allocation for the Spencer WWTP for the growing season represents approximately 5% of the allowable daily phosphorus load to the Pond.

The load allocation for the Spencer WWTP is divided into two seasons. There is an allocation for the growing season from May 1 – October 31, and another for the winter season from November 1 – April 30. The growing season phosphorus allocation was set at 0.79 lbs/day, which corresponds to a total phosphorus effluent concentration of 0.2 mg/l at an average discharge flow of 0.47 MGD, about half of the WWTP design flow of 1.08 MGD. The winter season allocation accounts for the increase in-stream flow that occurs during the winter season, and is set at 1.19 lbs/day, which corresponds to an effluent concentration limit of 0.3 mg/l at an average effluent flow of 0.47 MGD.

Federal regulations found at 40 CFR Part 122.44(d) (1)(vii)(B) require that effluent limits developed to protect water quality be consistent with the assumption and requirements of any available wasteload allocation for the discharge prepared by the State and approved by EPA pursuant to 40 CFR Part 130.7 (TMDLs and individual water quality-based effluent limitations). The draft permit therefore includes limits that are based on the technical analysis of the TMDL, and are consistent with the allocations discussed above. The growing season phosphorus limits in the draft permit an overall seasonal average mass limit of 0.79 lbs/day and a new winter seasonal average mass limit of 1.19 lbs/day which is based on the TMDL analysis. EPA concludes that the technical analysis performed for the TMDL study satisfactorily identifies allowable phosphorus loadings to Quaboag Pond, including the WLA for the Spencer WWTP, that are consistent with attaining eutrophication-related water quality standards in the Pond.

The monthly average summer concentration limit of 0.2 mg/l is also consistent with the highest and best practical treatment requirements of the Massachusetts Water Quality Standards. It should be recognized that effluent concentrations lower than this limit may have to be achieved in order to meet the TMDL-based mass limit when the treatment plant exceeds about half of its design flow (as shown above, a mass limit of 0.79 lbs per day and a concentration limit of 0.2 mg/l correspond to a flow of 0.47MGD).

The winter average monthly concentration limit has been reduced from 0.75 mg/l in the existing permit to 0.3 mg/l in the draft permit based on the TMDL's winter season phosphorus allocation to the facility (1.19 lbs/day) and an average effluent flow of 0.47 MGD. The average weekly concentration limit from the existing permit (1 mg/l) has been retained in the draft permit. It should be recognized that effluent concentrations lower than the winter seasonal average limit will have to be achieved in order to meet the TMDL-based mass limit (a mass limit of 1.19 lbs/day). For example, the allowable winter season concentration is reduced to 0.2 mg/l when the average effluent flow increases to 0.7 MGD.

As described, the TMDL is based on attaining water quality standards in the ponds downstream of the discharge. The rivers conveying the discharge to the ponds (i.e., Cranberry Brook and the Sevenmile River) are not listed for nonattainment of water quality standards for nutrients, DO, aquatic plants or indicators of eutrophication, so water quality-based limits more stringent than the highest and best limits required by MAWQS have not been considered to protect these water bodies. However, should new water quality information become available or if the state develops water quality criteria, the permit may be re-opened and modified.

Monitoring: The effluent monitoring requirements have been specified in accordance with 40 CFR 122.41(j), 122.44(i) and 122.48 to yield data representative of the discharge.

V. Sludge Information and Requirements

Section 405(d) of the Clean Water Act requires that sludge conditions be included in all POTW permits. The Spencer Wastewater Treatment Plant has its sludge hauled off-site for treatment. The sludge requirements for the facility are outlined in the permit and defined the sludge attachment. If the ultimate sludge disposal method changes, the permit requirements pertaining to sludge monitoring and other conditions would change accordingly.

VI. Infiltration/Inflow Requirements

Infiltration/inflow is extraneous water entering the wastewater collection system through a variety of sources. Infiltration is groundwater that enters the collection system though physical defects such as cracked pipes, or deteriorated joints. Inflow is extraneous flow entering the collection system through point sources such as roof leaders, yard and area drains, sump pumps, manhole covers, tide gates, and cross connections from storm water systems. Significant I/I in a collection system may displace sanitary flow reducing the capacity and the efficiency of the treatment works and may cause bypasses of secondary treatment. It greatly increases the potential for sanitary sewer overflows (SSO) in separate systems, and combined sewer overflows in combined systems.

