

**UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 1**

In Re:)	
)	
CITY OF GLOUCESTER, MASSACHUSETTS,)	TENTATIVE DECISION OF THE
PUBLICLY OWNED TREATMENT WORKS,)	REGIONAL ADMINISTRATOR
NPDES PERMIT No. MA0100625)	UNDER 40 C.F.R. PART 125,
APPLICATION FOR MODIFICATION OF)	SUBPART G
SECONDARY TREATMENT REQUIREMENTS)	
UNDER SECTION 301(h) OF THE FEDERAL)	
CLEAN WATER ACT, 33 U.S.C. § 1311(h))	
)	

On May 26, 2006, the City of Gloucester, Massachusetts (Gloucester) applied to the Region 1 Office of the United States Environmental Protection Agency (Region 1) for:

(a) renewal of its National Pollutant Discharge Elimination System (NPDES) permit (Permit No. MA0100625), issued under the federal Clean Water Act, 33 U.S.C. §§ 1251, *et seq.* (Act), by Region 1 to Gloucester's Water Pollution Control Facility (WPCF), a publicly owned treatment works; and

(b) renewal of the modification of the Act's secondary treatment requirements previously granted the WPCF by Region 1 under section 301(h) of the Act, 33 U.S.C. § 1311(h).

This modification of the Act's secondary treatment requirements, *see* 33 U.S.C. § 1311(b)(1)(C), is reflected in the Gloucester WPCF's current permit.

Having considered Gloucester's application, it is my tentative decision under 40 C.F.R. Part 125, Subpart G, to deny Gloucester's request that Region 1 renew the permit limits modified under section 301(h) of the Act. *See* 40 C.F.R. § 125.59(h). The basis of this tentative denial is detailed in the attached evaluation. In light of this tentative decision, Region 1 has prepared a draft NPDES permit that sets secondary treatment-based effluent limits for the Gloucester WPCF.

Region 1 is now publicly noticing, and seeking public comment on, this tentative decision and draft permit. After considering any public comments received, and any other relevant information, Region 1 will make a final decision on the modification request and permit and issue a final permit under the procedures of 40 C.F.R. Part 124. *See* 40 C.F.R. §§ 125.59(c)(4) and 125.59(i)(4). Any appeal of Region 1's final decision to grant or deny a section 301(h) modification to the Gloucester WPCF shall be governed by the procedures in 40 C.F.R. Part 124. *See* 40 C.F.R. § 125.59(i)(5).

Date: _____

H. Curtis Spalding
Regional Administrator
Environmental Protection Agency – Region I

ENVIRONMENTAL PROTECTION AGENCY
REGION 1

TENTATIVE DECISION DOCUMENT

EVALUATION OF THE APPLICATION FOR RENEWAL OF THE MODIFICATION OF
SECONDARY TREATMENT REQUIREMENTS UNDER SECTION 301(h)
OF THE CLEAN WATER ACT

FOR

CITY OF GLOUCESTER, MASSACHUSETTS
GLOUCESTER WASTEWATER POLLUTION CONTROL FACILITY

DATE

TABLE OF CONTENTS

LIST OF ABBREVIATIONS.....	3
I. INTRODUCTION.....	4
II. DECISION CRITERIA.....	4
III. SUMMARY OF FINDINGS.....	5
IV. DESCRIPTION OF TREATMENT FACILITY.....	5
A. Permit History.....	5
B. Treatment System.....	5
C. Improved/Altered Discharge.....	6
V. DESCRIPTION OF RECEIVING WATER.....	7
VI. PHYSICAL CHARACTERISTICS OF DISCHARGE.....	8
A. Zone of Initial Dilution (ZID).....	9
B. Initial Dilution.....	10
VII. APPLICATION OF STATUTORY AND REGULATORY CRITERIA.....	10
A. Compliance with Primary Treatment Requirements.....	10
B. Compliance with Water Quality Standards Applicable to the Pollutant(s) for Which a Section 301(h) Modified Permit is Requested.....	11
1. Water Quality Standards Applicable to Pollutant(s) for which a Section 301(h) Modified Permit is Requested.....	11
2. Demonstration of Compliance with State Water Quality Standards for BOD and Suspended Solids.....	12
3. State Determination of Compliance with State Law.....	12
C. Attainment or Maintenance of Water Quality Which Assures Protection of Public Water Supplies; Assures the Protection and Propagation of a Balanced Indigenous Population of Shellfish, Fish, and Wildlife; and Allows Recreational Activities.....	12
1. Attainment of Water Quality Standards.....	13
2. Impact of the Discharge on Public Water Supplies.....	22
3. Impact of the Discharge on Shellfish, Fish, and Wildlife.....	22
4. Impact of the Discharge on Recreational Activities.....	24
5. Impact of Improved Discharge.....	24
D. Establishment of a Monitoring Program.....	25
E. Impact of Modified Discharge on Other Point and Non-point Sources.....	27
F. Toxics Control Program.....	27
G. Increase in effluent volume or Amount of Pollutants discharged.....	28
VIII. COMPLIANCE WITH PROVISIONS OF OTHER STATE, LOCAL OR FEDERAL LAWS.....	28
A. Coastal Zone Management Act.....	28
B. Massachusetts Oceans Sanctuaries Act.....	28
C. Endangered Species Act.....	29
D. Marine Sanctuaries.....	29
E. Essential Fish Habitat.....	30
IX. REFERENCES AND ATTACHMENTS.....	31

