Comments of the City of Gloucester

Regarding

Tentative Decision of the Regional Administrator under 40 C.F.R Part 125, Subpart G (dated 11/5/2010)

Related to

City of Gloucester, Massachusetts, POTW, NPDES Permit No. MA0100625, Application for Modification of Secondary Treatment Requirements under Section 301(h) of the Federal Clean Water Act, 33 U.S.C. § 1311(h)

February 4, 2011

The City of Gloucester, Massachusetts ("Gloucester" or the "City") submits the following comments regarding the tentative decision of the EPA Regional Administrator to deny Gloucester's request for renewal of modification of Clean Water Act secondary treatment requirements for its Water Pollution Control Facility (WPCF).[1]

I. INTRODUCTION

Section 301(h) of the federal Clean Water Act ("CWA" or "Act")[2] allows publicly owned treatment works discharging into marine waters to receive a variance from the Act's technology-based secondary treatment requirements for 5-day biochemical oxygen demand (BOD) and total suspended solids (TSS), as long as certain statutory criteria are met. This provision reflects Congress's determination that secondary treatment provides little environmental benefit for discharges to deep ocean waters, due to the rapid aeration and dispersion of such discharges.[3]

Pursuant to § 301(h), EPA granted a variance from secondary treatment requirements for Gloucester's WPCF in 1985 and renewed the variance in 2001. Both of these waivers were for the current treatment plant, which has design flows of 7.24 million gallons per day ("MGD") average and 15 MGD maximum. The current average monthly flow is 5.08 MGD.

In 1990, Gloucester relocated the discharge from the WPCF to a location in Massachusetts Bay, more than a mile beyond Gloucester Outer Harbor, through an outfall approximately 15,000 feet long. The effluent is discharged through a diffuser on the ocean floor into a water depth of 90 feet. The effluent receives chemically enhanced primary treatment and chlorination/dechlorination. The 2001 waiver reflected the extension of the plant's outfall to its current location.

---

[1] In Re: City of Gloucester, Massachusetts, Publicly Owned Treatment Works, NPDES Permit No. MA010065, Application for Modification of Secondary Treatment Requirements under Section 301(h) of the Federal Clean Water Act, 33 U.S.C. § 1311(h), Tentative Decision of the Regional Administrator Under 40C.F.R. Part 125, Subpart G (November 5, 2010).

[2] 33 U.S.C. § 1311(h).

[3] See discussion in EPA's preamble to the initial 301(h) regulations, 43 Fed. Reg. 17484 (April 25, 1978).

In 2006, the City submitted an application to EPA Region 1 for a renewal of its 301(h) variance. On November 5, 2010, the EPA Regional Administrator issued a tentative decision (the "tentative decision," or "TD") denying the variance.[4] The denial is based on EPA's assertion that Gloucester has not demonstrated that it meets two of the nine 301(h) statutory criteria. EPA's tentative decision is not consistent with 301(h) regulations and guidance, or EPA's prior decisions regarding the WPCF. In fact, Gloucester's WPCF meets all of the 301(h) criteria as detailed below and EPA's tentative decision is therefore arbitrary and capricious, and not in accordance with the law.

II. DESCRIPTION OF THE TREATMENT FACILITY AND RECEIVING WATERS

II.A. The WPCF

Gloucester's WPCF began operation in 1984. In 1985 it was issued a 301(h) waiver and NPDES permit based on primary treatment. The plant was designed for an average daily flow rate of 7.24 million gallons per day (MGD) with a peak hydraulic flow rate of 15 MGD. The plant's average daily flow for the past five years is as follows:

Year	**Average WPCF flow (MGD)**
2010	4.27
2009	4.34
2008	4.49
2007	4.17
2006	4.69

The WPCF currently serves approximately 7,727 customers in Gloucester (6,928 residential households, 328 commercial facilities, 68 industrial facilities, and 777 mixed-use and public facilities). The industrial users include four permitted Significant Industrial Users and six permitted smaller users. The WPCF also serves approximately 600 households in Essex and 150 in Rockport (mostly seasonal use). The plant also receives trucked septage, sludge, and holding tank wastes from Gloucester and Essex. Some of the Gloucester flow is from combined sewers receiving both sanitary and stormwater flow.

The plant implements chemically enhanced primary treatment (CEPT), which uses ferric chloride and polymer to increase removal of oil and grease, BOD, and TSS. The effluent is chlorinated to eliminate bacteria, then dechlorinated to remove residual chlorine. The plant discharges effluent through a 15,690-foot outfall to a location approximately a mile beyond Dog Bar Breakwater (Figure 1) into 90 feet (27.4 m) of water. The effluent is discharged at the bottom of the water column through a 61-meter-long multiport diffuser with ten risers (Figures 2 and 3).

[4] The public comment period was extended by EPA on December 16, 2010 to February 2, 2011, and then again through the date of the public hearing to be held in this matter, currently scheduled for March 24, 2010. See letter dated January 24, 2010 from Stephen S. Perkins, Director of Office of Ecosystem Protection, EPA Region I to Mayor Carolyn A. Kirk.

II.B. WPCF Improvements

Since EPA's 2001 renewal of the WPCF's 301(h) waiver, numerous improvements have been made to the WPCF. Improvements from 2004-2006, which included the addition of dechlorination in 2006, are summarized in EPA's tentative decision and not restated here.

In addition, the City is currently in the midst of a two-phase set of upgrades to the WPCF. Phase I construction began in January 2010, with substantial completion expected by March 31, 2011, at a cost of approximately $6.5 million. Phase I improvements include:

- Replacement of the mechanisms and tank overflow for the two existing gravity thickeners and sludge holding tank. Installation of a new sludge holding tank mixing system and two new rotary sludge presses with a new polymer system, dewatering system control panel and dewatered sludge conveyors.
- Changes to process flow such that septage and scum will be pumped directly to the sludge holding tank where it will be thoroughly mixed with thickened primary sludge prior to dewatering.
- Replacement of all sludge and scum pumps including two primary sludge pumps, two primary scum pumps, two thickened primary sludge pumps, two thickened primary scum pumps and two sludge dewatering feed pumps. All pumps with the exception of the two thickened primary scum pumps are preceded by an in-line grinder.
- Replacement of the three plant effluent pumps with new higher capacity pumps and new variable frequency drives (VFDs).
- Electrical system upgrades including three new double-ended motor control centers for improved reliability and redundancy and upgrades to the existing fire alarm system and emergency lighting system.
- Upgrades to the SCADA computer control system including new programmable logic controllers (PLCs) at each sludge pumping station and operator work stations in the Control Building so operators can monitor process operations and begin to develop a data base on plant flows, loads and performance.
- A new influent sampler upstream of any side streams and chemical addition to give plant operators a true indication of influent wastewater characteristics.
- Replacement of the scum troughs in the chlorine contact tanks, which will further lower oil and grease concentrations in plant effluent.

In addition to the Phase I upgrades, in November 2009 the City contracted Veolia Environmental Services to operate and maintain the WPCF. Under this contract, the City tripled the repair and maintenance budgets, engaged Veolia technical specialists to review and optimize process operations of the facility and undertook significant improvements to immediately improve operations and effluent quality at the plant. Among other things, Veolia has modified the sodium hypochlorite feed pump suction and discharge piping to ensure reliability during low flows at night, and has made repairs to the effluent flume ultrasonic level indicator and transmitter that have restored the ability to pace sodium hypochlorite and bisulfite based on flow, improving treatment of bacteria. These improvements and more focused attention to the operations of the plant have resulted in substantial improvement in effluent quality as shown in the data presented below.

The Phase II design was completed and submitted to DEP for review in December 2010; it is anticipated to be bid in March-April 2011 with a construction notice to proceed in August 2011. Completion of Phase II construction is scheduled for August 1, 2013, at an expected cost of $13.5 million. Phase II improvements include:

- A new headworks building, which will include two mechanical bar screens with ½-in bar spacing each rated for peak wet weather flow, a screenings wash press for each screen, vortex grit removal with grit pumps and a grit washer and preliminary treatment (screening and grit removal) of all septage, a new polymer feed system to enhance primary treatment, and a new double-ended motor control center to replace two existing single-ended motor control centers for improved reliability and redundancy.
- New standby power generator for the entire plant.
- New transformer and switchgear for the entire plant.
- New odor control facilities for the control building and the new headworks building.
- Yard piping modifications to allow one primary sludge pump to feed one gravity thickener. A new flow meter on the pump discharge will allow the operators to monitor the flow and load to the gravity thickener.
- Additional SCADA system enhancements with connections to new equipment.
- Replacement of an existing primary sludge plunger pump.

These changes will further enhance the WPCF's performance and will result in significantly improved process redundancy.

II.C. Collection System Improvements

Like many older cities, Gloucester's sewer system includes some combined sewers, designed to transport stormwater along with sanitary sewage. This results in high flows in the collection system during wet weather and can result in combined sewer overflows (CSOs). Gloucester has been working on correcting this problem by replacing combined sewer pipes with separate sewer and stormwater pipes. The first area addressed was the basin draining roughly 87% of the area served by combined sewers. Most of the separation of this basin was completed in March of 2009, with the remainder completed in July 2010. Of the total stormwater flow to the sewers within the project area, approximately 90% has been eliminated, resulting in an estimated reduction of 95 million gallons of flow per year to the WPCF. The impacts of this project at the treatment plant have been noticeable and significant. Recovery from peak flows occurs very quickly, and there have been no flooding incidents in spite of extreme rain events, making operation of the plant easier, increasing reliability and effluent quality. Completion of the remaining sewer separation work is expected within the next four years. The CSO project costs total approximately $35 million.

II.D. "Current" vs. "Improved" Discharge

EPA's 301(h) regulations allow applicants to meet waiver requirements based on either a "current discharge" or an "improved discharge," which are defined as follows (40 CFR §

125.58(h)-(i)):

> *Current discharge* means the volume, composition, and location of an applicant's discharge at the time of permit application.
>
> *Improved discharge* means the volume, composition, and location of an applicant's discharge following:
>
> (1) Construction of planned outfall improvements, including, without limitation, outfall relocation, outfall repair, or diffuser modification; or
> (2) Construction of planned treatment system improvements to treatment levels or discharge characteristics; or
> (3) Implementation of a planned program to improve operation and maintenance of an existing treatment system or to eliminate or control the introduction of pollutants into the applicant's treatment works.