The draft permit includes requirements for the permittee to continue to implement a program to control infiltration and inflow (I/I) in the collection system. These requirements are continued from the existing permit. Annual I/I program reports submitted by the permittee, demonstrate that the permittee has made progress in removing I/I through the replacement of several deteriorating sewer pipes. The permittee has also developed a sewer bank which requires persons wanting to connect to the sewer system to address known areas of I/I. Nevertheless, a review of influent flow records to the Spencer WWTP clearly show that I/I still represents a substantial portion of the total flow treated by the WWTP. Additionally, on occasions during extreme high I/I events, secondary treatment bypasses have occurred at the facility which are prohibited by the draft permit. Finally, the permittee will need to continue to reduce I/I in order to comply with the seasonal mass phosphorus limits included in the draft permit.

The permit standard conditions for 'Proper Operation and Maintenance' are found at 40 CFR §122.41(e). These require proper operation and maintenance of permitted wastewater systems and related facilities to achieve permit conditions. Similarly, the permittee has a 'duty to mitigate' as stated in 40 CFR §122.41 (d). This 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. EPA and MassDEP maintain that an I/I removal program is an integral component to insuring permit compliance under both of these provisions.

The MassDEP has stated that inclusion of the I/I conditions in the draft permit shall be a standard State Certification requirement under Section 401 of the Clean Water Act and 40 CFR §124.55(b).

VII. Essential Fish Habitat Determination (EFH)

Under the 1996 Amendments (PL 104-267) to the Magnuson-Stevens Fishery Conservation and Management Act (16 U.S.C. § 1801 et seq. (1998)), EPA is required to consult with the National Marine Fisheries Services (NMFS) if EPA's action or proposed actions that it funds, permits, or undertakes, may adversely impact any essential fish habitat as: waters and substrate necessary to fish for spawning, breeding, feeding, or growth to maturity (16 U.S.C. § 1802 (10)). Adversely impact means any impact which reduces the quality and/or quantity of EFH (50 C.F.R. § 600.910 (a)). Adverse effects may include direct (e.g., contamination or physical disruption), indirect (e.g., loss of prey, reduction in species' fecundity), site-specific or habitat-wide impacts, including individual, cumulative, or synergistic consequences of actions. Essential fish habitat is only designated for species for which federal fisheries management plans exist (16 U.S.C. § 1855(b) (1) (A)). EFH designations for New England were approved by the U.S. Department of Commerce on March 3, 1999. After coordination with NMFS, EPA has concluded that no species listed under NMFS jurisdiction occur in the receiving waters identified in this fact sheet.

VIII. Endangered Species Act

Section 7(a) of the Endangered Species Act of 1973, as amended (ESA) grants authority to and imposes requirements upon Federal agencies regarding endangered or threatened species of fish, wildlife, or plants ("listed species") and habitat of such species that has been designated as critical (a "critical habitat"). The ESA requires every Federal agency, in consultation with and with the assistance of the Secretary of Interior, to insure 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 United States Fish and Wildlife Service (USFWS) administers Section 7 consultations for freshwater species, where as the National Marine Fisheries Service (NMFS) administers Section 7 consultations for marine species and anadromous fish.

As the federal agency charged with authorizing the discharge from this facility, EPA consulted with the USFWS as required under section 7 (a)(2) of the Endangered Species Act (ESA), for potential impacts to federally listed species. Based on a letter from the USFWS (July 20, 2006), it is EPA's understanding that no federally-listed or proposed, threatened or endangered species or critical habitat, under the jurisdiction of the US Fish and Wildlife Service, are known to occur in the in the receiving waters identified in this permit. Furthermore, the effluent limitations and other permit requirements identified in this Fact Sheet are designed to be protective of all aquatic species.

IX. State Certification Requirements

The staff of the Massachusetts Department of Environmental Protection has reviewed the draft permit. EPA has requested permit certification by the State and expects that the draft permit will be certified.