LIST OF ABBREVIATIONS

BIP	Balanced Indigenous Population
BOD	Biological Oxygen Demand
CWA	Clean Water Act
CZM	Massachusetts Office of Coastal Zone Management
DMR	Discharge Monitoring Report
DO	Dissolved Oxygen
EPA	Environmental Protection Agency
GPD	gallons per day
MassDEP.....	Massachusetts Department of Environmental Protection
MGD	million gallons per day
MOSA	Massachusetts Ocean Sanctuaries Act
MSWQS	Massachusetts Surface Water Quality Standards
NPDES	National Pollution Discharge Elimination System
TPH	Total Petroleum Hydrocarbons
TSD	Amended 301(h) Technical Support Document (1994)
TSS.....	Total Suspended Solids
TU	Toxic Unit(s)
WET	Whole Effluent Toxicity
WPCF.....	Gloucester Water Pollution Control Facility
WQA	Water Quality Act
WQS.....	Water Quality Standards
ZID	Zone of Initial Dilution
CZM.....	Massachusetts Office of Coastal Zone Management

I. INTRODUCTION

The City of Gloucester (“Gloucester,” “City,” or “the applicant”) has applied to the United States Environmental Protection Agency, Region 1 (“EPA Region 1” or “the Region”) for a renewed modification¹ of secondary treatment requirements under section 301(h) of the Clean Water Act (“CWA” or “the Act”), 33 U.S.C. § 1311(h). The applicant is seeking a § 301(h) variance to discharge wastewater receiving less-than-secondary treatment from the Gloucester Water Pollution Control Facility (“WPCF” or “the facility”) to Massachusetts Bay.

Based on its review of Gloucester’s variance application and other relevant information, EPA Region 1 is proposing to deny the City’s application. The instant document presents the Region’s “tentative denial” of Gloucester’s request and details the Region’s assessment of whether the applicant’s proposed discharge would comply with the criteria set forth in section 301(h) of the CWA and EPA’s implementing regulations codified at 40 CFR Part 125, Subpart G.

II. DECISION CRITERIA

CWA section 301(b)(1)(B), 33 U.S.C. § 1311(b)(1)(B), requires publicly owned treatment works (POTWs) to have met effluent limitations based upon secondary treatment by July 1, 1977. Secondary treatment is defined by regulation in terms of effluent quality for three parameters: total suspended solids (TSS), biochemical oxygen demand (BOD) and pH. *See* 40 C.F.R. § 133.102.

As part of the 1977 Amendments to the CWA, Congress added section 301(h), 33 U.S.C. § 1311(h) (hereinafter “301(h)”), which authorizes the Administrator,² upon application by a POTW and with State concurrence, to issue a National Pollution Discharge Elimination System (NPDES) permit that modifies the secondary treatment requirements of section 301(b)(1)(B), provided certain criteria are met. P.L. 95-217. Section 301(h) was later amended by the Municipal Wastewater Treatment Construction Grants Amendments of 1981, P.L. 97-117, and section 303 of the Water Quality Act (WQA) of 1987, P.L. 100-4. In 1994, EPA finalized revisions to its 301(h) regulations and accompanying Technical Support Document (TSD) to implement the WQA. 59 Fed. Reg. 40642 (Aug. 9, 1994) (codified at 40 CFR Part 125, Subpart G).

Section 301(h) of the CWA specifies, among other things, nine criteria that an applicant must satisfy to qualify for a variance from secondary treatment requirements. EPA’s regulations under section 301(h) address the nine statutory factors and, in some cases, elaborate upon them. *See generally* 40 CFR Part 125, Subpart G. A decision by the Regional Administrator to grant or deny a waiver must be based on a demonstration by the applicant that it has met each of the applicable requirements of 40 CFR §§ 125.59 through 125.68. 40 CFR § 125.59(i)(1).