These definitions reflect EPA's determination that it was Congress's intent that applicants that could not demonstrate compliance with the waiver requirements using empirical data from their current discharge could still obtain waivers based on "thoroughly planned and studied" future improvements.[5]

As EPA's tentative decision notes, the City's 2006 application stated that it was "based on an improved discharge because of the completion of the 'construction of planned treatment system improvements to treatment levels or discharge characteristics,'" including "the addition of a dechlorination and odor control system in the spring of 2006." This statement reflected a misunderstanding of the regulatory term "improved discharge," because the statement describes the improvements as completed, and the remainder of the application demonstrates that the discharge at the time of application complied with 301(h) requirements. Although it was correct to note that many improvements to the WPCF had been made since the previous waiver renewal, the application should have stated that it was based on a "current discharge."

The City's discharge at the time it submitted its application and its current discharge meet the 301(h) requirements. Since 2006, the City has continued to collect data on both the effluent and the environment in the vicinity of the discharge and has submitted those data to EPA. The City can demonstrate compliance with the 301(h) requirements based on this empirical data, and does not need to rely on predicted future improvements in discharge quality. Thus, the City believes that EPA should consider the WPCF discharge at the time of submission of these comments to be its "current discharge." Moreover, even if EPA considers the City's request for a waiver to be based on an "improved" discharge as compared to when the waiver application was submitted in 2006, the City's empirical data on the composition of the discharge meets the regulatory requirements for proof that an "improved" discharge will meet 301(h) requirements. See 40 CFR § 125.62(e). In any case, EPA should not deny the 301(h) waiver for the WPCF on the basis of a semantic distinction that bears no relation to water quality in the vicinity of the outfall.

[5] Environmental Protection Agency, Modification of Secondary Treatment Requirements for Discharges into Marine Waters: Final Rule, 44 Fed. Reg. 34784, 34788-90 (June 15, 1979).

II.E. Receiving Waters

The WPCF discharges to Massachusetts Bay, which is classified in the Massachusetts Water Quality Standards ("MWQS," 314 CMR 4.00) as a Class SA water. Gloucester has conducted extensive monitoring in the vicinity of the outfall since 1990.

In anticipation of the completion of the pipeline extension, in 1990 sampling was initiated at sites outside the harbor to establish a baseline for the monitoring of the effluent from the new diffuser (Figures 1 and 4). In October 1990, the discharge was transferred from the old single point discharge inside the harbor to the new outfall beyond the breakwater. Monitoring at the stations located around the new diffuser has been conducted continuously since March of 1990.

Major changes to the monitoring program over the years (all approved by EPA) have been:

- Priority pollutant scans of water samples were discontinued in 1990 because of the lack of detections of these compounds in samples, even at Station 1 next to the old outfall inside the harbor with no diffuser (e.g. Table 1). The new outfall with a diffuser that has an almost instantaneous dilution of 59:1 (based on conservative modeling) made it even more unlikely these compounds could be ever be detected. There have been very few detects in priority pollutants at the treatment plant and these have been at very low levels.

- Sampling for oil and grease ended in the year 2001 because most of the results were non-detects (Tables 2 and 3) and there was no evidence of accumulation in the sediments. The very few isolated detects were more probably associated with the heavy commercial and recreational boat traffic through the area.

- TSS sampling was discontinued in 2001 because 10 years worth of data had shown there was no association between concentrations in the water column and distance from the outfall. There was also no increase in solids in the sediments near the diffuser.

III. APPLICATION OF 301(h) CRITERIA

Section 301(h) of the Clean Water Act requires an applicant for a waiver to demonstrate that it meets nine statutory criteria. EPA acknowledges that Gloucester has met all but two of the criteria, but concludes in its 2010 tentative decision that Gloucester has failed to demonstrate that the WPCF discharge:

- will meet water quality standards for toxicity; oil, grease, and petrochemicals; and bacteria as required by 33 V.S.C. § 1311(h)(1); and
- will not interfere with the protection and propagation of a balanced indigenous population of fish, shellfish, and wildlife, and will not negatively impact recreational activities as required by 33 V.S.C. § 1311(h)(2).

EPA's application of these criteria to the WPCF in 2010 is strikingly inconsistent with its application of the same criteria in 2001, in ways not justified by updated data or changed water quality standards.

As is demonstrated in the detailed comments below, the discharge from the WPCF meets all water quality standards and will not interfere with the balanced indigenous population or recreation in the vicinity of the outfall. EPA's decision to tentatively deny the 301(h) waiver for the WPCF therefore has no basis in fact or law, and EPA should grant Gloucester a renewal of its 301(h) waiver and issue a new primary treatment permit for the WPCF.

IV. THE WPCF DISCHARGE MEETS THE RELEVANT WATER QUALITY STANDARDS IN THE WATERS OUTSIDE THE ZONE OF INITIAL DILUTION AS REQUIRED BY SECTION 301(h)

Section 301(h) requires that the discharge from a WPCF comply with all applicable state water quality standards at and beyond the boundary of the zone of initial dilution (ZID). As discussed below, contrary to EPA's tentative decision, the discharge from the WPCF complies with all water quality standards at the ZID boundary, and the 301(h) waiver should be granted.

IV.A. EPA Appropriately Defined the ZID

IV.A.1. Definition of the Zone of Initial Dilution

Congress added Section 301(h) to the Clean Water Act to address discharges into marine waters subject to rapid initial mixing. Therefore, under the 301(h) regulations, the effects of an applicant's discharge on the receiving waters are generally assessed at and beyond the boundary of a "zone of initial dilution (ZID)."[6] The 301(h) regulations define "zone of initial dilution" as "the region of initial mixing surrounding or adjacent to the end of the outfall pipe or diffuser ports, provided that the ZID may not be larger than allowed by mixing zone restrictions in applicable water quality standards." 40 CFR § 125.58(dd).

EPA guidance for calculation of the dimensions of the ZID is provided in EPA's 1994 *Amended 301(h) Technical Support Document* (EPA842-B-94-007). The *Technical Support Document* specifies the ZID to be that area circumscribed by a distance d (equal to the water depth) from any point on the diffuser.

The Massachusetts Water Quality Standards (MWQS) allow for mixing zones. 314 CMR 4.03(2). EPA's tentative decision concludes that, "as a general matter, the MSWQS do not create a more strict limitation on the size of the ZID than that contained in the 301(h) regulations themselves" (p. 9).

IV.A.2. EPA Has Applied a Conservatively Small ZID for the Gloucester WPCF Discharge

The existing outfall diffuser is a linear multiport diffuser 61 m in length, with ten six-inch (0.1524 m) diameter ports spaced at 6.1 m intervals.[7] EPA's tentative decision calculates the

---

[6] The only requirement within the zone of initial dilution for ocean discharges is that conditions "must not contribute to extreme adverse biological impacts, including, but not limited to, the destruction of distinctive habitats of limited distribution, the presence of disease epicenter, or the stimulation of phytoplankton blooms which have adverse effects beyond the zone of initial dilution." 40 CFR § 125.62(c)(3).

[7] The EPA tentative decision document and other references to the diffuser state a port diameter of 1.52 meters, which is obviously

surrounding ZID to be approximately 55.1 m by 115.2 m.

The ports discharge at a depth of 90 feet (27.43 meters) perpendicular to the diffuser barrel (which is generally perpendicular to the local bathymetric contours and principal current direction) at an upward angle of 11.25º from the horizontal. The design flow per port (for the maximum design flow of 15 MGD) is 0.0657 m^3/sec, giving a port velocity of 11.8 ft/sec. At the modeled wet weather maximum flow of 10 MGD (see below), the port flow is 0.0438 m^3/sec and the port velocity is 7.9 ft/sec. The diffuser design provides rapid initial dilution. The location of the discharge is well flushed by ambient currents and does not result in a build up of effluent in the vicinity of the discharge, as demonstrated by receiving water monitoring.

Critical initial dilution ("CID") as described in the EPA tentative decision is stated as 65:1 for dry weather (6.3 MGD effluent flow) and 59:1 for wet weather (10.0 MGD effluent flow). The City recently recalculated the CID using more recent data and modeling. Using the EPA-approved model UDKHDEN, the critical density profile from 2007[8], and a critical ambient current of 3 cm/sec [9], the initial dilution for an effluent flow of 10.0 MGD was calculated to be 79:1 as the plume rises past the eventual equilibrium depth (trapping level) and 103:1 at the point of maximum rise. The simulation was done using an effluent temperature of 15ºC.[10] If this simulation is done at an ambient current speed of zero the results are consistent with the existing CID. Thus, it appears that the existing CID is conservative, since the ambient current speed will almost always be greater than zero.

IV.B. The Discharge Can and Will Comply with Water Quality Standards for Toxicity

Although explicitly acknowledging that the WPCF's effluent would meet numeric state water quality standards for toxicity at the edge of the ZID, EPA nonetheless denies the 301(h) waiver on the basis of the results of effluent toxicity testing. It is arbitrary and capricious and without legal foundation for EPA to equate these test results with a failure to meet 301(h) criteria.

The Massachusetts water quality standard for toxicity for all waters includes a general narrative standard as well as numeric standards for most pollutants:

> All surface waters shall be free from pollutants in concentrations or combinations that are toxic to humans, aquatic life or wildlife. For pollutants not otherwise listed in 314 CMR 4.00, the *National Recommended Water Quality Criteria: 2002, EPA 822-R-02-047, November 2002* published by EPA pursuant to Section 304(a) of the Federal Water Pollution Control Act, are the allowable receiving water concentrations for the affected waters, unless the Department either establishes a site specific criterion or determines that naturally occurring background concentrations are higher. 314 CMR 4.05(5)(e).

---

a typographical error.

[8] This critical density profile is that profile resulting in the lowest initial dilution, with all other parameters constant (and at critical conditions). The July 11, 2007 density profile at Station 3C appears to be a good representation of critical conditions with a strong density gradient throughout the profile.

[9] For tidally influenced marine waters, currents are constantly and rapidly varying in space and time and seldom, if ever, are zero. The typical practice is to use the 10th percentile current speed in the vicinity of the discharge as the critical condition. A value of 3 cm/sec is reasonable, and is consistent with current data collected in the vicinity of the discharge.