X. Comment Period, and Procedures for Final Decisions

All persons, including applicants, who believe, any condition of the draft permit is inappropriate must raise all issues and submit all available arguments and all supporting material for their arguments in full by the close of the public comment period, to the U.S. EPA, Massachusetts Office of Ecosystem Protection (CMP), One Congress Street-Suite 1100 Boston, Massachusetts 02114-2023. Any person, prior to such date, may submit a request in writing for a public hearing to consider the draft permit to EPA and the State Agency. In reaching a final decision on the draft permit, the Regional Administrator will respond to significant comments and make these responses available to the public at EPA's Boston office.

Following the close of the comment period after the public hearing 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.

Within 30 days following the notice of the final permit decision, interested parties may petition the Environmental Appeals Board to review any condition of the permit decision. Regulations regarding the appeal of NPDES permits may be found at 40 CFR Part 124.19.

XI. EPA Contact

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

Mark Voorhees
Office of Ecosystem Protection
U.S. Environmental Protection Agency
1 Congress Street
Boston, Massachusetts 02114-2023
Telephone: 617-918-1537

or

Paul Hogan
Massachusetts Department of
Environmental Protection
Division of Watershed
Management
Worcester, MA 01608
Telephone: 508-767-2796
627 Main Street

Date: _____

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

Attachment 1. Outfall 001 Effluent Characteristics Based on Average Monthly Data

Date	Influent Flow (MGD)		Effluent Flow (MGD)		BOD_5 (mg/l)		BOD_5 % Removal	TSS (mg/l)		TSS % Removal	Total Phosphorus (mg/l)	Ammonia Nitrogen (mg/l)	Copper (ug/l)	*Fecal coliform* (cfu/100 ml)		LC50	C-NOEL 7-Day
	Monthly average	Maximum Daily	Monthly average	Maximum daily	Monthly average	Maximum Daily	Monthly average	Monthly average	Maximum Daily	Monthly average	Monthly average	Monthly average	Monthly average	Monthly average	Maximum Daily	Ceriodaphina	Ceriodaphina
Existing Limits	1.08 note 1	****			note 2	***	85%	note 2	***	85%	0.3 (Apr -Oct) 0.75 (Nov-Mar)	0.56 (May -Oct.) 8.5 (Nov.)	4	200	400	≥100	≥89
Proposed Limits	1.08 note 1	****			note 2	***	85%	note 2	***	85%	0.2 (Apr -Oct) 0.75 (Nov-Mar)	0.56 (May -Oct.) 8.5 (Nov.) 15.3 (Dec-Apr.)	10	200	400	≥100	>92
Sep. 2005	0.52	0.60	0.30	0.60	2.4	2.6	98.9	0.3	0.4	99.9	0.19	0.04	50	1	2	---	---
Aug. 2005	0.47	0.55	0.25	0.49	3.0	4.3	98.8	0.4	0.7	99.8	0.20	0.04	68	2	2	---	---
July 2005	0.55	0.94	0.29	1.18	2.7	3.5	98.6	0.6	1.4	99.8	0.19	0.11	69	6	105	---	---
June 2005	0.58	0.69	0.15	0.30	2.5	4.6	98.6	0.7	1.3	99.7	0.18	0.09	80	2	2	---	---
May 2005	0.77	1.09	0.35	0.56	1.3	1.8	99.0	0.2	0.3	99.9	0.17	0.12	28	0	0	>100	>100
Apr. 2005	1.12	2.51	0.62	2.85	1.3	1.6	98.7	0.2	0.3	99.8	0.17	0.15	48	---	---	---	---
Mar. 2005	0.80	2.90	0.47	1.15	1.8	4.5	97.4	0.8	2.3	98.3	0.16	0.29	130	---	---	---	---
Feb. 2005	0.70	1.27	0.53	1.04	1.4	1.6	98.9	0.2	0.3	99.9	0.13	0.05	70	---	---	>100	>100
Jan. 2005	0.96	2.54	0.75	2.35	1.3	1.4	98.8	0.3	0.4	99.8	0.14	0.06	30	---	---	---	
Dec. 2004	0.94	1.52	0.71	1.16	1.3	1.5	98.5	0.2	0.2	99.9	0.15	0.05	35	---	---	---	
Nov. 2004	0.61	1.18	0.41	0.86	1.7	2.1	99.0	0.3	0.4	99.9	0.17	0.04	50	---	---	>100	>100
Oct. 2004	0.68	1.06	0.47	0.95	1.7	2.0	99.0	0.2	0.4	99.9	0.17	0.04	36	1	1	---	---
Sep. 2004	0.86	1.82	0.69	1.88	1.6	1.9	98.8	0.3	0.5	99.8	0.20	0.03	37	0	0	---	---
Aug. 2004	0.69	1.34	0.46	1.37	1.3	2.0	99.3	0.3	0.3	99.9	0.22	0.04	38	5	21	>100	>100
July 2004	0.59	2.74	0.34	2.65	1.8	2.4	99.1	0.2	0.2	99.9	0.20	0.04	58	5	8	---	---