¹ Modifications of secondary treatment requirements pursuant to section 301(h) are commonly referred to as “variances” or “waivers.” These terms are used interchangeably in this tentative decision.

² The authority to grant 301(h) waivers has since been delegated to the Regional Administrators. 1200 TN 126 (Aug. 1, 1985).

Consistent with the statute, the regulations also provide that any NPDES permit modified pursuant to section 301(h) must comply with State and local laws, and with other Federal laws and Executive Orders, including the Coastal Zone Management Act of 1972, as amended, the Endangered Species Act of 1973, as amended, and Title III of the Marine Protection, Research and Sanctuaries Act, as amended. 40 CFR § 125.59(b)(3).

III. SUMMARY OF FINDINGS

EPA Region 1 has evaluated the data provided by the applicant and other relevant information to determine whether Gloucester's proposed discharge would comply with each of the nine statutory/regulatory criteria. On the basis of this evaluation, the Region concludes that the applicant has demonstrated that it would meet some but not all of the criteria. Specifically, the Region concludes that the applicant has failed to demonstrate that:

1. The proposed discharge would not negatively impact recreational activities, or interfere with the protection and propagation of a balanced, indigenous population (BIP) of fish, shellfish, and wildlife. Section 301(h)(2); 40 CFR 125.62(b), (c), (d).
2. At the time the 301(h) modification becomes effective, the applicant's outfall and diffuser will be located and designed to provide adequate initial dilution, dispersion, and transport of wastewater such that the discharge would not exceed at and beyond the zone of initial dilution *all* applicable water quality standards. Section 301(h)(9); 40 CFR 125.62(a)(1)(i), 122.4(d).

IV. DESCRIPTION OF TREATMENT FACILITY

A. PERMIT HISTORY

On June 26, 1985, EPA Region 1 issued the Gloucester WPCF a final NPDES permit with primary treatment-based effluent limits based on EPA Region 1's approval of Gloucester's application for a variance from secondary treatment requirements under section 301(h). The permit became effective on July 26, 1985. On August 28, 2001, EPA Region 1 reissued the permit to Gloucester, retaining primary treatment-based limits based on Region 1's approval of Gloucester's application for renewal of the variance under section 301(h). This permit became effective on October 28, 2001, and expired on October 28, 2006, but has been administratively continued under the provisions of 40 CFR §122.6 because on May 26, 2006, Gloucester timely submitted its application for renewal of the WPCF's permit and the section 301(h) variance ("application"). Thus, the permit issued to Gloucester in 2001 currently remains in effect.

B. TREATMENT SYSTEM

As of 2005, the WPCF served an estimated population of 42,450 people. The WPCF also serves four significant industrial users. The WPCF takes in an average of 11.3 million of gallons per year of septage or 31,030 gallons per day (GPD) as a 365-day average. *See* Application attachments 1.2 and 1.3. The plant has a rolling monthly average flow permit limit of 5.15 MGD. The current reported average monthly flow is 5.08 MGD. The plant is designed to treat up to an average flow of 7.24 MGD with a peak hydraulic loading of 15.0 MGD.

The application describes the treatment facility as follows:

Wastewater is conveyed through an interceptor sewer crossing under the Annisquam River through a double-barreled siphon, then to a 36-inch gravity sewer in Essex Avenue. Raw sewage and sludge dewatering recycle are routed through a manhole outside the grit chamber equipped with a recently installed temporary flow meter. A 36-inch sewer connects the manhole to two aerated grit tanks.

Trucked waste from the following sources is received at the plant: commercial and residential holding tank wastes from Gloucester and Essex; septage from Gloucester and Essex; Gloucester STEP system septage; and industrial sludges. The Gloucester and Essex holding tank wastes are discharged directly into the aerated grit tanks. Trucked sludges and septage are discharged to alternate locations . . . Thickener overflow returns to the flow stream after the aerated grit tanks while the belt filter press (BFP) filtrate is discharged ahead of the aerated grit tanks. The aerated grit tank effluent, once combined with sludge thickening recycle and plant drainage at a second manhole, flows into the raw sewage pumping wet well at the Headworks Building. One of two screw pumps lift the combined flow to communitor channels where two comminutors shred rags and debris contained in the flow stream.