[10] Effluent temperature has a minor effect on initial dilution: effluent temperature variation between 5ºC and 25ºC changes dilution by < 5%.

The MWQS standards allow water quality criteria to be exceeded inside of mixing zones "...so long as there is safe and adequate passage for swimming and drifting organisms with no deleterious effects on their populations." 314 CMR 4.03(2).

EPA acknowledges that the WPCF meets all of the numeric water quality standards for toxicity in its tentative decision (p. 23). However, EPA concludes that the WPCF discharge does not meet the narrative MWQS for toxicity. This is incorrect. EPA's tentative waiver denial states that "an end-of-pipe WET limit of 1 TU [i.e., $LC_{50} \geq 100\%$ effluent] is required by the [MassDEP] Toxics Policy" (p. 15). EPA then states (TD at 16-17):

> The WPCF's effluent has frequently exceeded the existing permit's state water quality standards-based effluent limit for preventing acutely toxic effects. Based on this information, and in the absence of any data or analysis indicating that this pattern of exceedances would change if the WPCF's waiver were renewed, EPA Region 1 concludes that the applicant has failed to show that, at the time the renewed modification would become effective, its discharge would meet the state standards for toxicity at and beyond the ZID.

EPA is wrongly conflating end-of-pipe limits with ambient water quality standards. The "Toxics Policy" EPA cites is a document entitled "Massachusetts Water Quality Standards: Implementation Policy for the Control of Toxic Pollutants in Surface Waters, February 23, 1990" ("Toxics Policy").[11] EPA erroneously relies on the Toxics Policy for the premise that an end-of-pipe limit of 1.0 acute toxic units (TUa) employing Whole Effluent Toxicity Testing is a "water quality standard" that the WPCF must meet. Effluent limits are <u>not</u> water quality standards. Rather, "applicable water quality standards" for toxic pollutants for the 301(h) evaluation are those contained in 314 CMR 4.05(e), as referenced above.[12]

Moreover, EPA's reliance on WET testing to conclude that the effluent is causing toxicity at and beyond the ZID is flawed. In fact, the WPCF discharge meets the narrative and numeric water quality standards for toxicity at and beyond the zone of initial dilution, as required by the 301(h) regulations. First, the fact that all numeric effluent standards are met at the boundary of the ZID provides strong evidence that the narrative standard ("free from pollutants in concentrations or combinations that are toxic to humans, aquatic life or wildlife") is also met. Second, the WET testing results upon which EPA relies reflect unrealistic laboratory conditions not representative of the conditions at the boundary of the ZID.[13]

---

[11] The tentative waiver decision states that the Toxics Policy provides information required by EPA under 40 CFR § 131.11(a)(2). (Tentative waiver decision at 14.) However, that regulation requires states to provide information on applying narrative standards to "point source discharges of toxic pollutants on water quality limited segments." Massachusetts Bay is not "water quality limited" for any pollutants, including toxic pollutants.

[12] Similarly, the supposed "technology-based limit" of 2.0 TU cited by EPA as MassDEP policy is an effluent limit, not a water quality standard. Moreover, neither EPA nor MassDEP provides any justification for this arbitrary number.

[13] A number of WET test conditions differ from ambient conditions in the vicinity of the WCPF outfall in ways that increase toxicity to test organisms, making the test inappropriate for use in evaluating Gloucester's 301(h) application. Some of the differences include:

<u>Dilution and Exposure Time</u>
The toxicity tests bear no resemblance to what any organism is subjected to at the diffuser. In the laboratory, the exposure time is 48 hours. Because of the diffusers, the highest concentration an individual organism could experience at the edge of the ZID is a 1:59 dilution of the effluent, and that would only be for a matter of seconds. Further dilution occurs rapidly.

Finally, the City's discharge also meets the MWQS mixing zone provision inside the ZID,[14] providing "safe and adequate passage for swimming and drifting organisms with no deleterious effects on their populations." To assess compliance with these narrative criteria, the MassDEP Toxics Policy document recommends 0.3 TUa as "a conservative (non-time-dependent) acute limit," "[i]n the absence of detailed site-specific exposure histories for all important species." However, this generic guidance is not part of the duly promulgated MWQS regulations and is not appropriate for the Gloucester WPCF discharge, for which there is site-specific evidence that the narrative MWQS standard is met. In the open ocean area receiving the discharge, there is clearly no blockage of passage, and the mixing resulting from the diffuser jet velocity results in rapid dilution. Based on the initial dilution modeling described earlier, the conservative CID of 59:1 is reached within 8 meters of the discharge point and within 20 seconds of the initial time of discharge. Organisms entrained in the plume would, therefore, not be exposed to purported acute toxicity levels for more than a few seconds. More than 20 years of ecological monitoring data support the assessment that there have been no deleterious effects on marine populations (see Gloucester's annual 301(h) reports submitted to EPA). The WPCF's discharge does not violate the MQWS for toxicity.

IV.C. The Discharge Can and Will Comply with Water Quality Standards for Oil and Grease

The MWQS state that Class SA waters "…shall be free from oil and grease and petrochemicals." 314 CMR § 4.05(4)(a)(7). EPA has inexplicably turned this narrative standard into a requirement that absolutely no oil, grease or petrochemicals be discharged in the WPCF's effluent, which it knows is impossible in a WPCF with *any* level of treatment, and which does not take into account the application of a ZID as allowed by Section 301(h).

In Gloucester's 2001 permit, EPA used this same narrative standard to develop an effluent limit of 25 mg/l monthly average for oil and grease (O&G) based on the discharge's dilution factor. EPA's 2010 tentative decision, without justification, states that the current permit limitation was

---

Dissolved Oxygen

Unrealistically low levels of dissolved oxygen in test chambers can stress test organisms. In the laboratory tests, oxygenation of the test chambers is not permitted unless DO drops to 4 mg/l and then oxygenation is only allowed at the rate of 100 bubbles/min. In the results for tests done on the Gloucester effluent since 2001, there was a statistically significant correlation ($p < 0.001$) between the average oxygen concentration at 24 hrs in the test chambers and survival rates of both *Menidia* and *Mysidopsis*. In reality, the effluent of the Gloucester wastewater treatment plant is released into an oxygen-rich environment. Regular testing of dissolved oxygen levels at the outfall over the last 20 years show that there is never an issue with concentrations of dissolved oxygen (see, e.g., Table 4). Phytoplankton in the ocean produce at least half of all the oxygen on the planet (e.g. Field et al., 1998) and the photic zone in Massachusetts Bay is very productive.

Temperature

The laboratory tests are conducted at either 20 or 25 degrees Celsius although the temperature at the outfall never approaches these temperatures. The diffuser releases the effluent at 30 meters depth in Massachusetts Bay where the maximum summer temperature is 10 – 11 degrees C. For most of the year the temperature is well below 10^{o} C. A toxicity identification evaluation (TIE) study conducted on the Gloucester treatment plant effluent identified ammonia as the likely primary cause of toxicity (Brown and Caldwell, 2007). The percentage of unionized ammonia, the fraction toxic to marine organisms, is greatly affected by pH and temperature. Higher temperature and pH increases the amount of un-ionized ammonia. At a pH of 8 and salinity of 32 ppt (approximate conditions at the outfall), the percentage of un-ionized ammonia changes from 1.44% at 10^{o}C degrees to 2.98% at 20^{o} C and 4.28% at 25^{o} C (EIFAC, 1986). Clearly, the temperature of the seawater during the laboratory tests has a dramatic effect on results, essentially doubling or tripling the toxicity of the ammonia component.

[14] Gloucester does not concede that the 301(h) criteria contemplate the application of water quality standards inside the ZID, or that the Toxics Policy's contemplation of an acute toxicity limit inside a mixing zone is a water quality standard for Section 301(h) purposes, particularly since these requirements are inconsistent with 40 CFR § 125.62(c)(3), which provides requirements for within the ZID. There is no dispute that the discharge meets those requirements.

"inappropriate." In the tentative decision, EPA states that the renewal permit limitation should be 0 mg/l, with a compliance limit of 5 mg/l because that is the lowest reliably measurable concentration. O&G has been detected above 5 mg/l in the plant's discharge, and therefore EPA concludes that Gloucester has failed to show that its discharge would meet water quality standards for O&G at and beyond the ZID.

EPA's translation of the "free from" water quality standard for oil and grease into a 5 mg/l standard for the WPCF effluent lacks a rational basis. Based on the critical initial dilution of 59:1 posited by EPA, even an effluent concentration of 25 mg/l will result in an ambient concentration of 0.42 mg/l at the edge of the ZID. This is an order of magnitude below the ML of 5 mg/l, which EPA indicates is an appropriate compliance level. Thus, the effluent limitation of 25 mg/l previously implemented by EPA was appropriate and even conservative based on the initial dilution. Because the current discharge consistently meets this limitation, there is no basis to conclude that the effluent will result in any violations of the criterion at the edge of the ZID.

Further, compliance with the MWQS criterion in the receiving waters has been well demonstrated. For the first 12 years of Gloucester's 301(h) monitoring program, levels of oil and grease were measured in the receiving waters. Samples were taken from surface and bottom waters at four stations around the diffuser and at two control sites. In spite of commercial and recreational boat traffic through the area, positive detects were exceedingly rare.[15] As a result, EPA has not required sampling for oil and grease in the waters around the outfall since 2002.

Moreover, the City is unaware of any permits for Massachusetts POTWs discharging to SA waters for which the O&G limit is set at the level EPA says is required. Below are some examples from the EPA Region 1 website of permits for POTWs discharging to SA waters. None of these even have an O&G limit, much less a 0 mg/l requirement.

- Cohasset Wastewater Treatment Plant (NPDES Permit MA0100285, 7/18/2007): No O&G limit or monitoring requirement.
- Rockport Wastewater Treatment Plant (Draft NPDES Permit MA0100145, public notice date 5/20/2009): No O&G limit or monitoring requirement.
- South Essex Wastewater Treatment Facility (NPDES Permit MA0100501):
  - Permit dated 2/9/2001: O&G monitoring/reporting requirement only.
  - Draft permit (2008): No O&G limit or monitoring requirement. The fact sheet states:

    > The current permit includes an effluent limit of 15 mg/l for oil and grease. This value meets the narrative "free from oil and grease and petrochemicals" in the SA criteria. Since the current permit became effective on October 10, 2001, the maximum daily value for oil and grease has not exceeded 9 mg/l and has an average maximum daily value of 7.83 mg/l (n=70). EPA has determined that there is no reasonable potential and has removed the requirement from the permit.