Date	Influent Flow (MGD)		Effluent Flow (MGD)		BOD_5 (mg/l)		BOD_5 % Removal	TSS (mg/l)		TSS % Removal	Total Phosphorus (mg/l)	Ammonia Nitrogen (mg/l)	Copper (ug/l)	*Fecal coliform* (cfu/100 ml)		LC50	C-NOEL 7-Day
	Monthly average	Maximum Daily	Monthly average	Maximum daily	Monthly average	Maximum Daily	Monthly average	Monthly average	Maximum Daily	Monthly average	Monthly average	Monthly average	Monthly average	Monthly average	Maximum Daily	Ceriodaphina	Ceriodaphina
Existing Limits	1.08 note 1	****			note 2	***	85%	note 2	***	85%	0.3 (Apr -Oct) 0.75 (Nov-Mar)	0.56 (May -Oct.) 8.5 (Nov.)	4	200	400	≥100	≥89
Proposed Limits	1.08 note 1	****			note 2	***	85%	note 2	***	85%	0.2 (Apr -Oct) 0.75 (Nov-Mar)	0.56 (May -Oct.) 8.5 (Nov.) 15.3 (Dec-Apr.)	10	200	400	≥100	>92
June 2004	0.61	0.76	0.41	0.64	1.9	2.0	98.9	0.2	0.2	99.9	0.18	0.05	63	1	3	---	---
May 2004	0.80	1.29	0.75	1.37	2.4	2.7	95.0	0.6	0.7	99.6	0.16	0.09	46	0	0	>100	89
Apr. 2004	1.28	2.43	1.36	2.45	3.1	4.1	96.2	0.2	0.3	99.8	0.14	0.03	53	---	---	---	---
Mar. 2004	0.71	1.52	0.73	1.55	3.5	5.6	97.1	0.2	0.4	99.9	0.14	0.06	----	---	---	---	---
Feb. 2004	0.50	0.56	0.44	0.69	2.3	2.8	98.7	0.3	0.4	99.9	0.14	0.08	---	---	---	>100	>100
Jan. 2004	0.65	0.96	0.63	1.17	1.3	2.0	99.1	0.2	0.4	99.9	0.13	0.04	---	---	---	---	---
Dec. 2003	1.04	2.34	1.09	2.70	2.8	4.8	97.1	1.9	6.8	97.2	0.19	0.03	---	---	---	---	---
Nov. 2003	0.78	1.01	0.55	0.71	2.2	3.5	98.7	0.2	0.3	99.9	0.20	0.03	---	---	---	>100	>100
Oct. 2003	0.79	1.97	0.44	1.55	0.9	1.5	99.1	0.4	1.2	99.7	0.24	0.03	---	0	0	---	---
Maximum	1.28	2.90	1.36	2.85	3.5	2.8	99.3	1.9	6.8	99.9	0.24	0.29	130	6	105		
Minimum	0.47	0.55	0.15	0.30	0.9	1.4	95.0	0.2	0.2	97.2	0.13	0.03	28	0	0		
Average	0.75	1.48	0.55	1.34	2.0	2.8	98.4	0.4	0.8	99.7	0.17	0.07	55	2	12		

1. The 1.08 MGD flow limit is running annual arithmetic average
2. BOD_5 and TSS monthly average for May 1 - Oct 31 is 5.6 mg/l. BOD_5 and TSS monthly average for Nov 1 - Apr 30 is30 mg/l.