Flow is conveyed by gravity to the center feed well of two primary clarifiers. In 1993 chemically enhanced primary treatment (CEPT) using ferric chloride and polymer was implemented to improve oil and grease, BOD and TSS removal. Clarifier effluent is metered using a Parshall flume just prior to the chlorine contact tanks and is chlorinated as it enters two tanks. The contact tank effluent is de-chlorinated and routed to the effluent diversion structure where the effluent 24-hour composite sampler is located. The original design concept was that plant effluent would flow through the diversion structure by gravity and into the outfall during low tides and would be diverted to the effluent pumping station for pumping during high tides. Currently, plant effluent flows over a weir in the diversion structure to the effluent pumping station at all times. The effluent pumps transport the final effluent through the extended 36-inch outfall and end diffuser in 90 feet of water.

Application at 3.

C. IMPROVED/ALTERED DISCHARGE

The application states that it “is based on an improved discharge” pursuant to 40 CFR 125.58(i). *Id.* The applicant has provided the following description of recent improvements to the facility:

2004 – Completion of replacement of the plant’s two Influent Screw Pumps. The project consisted of two 15 MGD screw pumps, steel troughs, bearing assemblies, gear reducers, belts sheaves and couplings.

New influent sluice gates were also installed. The screw pumps and influent wet well were refitted with diamond plate covers in anticipation of the odor control project.

2004 – Replacement of one comminutor – one of the plant’s two comminutors was replaced in kind.

2005 – Construction began on an Odor Control Project. [The p]roject included covering of major tanks, installation of a large blower that exhausted the odorous air through a newly constructed Biofilter. The clarifiers, gravity thickeners, aerated grit chambers, comminutor channels and distribution box to chlorine contact chambers were coated with epoxy coatings and covered. Replacement of the second comminutor and associated controls were completed during this project. Installation of new slide gates in the comminutor channel was completed.

2005 – Upgrade of chlorination facility and addition of dechlorination. The new chlorination project included replacement of the sodium hypochlorite chemical feed equipment, installation of a sodium bisulfite chemical feed system, four new induction mixers and installation of residual analyzers for hypochlorite and bisulfite. The system has been on line for several months. Ongoing improvements are being added to improve performance and reliability of the system.

2006 – Replacement of both primary clarifier mechanisms. Prior to covering the tanks, both drive units and rake mechanisms were replaced.

E-mail from Christine Millhouse, City of Gloucester, to Doug Corb, EPA Region 1 (Feb. 13, 2007).

Nevertheless, the application does not provide the analyses required for applications based on improved or altered discharges pursuant to 40 CFR § 125.62(e). *See* section VII. C.4 below. In addition, despite the improvements to the facility noted by the City above, the WPCF has continued to violate its permit limits for fecal coliform. *See* section VII. C.1.c below~~VII. C.1.e below~~
~~VII. C.1.e below~~

Formatted: Font: Not Italic
Formatted: Font: Not Italic
Formatted: Font: Not Italic
Formatted: Font: Not Italic

V. DESCRIPTION OF RECEIVING WATER

The outfall from the WPCF is located in 90 feet (27 meters) of water outside of Gloucester Harbor in the ocean waters of Massachusetts Bay. The outfall discharges through a multi-port diffuser to a location approximately 5,250 feet offshore of Dog Bar Breakwater (Eastern Point) at a depth of 90 feet below mean low water. The area receiving the discharge is Massachusetts Bay is classified by the Massachusetts Department of Environmental Protection (MassDEP) as a Class SA water. 314 CMR 4.06, Table 23.

Under the Massachusetts Surface Water Quality Standards (MSWQS), Class SA waters “are designated as an excellent habitat for fish, other aquatic life and wildlife, including for their reproduction, migration, growth and other critical functions, and for primary and secondary contact recreation.” 314 CMR 4.05(4)(a).

Field studies conducted by Gloucester in the vicinity the outfall in 1979 indicate that the dominant tidal currents:

... are diurnal tides of about 10 feet. The tide floods west to northwest and ebbs east to southeast. Pulses of current speed correspond to each flood and ebb episode, with peak speeds of 10 - 20 cm/sec near the surface and 5 to 15 cm/sec near the bottom (Figure 3). Frequencies of current directions indicate that near the surface, flow directions are more variable and concentrated in the west to northwest and to a lesser extent in the east. Bottom currents are most frequently northwest and southeast. . .

Application at 11-12.

The application also describes the following fisheries located in areas potentially affected by the discharge:

There is recreational and commercial fishing for lobsters both inside Gloucester Harbor and out around the site of the Gloucester outfall. Commercial fishing for finfish is prohibited within three miles of shore. Recreational fishing, mostly seasonal based on weather conditions, occurs both inside and outside the harbor. This is concentrated in the spring through fall and directed at species such as cod, winter, flounder, mackerel, pollock, smelt and striped bass. There is an active commercial and recreational lobster fishery.

Id.