- Dartmouth Water Pollution Control Facility (NPDES Permit MA0101605,

[15] In 2000 and 2001 there were no detects for oil and grease in more than 500 samples (Tables 2 and 3).

6/19/2009): No O&G limit or monitoring requirement.

EPA should not arbitrarily impose an oil and grease standard which is not achievable and which has not been applied to other WCPFs discharging to marine SA waters. The existing standard has already been determined to be adequately protective, and thus Gloucester has demonstrated its discharge can and will comply with the water quality standard for oil and grease.

IV.D. The Discharge Can and Will Comply with Water Quality Standards for Total Petroleum Hydrocarbons (TPH)

Similar to the oil and grease analysis, EPA again arbitrarily translates the "free from" water quality standard into a 0 mg/l permit limit with a 5 mg/l compliance limit, regardless of data showing that the effluent does not contribute detectable TPH to the receiving waters. Using data from January 2006 to March 2009, EPA's tentative decision states that "the WPCF's discharge violated the 5 mg/l TPH limit nine times out of the last thirty-nine sampling events." (p. 17). First, EPA's determination that the WPCF's discharge violates the 5 mg/l standard ignores the fact that the limit is consistently met at the boundary of the ZID, which is what is required by Section 301(h). Moreover, EPA ignores more recent data and wrongly fails to recognize the significant improvement in the quality of the discharge since the City's application was submitted in 2006. The WPCF effluent only exceeded the 5 mg/l TPH limit *once* between April 2007 and December 2010 (see TD, p. 18, and WPCF 2009-2010 monthly Discharge Monitoring Reports submitted to EPA). Not coincidentally, the City began to implement a program to separate its combined sewer system soon after the application was submitted. The majority of TPH in the discharge was almost certainly a result of stormwater run-off from streets and parking lots. The Phase I CSO Abatement Project was completed in March 2009. There have been no violations of the TPH limit since then.

The fact that the WPCF effluent is not a significant contributor to TPH in the receiving waters has also been demonstrated in the results of sediment sampling in the vicinity of the outfall reported annually since 1991. Priority pollutants scans for volatile and semi-volatile organics were originally performed on samples from both the water column and sediments. Water column sampling was discontinued in 1991 due to the failure to detect any of these compounds. Sediment sampling has continued for the last 20 years at sites ranging from 30 m to 1500 m from the diffuser. Only a few pyrogenic semi-volatile hydrocarbons have been detected and these at very low levels (parts per billion) typical of background levels for Massachusetts Bay (Table 5). The sampling site nearest the outfall usually has the lowest concentrations of these compounds. There have been no indications of increases in the concentrations of any of these materials in the 20-year time period. The sources are most likely atmospheric deposition, runoff and boat traffic. There is simply no basis to conclude that TPH from the WPCF discharge is having any impact on the marine environment in the vicinity of the outfall.

IV.E. The Discharge Can and Will Comply With Bacteria Water Quality Standards for Primary Contact Recreation

Once again ignoring the provisions of Section 301(h) that mandate the determination of compliance at the ZID boundary, EPA concludes that the discharge from the WPCF will violate primary contact bacteria water quality standards. Compounding the error, EPA faults Gloucester

for not providing data to support compliance with enterococci standards that it acknowledges did not even exist at the time the City's application was submitted.

As an initial matter, the existing Gloucester WPCF is designed to meet and has demonstrated it can consistently meet the applicable fecal coliform effluent limits in the permit. The permit limit exceedances indicated in Table 5 of the tentative denial were all the result of operational issues that have since been corrected or of one-time events unlikely to be repeated. Most of the exceedances of the fecal coliform limit occurred in 2006-2007, during the commissioning of the dechlorination system. The dechlorination system was designed for the dosage to be controlled automatically, flow-paced and altered by a feed back loop from a residual analyzer, but the automatic system was not reliable. Eventually, after numerous attempts and system modifications, the system was set up to run with manual dosage adjustments and exceedances of the fecal coliform limit stopped. The handful of bacteria violations since then have been the result of one-time mechanical problems or operator error, as shown in the table below.

Exceedances of Daily Maximum Permit Limit for Fecal Coliform Bacteria in Effluent Gloucester WPCF 2009-2010		
MONTH	**NUMBER OF EXCEEDANCES**	**REASON FOR EXCEEDANCES**
September 2009	1	The failure of hypochlorite pump to deliver adequate chemicals (due to wear) caused inadequate disinfection.
December 2009	2	Both violations appear directly related to mechanical problems caused by sludge accumulations in the clarifiers. Primary sludge piping was blocked by grit preventing sludge removal, causing the clarifier rake arms to torque out and solids washouts. During the preceding 6 or 7 months, it had been impossible to remove grit at the headworks because of the placement of temporary emergency bypass pumps (required by Mass DEP) while one of the influent screw pumps was being replaced due to failure.
April 2010	1	Inadequate chlorination due to operator setting dosage too low, in error.
September 2010	1	Chlorine mixers tripped out during a generator load test. Operators failed to notice and the mixers were not restarted for some 90 minutes, during which time a sample had been collected for bacteria analysis.

In any case, the permit limit exceedances in Table 5 of the TD do not translate into violation of state water quality standards in the receiving waters at the boundary of the ZID. Employing the dilution factors used by EPA, there would be no exceedances of the monthly geo-mean and only six exceedances of the daily maximum concentration of bacteria over the three years of results in Table 5 of the TD, all but one of which occurred during the commissioning of the dechlorination system in 2006-2007. EPA seeks to avoid Section 301(h)'s recognition of the use of a ZID by stating that EPA and Massachusetts traditionally do not allow dischargers to meet bacteria criteria through dilution. However, the TD cites to no Massachusetts regulations or guidance on this point, and the EPA document it cites is a 2008 memorandum that references mixing zones in

"rivers and streams," where presumably access to waters immediately adjacent to an outfall could be more common. The Gloucester discharge is clearly not to a river or stream, so the referenced policy is inapplicable. Finally, EPA bases its conclusion that the discharge does not meet the bacteria water quality standard for primary contact recreation on the "fact" that there are popular scuba diving locations in the vicinity of the outfall. However, EPA itself recognized in its 2001 decision that the area in the vicinity of the discharge has never been identified as a popular scuba diving location, and that the discharge is not impacting recreational activities. There has been no change in recreational uses in the vicinity of the discharge, and EPA's 2001 conclusions remain valid.

Also, with regard to EPA's criticism that Gloucester did not submit any data regarding enterococci levels in the WPCF's discharge, the City's application for permit renewal was submitted on May 26, 2006. The MWQS fecal coliform standard for primary contact recreation was not changed to the enterococci criterion until December 2006. The City had no requirement to sample for enterococci or meet the enterococci criterion prior to the submittal of its application, nor has the WPCF NPDES permit been modified to require enterococci monitoring. Therefore, inclusion of discharge-specific enterococci information in the application was not only impossible but unnecessary at the time of the submittal.

In the absence of actual data, EPA's opinion that the Gloucester WPCF will not meet the enterococci requirements is conjecture, and not based on facility-specific information or analyses of the Gloucester WPCF or its influent or discharge characteristics. Instead, EPA simply recites the existing bacteria data and states that "This result *[based on studies from Southern California] tends to suggest* that the new single sample standard for enterococci in the MSWQS for SA waters *is likely* to be even *more difficult to meet* than the old fecal coliform standard" (emphases added). Conjecture and guess-work are not sufficient grounds to deny the 301(h) waiver.[16]

IV.F. The Discharge Can and Will Comply With Bacteria Criteria for Shellfishing

On the basis of inapplicable water quality standards, EPA concludes that the discharge will not comply with bacteria criteria for shellfishing. This is not correct.

The TD states that the numeric criterion for bacteria for Class SA waters designated for shellfishing applies to the area to which the WPCF discharges. For such waters, the MWQS state that "fecal coliform shall not exceed a geometric mean Most Probable Number (MPN) of 14 organisms per 100 ml, nor shall more than 10% of the same exceed a MPN of 28 per 100 ml…" EPA states that, according to Gloucester's annual 301(h) monitoring reports, "23 out of 192 samples (approximately 12%) taken at Station 3A, which is located at the edge of the ZID, exceeded 28 organisms per 100 ml." (p. 22) (EPA does not state which years' reports it used to make this calculation.)

EPA's conclusion is unjustifiable for a number of reasons. First, the MWQS for shellfishing do not apply to the area of the WPCF discharge. EPA itself acknowledges that the area of the

[16] Although the City believes that it will meet the new enterococci standard, at a minimum it would be appropriate for EPA to condition the waiver on the implementation by the City of a compliance plan that would include operational and monitoring activities that would be undertaken over the next permit cycle to demonstrate that the WPCF can meet the enterococci criterion.

WPCF discharge is classified as "Prohibited" by the Massachusetts Division of Marine Fisheries (DMF) under the National Shellfish Sanitation Program (Figure 5).[17] The MWQS for Class SA waters designated for shellfishing only apply to "Approved and Conditionally Approved Shellfish Areas." 314 CMR 4.05(4)(a). Thus, an area that is classified not as "Approved" or "Conditionally Approved" by the DMF, but rather as "Prohibited," is not subject to the MWQS for shellfishing.

Further, even if the shellfishing bacteria standard did apply in the vicinity of the outfall, EPA has again ignored the time trends in the data. Results for 2009 monitoring (Table 6) show that at each station in the vicinity of the outfall (including at the boundary of the ZID; see Figure 1), the geometric mean of all samples did not exceed 14/100 ml, nor did more than 10% of samples exceed 28/100 ml.

Finally, even if the area were opened to shellfishing (which, as discussed above, will not be the case as long as *any* WPCF discharge, primary or secondary, is present), there is no potential for shellfishing in the area of the outfall. There are only two species found in the area of the discharge that could be considered potential resource species. These are the soft-shell clam, *Mya arenaria*, and the ocean quahog, *Arctica islandica*. Both of these species are typically found in "beds" where high densities make it feasible to collect enough individuals to make the effort worthwhile. *Mya arenaria* beds are found in intertidal areas and ocean quahog beds in sandier sediments offshore. Small numbers of juveniles of both these species have been reported in benthic grab samples in the monitoring program, but fewer than 10 adult individuals of *Arctica islandica* and no adult specimens of *Mya arenaria* were collected in more than 1000 benthic grab samples taken over 20 years. Further, there is not presently a commercial or recreational market for *Arctica islandica* in Massachusetts.[18]

As demonstrated above, the discharge from the WPCF meets all water quality criteria, and therefore the 301(h) waiver should be granted.

V. THE DISCHARGE WILL ALLOW MAINTENANCE OF A BALANCED INDIGENOUS POPULATION OF SHELLFISH, FISH AND WILDLIFE AS WELL AS RECREATIONAL ACTIVITIES IN AND ON THE WATER

Despite acknowledging that actual biological monitoring in the vicinity of the outfall has revealed no adverse impacts on shellfish, fish and wildlife, EPA improperly relies on end-of-the pipe WET test results to conclude that the 301(h) waiver should be denied. Also, with regard to recreational impacts, EPA relies on the same incorrect bacteria impact analysis discredited in Section IV, above. These conclusions are arbitrary and capricious and incorrect as a matter of law.

[17] The outfall is considered a point source under the National Shellfish Sanitation Program, regardless of whether pollution from the point source is actual or potential and whether the POTW uses secondary treatment, and as such there must be a prohibited buffer around that outfall for the harvesting of shellfish. Thus, denying the 301(h) waiver and imposing a secondary treatment requirement is not going to result in the area of the discharge being opened to shellfishing.

[18] Based on discussions with the Gloucester Shellfish Constable.

V.A. EPA Incorrectly Ignores Biological Data Demonstrating a Balanced Indigenous Population and Instead Relies on Unreliable WET Testing

Pursuant to 301(h), Gloucester's discharge "must allow for the attainment or maintenance of water quality which assures protection and propagation of a balanced indigenous population of shellfish, fish, and wildlife" beyond the ZID boundary. 40 CFR 125.62(c)(1-2). EPA's *Amended Section 301(h) Technical Support Document* prescribes the use of a biological assessment (not laboratory toxicity testing) to address this criterion (see pp. 78-92). Despite its own conclusion that biological monitoring data show no adverse effects from the Gloucester WPCF outfall, EPA relies solely on laboratory toxicity testing to conclude that "the applicant has failed to demonstrate that a modified discharge would not interfere with the attainment or maintenance of that water quality which assures protection and propagation of a balanced indigenous population." This conclusion does not comport with the approach laid out in the *Amended 301(h) Technical Support Document.*[19]

V.A.1. Biological Monitoring Demonstrates the Presence of a Balanced Indigenous Population

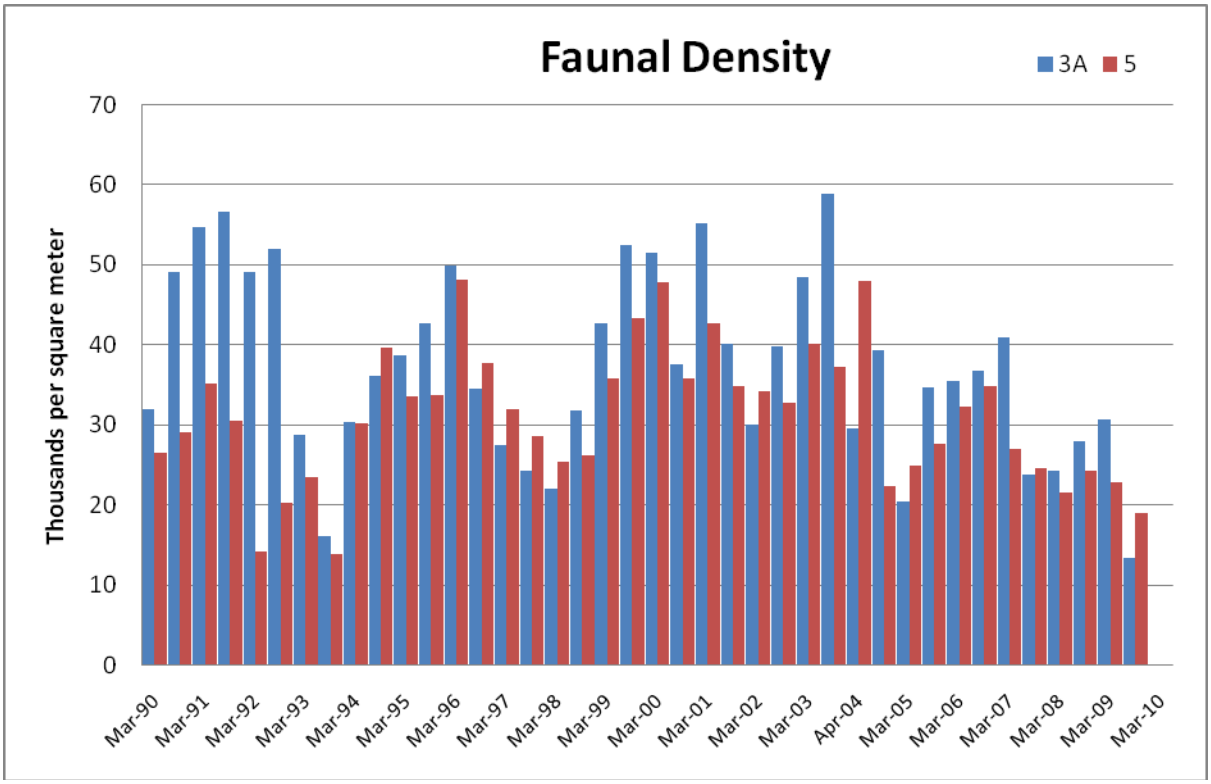
The City has spent in excess of $3 million over the last 20 years conducting an extensive EPA-approved monitoring program designed in accordance with the *Amended 301(h) Technical Support Document* to identify any possible effects of the effluent on the receiving waters. The city believes that EPA has erred in ignoring this powerful data set which clearly demonstrates no impacts from the Gloucester effluent and instead, inconsistently with its own 301(h) guidance, basing its decision on a laboratory test which produces highly variable results of questionable relevance.

The key focus of the monitoring program is the benthic community. These small organisms living in the sediments on the sea floor do not move significant distances and are subject to any organic and contaminant loadings that reach the sediments. There is a very well established base of ecological theory developed over the last 40 years and supported by thousands of peer-reviewed scientific papers that identifies benthic community changes induced by organic loading or contaminant stress. See, e.g., Pearson and Rosenberg (1978); Rhoads and Germano (1982). Pearson and Rosenberg described the differences in community structure (number of species, faunal densities, and species composition) along a gradient from a highly contaminated point source to an uncontaminated area. Changes in the benthic fauna caused by organic loading and contaminants range from very subtle differences in species composition to major reduction in species richness and densities (Figure 6). Gloucester's monitoring program has provided a wealth of data that the City has used to evaluate whether the outfall has led to any changes in the benthic community.

One parameter is species density. In the monitoring program, the five replicate benthic grab samples at each site collect show densities of from 20,000 to more than 50,000 organisms per square meter. Densities are highly variable and are affected by the time of sampling with respect

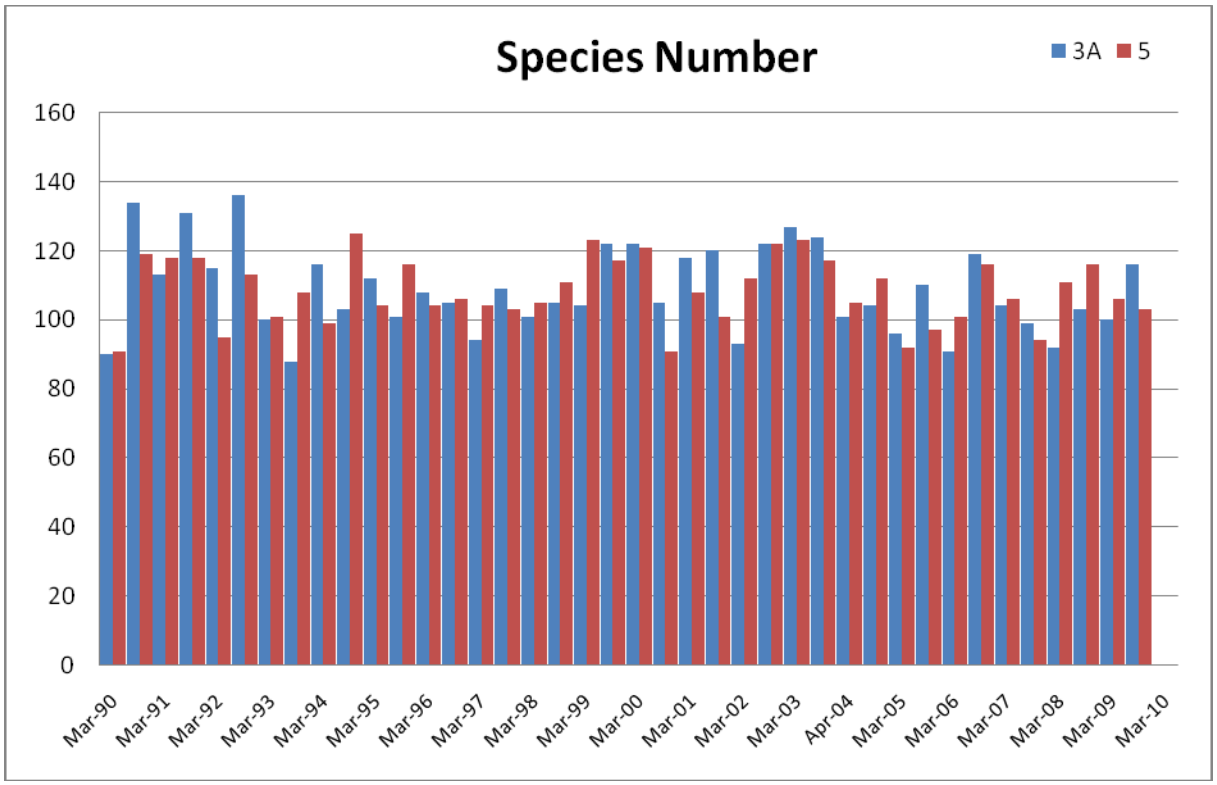
[19] The waiver denial quotes a different guidance document, the *Technical Support Document for Water Quality-based Toxics Control,* for the premise that toxicity testing results can trump field-based biological monitoring. However, that guidance is not appropriate for the 301(h) evaluation because it is intended to be used for the purpose of establishing end-of-pipe water quality based effluent limits.

to breeding cycles. A recent settlement of juveniles out of the water column produces much higher densities. While the numbers vary widely, there has been no trend of decreasing density at Station 3A, 30 m from the outfall, when compared with a control site, Station 5. Annual variations in faunal density at Station 3A parallel that at Station 5, located more than 500 m distant (see figure below).



Faunal density at Station 3A, 30 m from the outfall, and control Station 5, 1990 - 2009

A more conservative index is species richness, the total number of species found in 5 replicate grabs. This has ranged from about 85 to 130 species in each sampling for the period from 1990 to 2009. There has been no trend of either an increase or decrease in species richness at either the outfall site, Station 3A or the control site, Station 5 (see figure below).



Species richness at Station 3A, 30 m from the outfall, and control Station 5, 1990 – 2009

An even more sensitive parameter is species composition. The slightest environmental stress, be it natural or due to some anthropogenic source, will cause changes in species composition which can be dramatic or very subtle. There have been no such changes in the fauna near the outfall. There has always been a very high level of similarity between the fauna at Station 3A, near the outfall and the other sampling sites (Figure 7). Multivariate classification is an analysis based on all the species present in individual samples. A similarity coefficient is calculated between all possible pairs of samples and a clustering strategy is used to group samples based on the resulting similarity indices. In a very uniform environment, Bray/Curtis similarity between replicate samples taken at the same site will be on the order of 70 – 80%. In Figure 7 it is clear that there is a very high degree of similarity between all sampling sites around the Gloucester outfall after 20 years.

Finally, an inspection of the dominant species at Stations 3A , located 30 m from the diffuser, shows that there has been no change in community structure over a very long time period. In March 1993, 18 months after discharge started at the new outfall, a small polychaete worm, *Prionospio steenstrupi*, was the most abundant organism followed by a small bivalve, *Nucula delphinodonta* (Table 7). The same two species were dominant organisms at the outfall station 16 years later. Most of the sub-dominant species were small polychaetes all of which were found in both samplings at the site. *Prionospio* has been the most common species in all samplings at stations near the outfall except in 1992 when a physical disturbance that affected the whole area allowed more opportunistic polychaetes of the genus *Polydora* to dominate the fauna for a short period of time. *Prionospio* was still present but not as the dominant species (ADM, 1994). The benthic community recovered by the end of the year and has shown

remarkable stability and persistence over the 20-year period, clearly not affected by the presence of the Gloucester outfall.

The 20 year biological monitoring program conducted by Gloucester has consistently demonstrated that the discharge from the WPCF allows for a balanced indigenous population of shellfish, fish and wildlife.

V.A.2. WET Toxicity Testing is Not an Appropriate Tool for Evaluating Impacts from the WPCF's Discharge

Consistent with the 301(h) guidance, there are many reasons that a biological assessment is most appropriate for evaluating the impacts of Gloucester's discharge and WET testing should not be used. First, a toxicity test is nothing more than a screening tool which tells little or nothing about what actually happens in the environment. The WET testing of Gloucester's effluent does not replicate ambient conditions at the outfall, for a number of reasons, as discussed in Section IV.B. Second, toxicity test results can be quite variable from laboratory to laboratory. Quality assurance testing done annually by regulatory agencies has demonstrated wide variability in results on the same toxicant among various laboratories. Similarly, in a "split-sample" test done during the TIE study on the Gloucester effluent, the effluent passed the test at one laboratory but failed at the other (Brown and Caldwell, 2007). WET testing is unreliable and should not be considered to the exclusion of the 20 years of biological monitoring data demonstrating a balanced indigenous population. Finally, EPA's regulations specify that "[a] balanced indigenous population of shellfish, fish, and wildlife must exist…*beyond the zone of initial dilution*." 40 CFR § 125.62(c)(2) (emphasis added). Beyond the zone of initial dilution, the effluent is diluted by at least a 59:1 ratio. Thus, WET testing of 6.25% - 100% effluent (1:1 – 16:1 dilutions) provides no information on conditions at and beyond the zone of initial dilution.

V.B. Recreational Activities

In its tentative decision, EPA claims that "the WPCF is very likely currently causing violations of the single sample, primary contact water quality criterion for Class SA waters under the MSWQS," and thus "reflects a threat to the health of persons engaged in water-contact recreation in these waters" (p. 24). As discussed in Section IV.E, above, EPA's claim that the WPCF is "very likely" violating bacteria water quality criteria is unfounded. Further, it is highly unlikely that anyone is engaged in water-contact recreation in the immediate vicinity of the outfall. In its July 2001 Final Decision Document (V.C.4), EPA concluded that the location of the relocated outfall "…has never been identified as a popular scuba diving location." In fact, the closest potential area to the outfall for diving or other recreational activities is the shipwreck Chester C Poling. It is located more than a third of a mile from the outfall. For these and other reasons, EPA determined in 2001 that the "…primary discharge at the relocated outfall site is not impacting recreational activities." Recreational use of the area near the outfall has not changed since 2001, and EPA's conclusion that the discharge is not impacting recreational activities remains valid.

VI. THE DISCHARGE WILL COMPLY WITH PROVISIONS OF OTHER STATE, LOCAL AND FEDERAL LAWS

VI.A. Ocean Sanctuaries Act

The waiver denial states (pp. 28-29) that the WPCF is covered by the "grandfathering" provisions of the Massachusetts Ocean Sanctuaries Act, M.G.L. c. 132A §§ 12A-18, which would require a variance for any flow increase.

This statement is incorrect. Gloucester's WPCF is not subject to the requirements of the Massachusetts Ocean Sanctuaries Act. A Special Act of the General Court made a specific exception for the Gloucester facility (see Attachment A):

> Notwithstanding the provisions of sections fourteen, fifteen, sixteen and eighteen of chapter one hundred and thirty-two A of the General Laws, the city of Gloucester may build and discharge from a primary wastewater treatment facility with an extended outfall as described in the application submitted to the administrator of the Environmental Protection Agency of the United States for a waiver of the secondary wastewater treatment requirement as provided by 33 USC 1343.
>
> Chapter 120 of the Acts of 1981 (May 1, 1981).

The application Gloucester had submitted to the Environmental Protection Agency described a facility with design average flow of 7.24 MGD and design maximum flow of 15 MGD (see Attachment A); the facility was constructed as designed, and Gloucester is not proposing to significantly increase flow at all, much less beyond the design flow of the plant as contemplated in Chapter 120 of the Acts of 1981. Thus, the discharge from the Gloucester WPCF is exempt from the requirements of the Massachusetts Ocean Sanctuaries Act.

VI. B. Compliance with Other State and Federal Laws

The relevant state and federal agencies concurred with EPA's 2001 waiver decision, and there are no changed circumstances that would warrant disapproval of this waiver renewal now. Moreover EPA has not stated any reason to believe that renewal of Gloucester's 301(h) waiver would fail to comply with other state or federal laws, and does not appear to have even contacted any of the relevant state or federal agencies to seek their opinions.

VII. COMMENTS ON DRAFT NPDES PERMIT REQUIRING SECONDARY TREATMENT

At the same time it issued its draft denial of the 301(h) waiver, EPA also released a draft NPDES permit for the Gloucester WPCF incorporating secondary treatment requirements. As stated to EPA in a letter dated January 5, 2011, the City believes that drafting of the NPDES permit should take place after EPA has issued its final decision on the 301(h) waiver. Nonetheless, the City is preparing comments on the draft permit, which it will submit before the close of the public comment period, which has been extended until the date of the public hearing in this

matter, currently scheduled for March 24, 2010.

VIII. SOUND PUBLIC POLICY FAVORS THE ISSUANCE OF A 301(h) WAIVER FOR THE WPCF

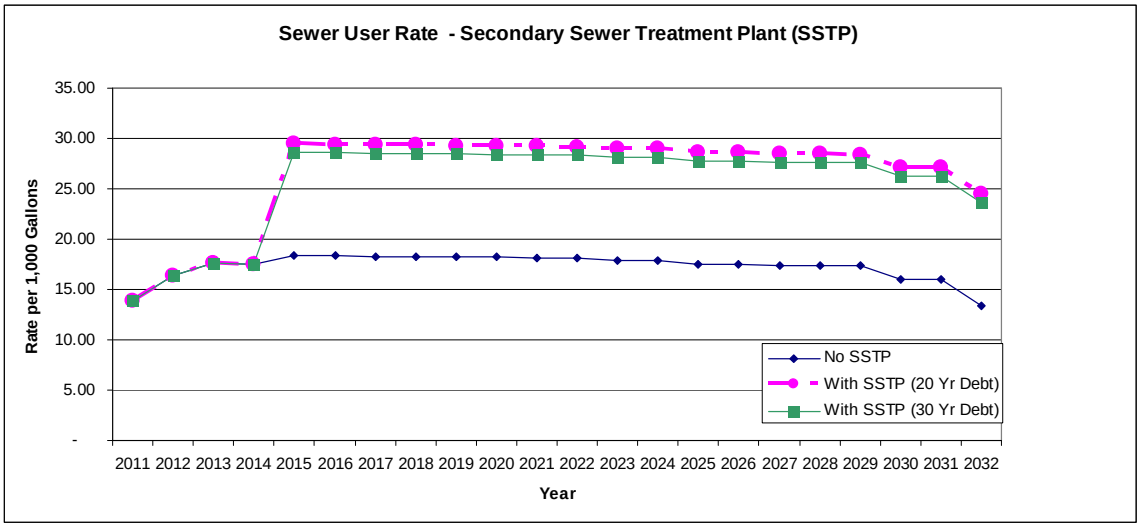
VIII.A. The Financial Impacts to the City of a Secondary Treatment Plant Would Be Enormous

The City has completed a preliminary evaluation of the impacts of this proposed waiver denial on the financial situation of the City and affordability to ratepayers (Attachment B). The analysis is based on preliminary estimates of the capital and operating costs of a new secondary wastewater treatment plant to replace the existing advanced primary plant. Preliminary estimates indicate that a new secondary facility would cost approximately $60,000,000, not including land and other ancillary costs. Annual operation and maintenance costs would be approximately $1,000,000 per year above the existing operating costs.

The following would be the consequences of EPA's proposed action:

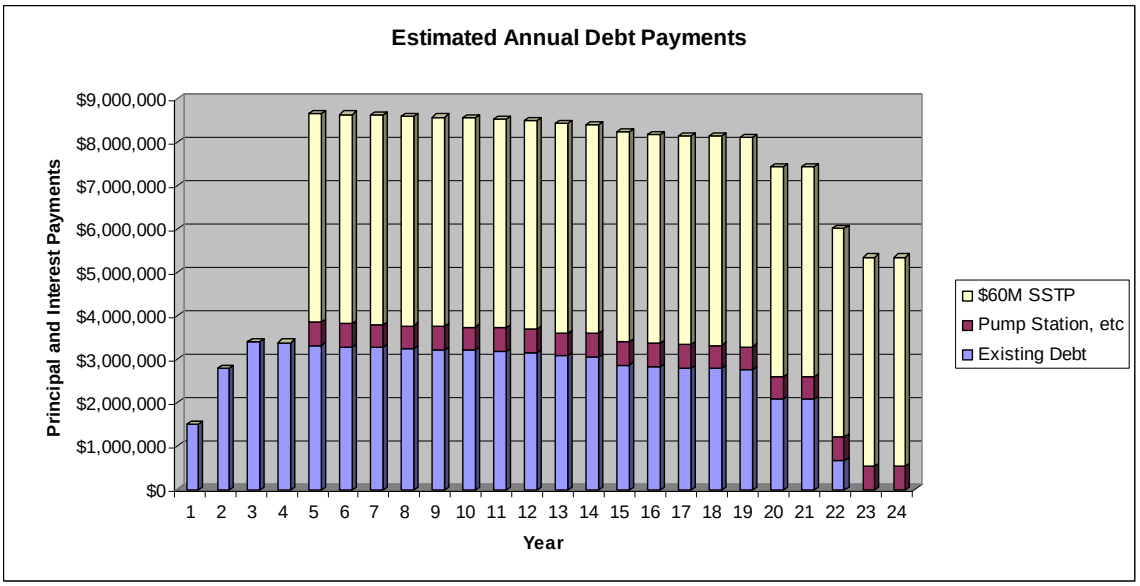
1. Without the Construction Grants program, which EPA instituted in 1972 to pay 75% of the cost of secondary treatment plant for communities that did not receive a 301(h) waiver, the full cost of the new facility would fall on the ratepayers of Gloucester. There are currently no federal grants available for secondary treatment plant construction, as there were for all of the secondary plants built between 1972 and 1990.

2. Including the increased operations and maintenance costs with capital costs, annual charges for the average Gloucester household would increase from $1,251 per year presently to approximately $2,570 per year (see figure below). By comparison, the average 2009 rate per household in Massachusetts was $584 per year. The highest rate in Massachusetts in 2009 was $1,632.[20]



3. This annual charge would be about 5.4% of the Median Household Income in the City, ***almost three times the percentage that EPA considers a "very high" burden on residential customers in its guidance on affordability of sewer infrastructure improvements***.

4. The total sewer enterprise debt of the City would more than double, which could have a significant impact on the City's bond rating (see figure below).



5. Because of the current high employment and foreclosure rates and the high number of citizens on fixed incomes, such an increase in user charges would likely result in payment defaults and decrease user charge collection percentages.

6. The large increase in rates could cause Gloucester to lose businesses to other towns or areas of the country, exacerbating the unemployment rate and increasing residential user rates (above those estimated above) as operating and debt service costs are reallocated from the commercial – industrial base to the residential base.

7. The ability of the City to operate, maintain, repair and replace aged sewerage infrastructure, as well as comply with existing commitments to CSO control in addition to new EPA regulations on stormwater, would be seriously limited. The risk and danger of the failure of critical existing equipment and systems would increase, adding additional burden to municipal budgets.

In the current and probable future economic climate, the mere perception of dramatically increased future costs of public utilities, especially water and wastewater services such as those

[20] 2009 Massachusetts Sewer Rate Survey, Tighe & Bond.

that would be required in this case, could be expected to have serious and immediate repercussions in the business and real estate sectors of the City. The very large increases in user rates resulting from EPA's proposed decision might be justified by clear, beneficial environmental improvements that would increase property values, quality of life, or other social or economic conditions in a community. In this case, the threat of quantum increases in the cost of wastewater service, combined with no measurable environmental improvement, only poses a long-term economic threat to the City of Gloucester, with no associated benefits. In summary, EPA's tentative decision creates a very critical and serious economic threat to the City.

VIII.B. Congress Recognized the Financial Burden of Upgrading to Secondary Treatment and Enacted Section 301(h) to Alleviate the Burden

On passage of the Clean Water Act in 1972, Congress recognized the very heavy financial burden of secondary treatment being mandated on publicly owned treatment plants. In light of this burden, Congress enacted two interrelated provisions that allowed cities to meet the enormous capital and operating requirements:

1. The 301(h) waiver provisions; and

2. The Construction Grants Program that provided 75% grants to communities for upgrade to secondary treatment.

VIII.B.1. Waiver Intent

Congressional intent in creating the § 301(h) waiver provision was to establish an alternative to costly secondary treatment for municipalities that are located near coastal waters with adequate assimilative capacity when there would be no significant impact on the marine environment.[21] The legislative history contains numerous references to Congress' concern about the enormous costs associated with secondary treatment especially in contrast with the small marginal benefits when the outfall was in an active, deep-water marine environment.[22] A key congressional report stated it clearly:

> There have been continuing increases in [the cost to construct secondary treatment]. In view of these factors, and in order to achieve needed savings in the cost of treatment of municipal wastes, the Committee considers it desirable to make the operation of ocean discharges available where it can be shown that unacceptable adverse environmental effects will not result.[23]

---

[21] *See* H.R. REP. 97-270, at 17 (1981), *reprinted in,* 1981 U.S.C.C.A.N. 2629, 2645.

[22] *See* H.R. REP. NO. 97-270, at 17 (1981), *reprinted in* 1981 U.S.C.C.A.N. 2629, 2645 ("In view of these factors, and *in order to achieve needed savings in the cost of treatment of municipal wastes*, the Committee considers it desirable to make the operation of ocean discharges available where it can be shown that unacceptable adverse environmental effects will not result.") (emphasis added); *see* 95 Cong.Rec. S19,679 (1977) (daily ed. Dec. 7, 1977); *see also Rite-Research, Etc.* v. *Costle*, 650 F.2d 1312, 1318 (5th Cir. 1981) ("There are a number of communities that have been and will be subjected to administrative burdens way beyond their financial and administrative capacity because of the need to comply with the secondary treatment requirement … [T]he Congress has announced its intention to put some sense into the treatment of municipal wastes"); *see* S. REP. NO. 95-370, at 44 (1977), *reprinted in* 1977 U.S.C.C.A.N. 4326, 4369 ("This provision's goal is to limit unnecessary treatment for treatment's sake").

[23] *See* H.R. REP. NO. 97-270, at 17 (1981), *reprinted in* 1981 U.S.C.C.A.N. 2629, 2645 (emphasis added).

Federal courts have also emphasized the importance Congress placed on the avoidance of the unnecessary cost of constructing secondary treatment facilities by municipalities that can discharge to an active ocean environment. For example, the United States Court of Appeals for the District of Columbia Circuit said that § 301(h) was designed to "allow some savings in sewage treatment through harmless marine discharges."[24] Furthermore, the Court found "[t]he purpose of § 301(h) is to permit some coastal municipal sewage treatment plants to avoid costs associated with secondary treatment so long as environmental standards can be maintained. If a treatment plant can discharge a pollutant and meet the criteria of § 301(h), unnecessary expenditures may be avoided."[25]

EPA rightfully granted Gloucester a 301(h) waiver in 1985, consistent with the intent of Congress and consistent with the provision that a 301(h) waiver was appropriate "where it can be shown that unacceptable adverse environmental effects will not result." As shown in this document, and in light of the total absence of any evidence from EPA to the contrary, 20 years of monitoring and testing at the site of the discharge has shown that there are no adverse environmental impacts and that EPA's decision to grant the waiver was justified and in accordance with the intent of the law.

VIII.B.2. Construction Grants Provision

Most municipal secondary wastewater plants built under the Clean Water Act received 75% grants to pay for the construction of the facilities. The $5 billion per year authorized through the first 12 years of the Act recognized that cities could not handle the financial burden without government financial support. Where appropriate, POTWs were granted 301(h) waivers to avoid unnecessary government spending in situations with no contingent environmental benefits.

With the elimination of the Construction Grants program over 20 years ago, for EPA to reverse an appropriate 301(h) waiver decision that has stood for 25 years, including a renewal confirming that there were no impacts of the discharge, without any reasonable basis is not only unwarranted, but places Gloucester is an extremely untenable financial position. Such a decision would result in a gross waste of public moneys with no measurable environmental benefit and is a clear violation of the intent of the Clean Water Act and public policy.

VIII.C. Sustainability Principles Favor Granting the 301(h) Waiver

There is an emerging focus on the benefits of integrating principles of sustainability into environmental solutions and decisions. Sustainability can be defined as "*Meeting the needs of the present generation without compromising the ability of future generations to meet their needs.*"[26] The following assessment analyzes the environmental, social and economic benefits, of secondary treatment as compared to advanced primary treatment at the Gloucester WPCF.

---

[24] *Natural Resources Defense Council, Inc.* v. *U.S. Environmental Protection Agency*, 656 F.2d 768, 780 (D.C. Cir. 1981) (citation omitted).

[25] *Id.* at 784 (emphasis added).

[26] United Nations General Assembly (March 20, 1987). *Report of the World Commission on Environment and Development: Our Common Future*; Transmitted to the General Assembly as an Annex to document A/42/427 - Development and International Co-operation: Environment; Our Common Future, Chapter 2: Towards Sustainable Development; Paragraph 1. United Nations General Assembly. http://www.un-documents.net/ocf-02.htm. Retrieved 1 March 2010.

The clear conclusion of this assessment is that EPA's decision to deny the waiver would violate the principles of sustainability, burdening the citizens of Gloucester for this and at least the next generation with severe economic and social consequences that would compromise their ability to operate, maintain, repair and replace their existing water and wastewater infrastructure, as well as provide for public safety, education and other basic services with no measurable environmental improvement in water quality or beneficial water uses. On this basis, the EPA decision violates the often-stated priorities of both the Federal Government and Commonwealth of Massachusetts that environmental decisions should produce sustainable environmental quality results commensurate with the commitment of resources.

VIII.C.1. Sustainability Metrics

The Gloucester WPCF currently uses polymer addition to enhance settling, which provides for advanced primary treatment; this is considered as the baseline alternative. The sustainability metrics evaluation of this alternative is based on plant processes, operation, and performance. For comparative purposes, it was assumed that a secondary treatment plant would be built and that the existing primary treatment facilities would remain.[27] The main differences between these two alternatives, then, are that secondary treatment would require several (as many as six) additional processes, but would eliminate the need to add polymer at the primary clarifiers.

The following goals were selected to compare the sustainability of the change from advanced primary treatment to secondary treatment, as measured by the environmental and social impact that would result from that change:

- **Biosolids.** Minimize the generation of wastewater residuals. The potential impact of increased residuals generation on regional residuals processing, demand and disposal capacity is a significant factor.[28]
- **Greenhouse Gas Emissions.** Minimize greenhouse gas (GHG) pollution from electricity and fuel consumption (and related transportation) during construction and operation.
- **Other Air Pollutants.** Minimize other air pollution other than GHG emissions, primarily criteria pollutants from electricity and fuel consumption (and related transportation) during construction and operation.
- **Water Quality.** Minimize water quality impacts from the effluent discharge.
- **Land Resources.** Conserve land resources for beneficial uses by future generations.
- **Economic Impacts.** Maximize the benefit/cost ratio of environmental decisions to ensure the most environmental benefit for limited public moneys in an increasingly difficult municipal financial setting.
- **Social Impacts.** Ensure that environmental decisions provide maximize sustainability of local employment, promote environmental justice and minimize negative secondary and tertiary impacts (higher commuting distances, housing prices, etc.).

---

[27] This is probably not the case. The existing WPCF is on a site with serious expansion limitations. The land requirements for secondary treatment would most probably require relocating the existing WPCF to a new site of 10 acres or more. Given the land availability in Gloucester this would be extremely difficult and expensive.

[28] There is a general need to greatly reduce the volume of all forms of solid waste, including wastewater residuals, to extend the useful life of available landfills, and not create unnecessary additional waste. Although the Gloucester WPCF currently sends its processed residuals to New England Fertilizer for beneficial reuse, there is no certainty that this market will continue. In addition, all disposal options have their own environmental consequences and sustainability problems.

VIII.C.2. Sustainability of Denial of 301(h) Waiver for Gloucester WPCF

The following table demonstrates that EPA's decision to require a secondary WPCF violates the above sustainability metrics.

Sustainability Issues Related to the EPA's Waiver Denial Decision

Sustainability Metric	Sustainability Outcome	Magnitude of Change
GHG Emissions	Reduced	There would be an increase of CO_2(e) (carbon dioxide equivalent; a combination of CO_2, CH_4 and N_2O) emissions during construction; and an increase of CO_2(e) annual emissions during operation.
Air Pollutant Emissions	Reduced	There would be an increase of CO, NOx, particulate matter (PM10 and PM2.5), and SO_2 during construction. Additional power consumption required for operating a secondary treatment facility would increase NOx and SO_2 emissions.
Biosolids Impact on Landfill Capacity	Reduced	Biosolids quantities would increase by more than two-fold, with associated solids disposal issues. (It is well-established that secondary treatment generates significantly more sewage sludge for disposal compared to the amount produced by primary treatment. In fact, a Federal court noted this as one of the main reasons it rejected secondary treatment for San Diego, California, in *United States v. City of San Diego*, 1994 WL 521216, *5-6 (S.D. Cal. 1994).
Land resources	Substantially Reduced	Additional requirement for 10 to 12 acres for a new wastewater plant would severely strain very limited land resources in the City
Economic impacts	Substantially Reduced	Burden to the ratepayers in Gloucester of between $50 M and $70M in new debt, as well as substantially higher operating costs, which, along with other regulatory requirements (CSO, stormwater, CMOM, etc.), will seriously inhibit the ability of the town to operate, maintain, repair and replace it existing water and wastewater infrastructure and create a debt burden that severely compromises the financial capacity of the town to provide other basic municipal services.
Social Impacts	Substantially Reduced	Increased wastewater user rates would seriously impact local business survival, especially in the food processing industry, resulting in further relocations out of the City, consequent reduction in jobs, reduction in City revenues, further reallocation of the costs of services to residential customers, resulting in extreme unaffordability and associated negative impacts to the already stressed housing market and the provision of public services such as education and public safety. (See Financial Assessment and Affordability section)
Water Quality Benefits	No change	There would be no measurable improvement in water quality, no increase in human use benefits and no measurable reduction in risk to either human or aquatic water uses. There would be a reduction of effluent BOD and TSS loads; however, these are not pollutants of concern and the existing plant meets permit and water quality requirements for the parameters.
Noise/Odor/Traffic Impacts to the Community	Reduced	There would be a relatively large increase in noise/odor/traffic impacts during construction. These impacts would be reduced, but still incrementally present, during operation due to increased solids management and disposal needs.

The following impacts are not included in the above analysis, but are still very real and not avoidable if the WPCF were to be converted from advanced primary treatment to secondary treatment.

- Fuel consumption associated with shipping the materials to the point of distribution and fuels used by the vehicle and machinery of manufacturing facilities
- Harvesting of raw material for manufacturing
- Travel of construction and operations personnel to and from the site

Thus, the resource needs and associated impacts for converting from advanced primary treatment to secondary treatment are understated in this analysis.

In conclusion, EPA's tentative decision to deny the 301(h) waiver for the Gloucester WPCF, which has been in place for over 25 years, is directly in conflict with critical sustainability principles as outlined above. The EPA decision seriously violates the goal of both the federal government and the Commonwealth of Massachusetts that environmental decisions produce sustainable environmental quality results commensurate with the commitment of resources. The 301(h) waiver should be granted.

IX. CONCLUSION

The City's comments have demonstrated the following points:

1. EPA's assertion that the WPCF discharge will not meet water quality standards as required by Section 301(h) is incorrect. In fact, the Gloucester discharge satisfies MWQS criteria at and beyond the boundary of the ZID, and the permit limit exceedances noted by EPA were either corrected by upgrades to the WPCF or are due to minor operational problems common in virtually every wastewater treatment plant, regardless of the level of treatment provided. Based on a sustainability analysis, the current discharge is preferable to secondary treatment and has less impact on environmental resources.
2. EPA has cited no actual impacts to human, aquatic or other environmental uses of the waters in the area of the discharge. Twenty years of data from the discharge location confirm that there is, in fact, no measurable impact due to the discharge.
3. The tentative denial is founded on mis-application and mis-interpretation of fundamental principles of water quality impairment, dilution and dispersion in the marine environment and risk to human and aquatic uses. It is based on technicalities of policies and regulations that point to minor operational issues that have already been or are being corrected, to justify enormous capital expenditure that will provide no improvement to water quality or beneficial uses, thus subverting the express intent of the 301(h) provision in the law.
4. The enormous additional capital and operating cost of secondary treatment will dramatically and negatively impact the ability of the City of Gloucester to sustain its critical infrastructure and its basic social, economic and environmental quality of life, including its ability to provide basic public services such as public safety and infrastructure.

The capital expenditure of $60 million for a secondary treatment facility is not the answer to historical problems that have been fundamentally operational in nature and have, in fact, been

corrected. The expenditure and resulting annual debt resulting from construction of an unnecessary secondary WPCF would severely threaten the ability of the City to commit adequate O&M budgets necessary to ensure proper operation, maintenance and performance of the facility. The City is committed to providing sufficient operating budget into the future to ensure proper maintenance and operation of the existing facility, which will enable it to continue to meet all of the criteria of Section 301(h).

References

ADM Associates, 1994. Gloucester 301(h) monitoring program, 1992 annual report. Report submitted to the Gloucester Department of Public Works.

Brown and Caldwell, 2007. Draft Phase II Voluntary Toxicity Identification Evaluation. Prepared for the City of Gloucester.

EIFAC, 1986. Report of the working group on terminology, format and units of measurement as related to flow-though and recirculation system. European Inland Fisheries Advisory Commission. Tech. Pap 49. 100pp.

Field, C.B, M.J. Behrenfeld, J.T.Randerson and P. Falkowski, 1998. Primary production of the biosphere: integrating terrestrial and oceanic components. Science V 281 no 5374 pp 237-240.

Michael, A.D and S. Fleming, 2002. Gloucester 301(h) monitoring, 2000 annual report. Report submitted to Gloucester Department of Public Works. 68pp plus App.

Michael, A.D. and S. Fleming, 2003. Gloucester 301(h) monitoring, 2001 annual report. Report submitted to Gloucester Department of Public Works. 86 pp plus App.

Michael, A.D. and M.Hall, 2010. Gloucester 301(h) monitoring, 2009 annual report. Report submitted to Gloucester Department of Public Works.

NET Atlantic, 1990. Mid-year report for engineering services for the 301(h) monitoring program. Report submitted to Gloucester Department of Public Works.

Nilson, H.C. and R. Rosenberg, 1997. Benthic habitat quality assessment of an oxygen stressed fjord by surface and sediment profile images. J. Mar Syst 11:249 – 264.

Pearson, T.H and R. Rosenberg 1978. Macrobenthic succession in relation to organic enrichment and pollution of the marine environment. Oceanogr Mar Biol Annu Rev 16: 229 – 311.

Rhoads, D.C and J. D. Germano, 1982. Characterization of organism-sediment relations using sediment profile imaging: an efficient method of remote ecological monitoring of the sea floor. Mar Ecol Prog ser 8: 115 – 128.