VI. PHYSICAL CHARACTERISTICS OF DISCHARGE

In order for a modification of secondary treatment requirements to be granted, “. . . the applicant's outfall and diffuser must be located and designed to provide adequate initial dilution, dispersion, and transport of wastewater such that the discharge does not exceed at and beyond the zone of initial dilution (ZID). . . [any] applicable water quality standards.” 40 C.F.R. § 125.62(a)(1)(i). *See also* 33 U.S.C. 1311(h)(9).

For any given discharge, there are two key physical characteristics that determine whether this requirement can be met: (1) the size of the ZID, and (2) the degree of initial dilution provided by the receiving waters within the ZID.

ZONE OF INITIAL DILUTION (ZID)

EPA regulations define the zone of dilution (“ZID”) as “the zone 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). The MSWQS allow for “a limited area or volume of a waterbody as a mixing zone for the initial dilution of a discharge.” 314 CMR 4.03(2). Under the MSWQS, waters within a designated mixing zone are allowed not to meet otherwise applicable water quality criteria provided certain conditions are met. *Id.* Among other things, a mixing zone may not “interfere with the existing or designated uses of surface waters.” *Id.* 4.03(2)



Figure 1: ZID

Despite the reference in the MSQWS to “a mixing zone for the initial dilution of a discharge,” the Massachusetts Surface Water Quality Standards Implementation Policy for Mixing Zones (“MassDEP Mixing Zone Policy”) actually allows for mixing zones to extend beyond the ZID to include that portion of the waterbody where complete mixing occurs (i.e., where the concentrations of pollutants within a waterbody reach a uniform concentration), under certain conditions and subject to a variety of restrictions. *MassDEP Mixing Zone Policy*, Part V (Jan. 8, 1993). Thus, 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.

EPA’s *Amended Section 301(h) Technical Support Document* (“TSD”) explains that, “[i]n general, the ZID can be considered to include that bottom area and the water column above that area circumscribed by distance *d* from any point on the diffuser, where *d* is equal to the water depth. . . . The water depth used should be the maximum water depth along the diffuser axes with respect to mean lower low water (or mean low water)” TSD at 56 (1994). Thus, for a linear diffuser, the bottom area of the ZID is oblong-shaped, as shown in Figure 1.

Based on the design specifications for the outfall and diffuser of the WPCF and the formula provided by the TSD, EPA estimates the bottom area and surface area for the WPCF’s ZID to be approximately 55.1 meters by 115.2 meters. This falls within the range of the ZID dimensions provided by Gloucester in its application, namely 28.4 ± 33 meters by 88.4 ± 33 meters. Application at 31.

Table 1: Gloucester, MA WPCF Outfall Design Specifications³

<i>Outfall</i>	Diameter (m)	0.91
	Length (m)	4532
<i>Diffuser</i>	Angle of orientation of ports (from horizontal)	11.25 degrees
	Port diameter (m)	1.52
	Distance below MLW (m)	27.1
	Number of Ports	10
	Port spacing (m)	6.096
	Design flow per port (m ³ /sec)	0.0657

A. INITIAL DILUTION

The level of initial dilution achieved by a particular outfall and diffuser is determined by the characteristics of the effluent discharge, the receiving water, the diffuser design and the depth of the discharge. TSD at 52. Pursuant to EPA regulations, the evaluation of whether a discharge meets water quality standards must be “based upon conditions reflecting periods of maximum stratification and during other periods when discharge characteristics, water quality, biological seasons, or oceanographic conditions indicate more critical situations may exist.” 40 C.F.R. § 125.62(a)(1)(iv). In other words, this evaluation must be based on conditions when the discharge receives the lowest possible level of initial dilution to occur at the site, commonly referred to as “critical initial dilution,” TSD at 54. Therefore, a mathematical model is used to compute the critical initial dilution using inputs such as the predicted peak 2- to 3-hour effluent flow for the new end-of-permit year (i.e. 2015), data from a temperature and salinity depth profile of the receiving water, and current speed no higher than the lowest 10th percentile of speeds that occur. *Id.*

Initial dilution values for the WPCF outfall were calculated by Tetra Tech in 1989 using the EPA-approved models UMERGE and ULINE. These calculations were based on a projected peak dry weather flow of 6.3 mgd and a peak wet weather flow of 10.0 mgd and yielded critical dilutions of 65:1 for dry weather and 59:1 for wet weather.

VII. APPLICATION OF STATUTORY AND REGULATORY CRITERIA

A. COMPLIANCE WITH PRIMARY TREATMENT REQUIREMENTS

In order to receive a 301(h) waiver, the Gloucester WPCF must demonstrate that “at the time its modification becomes effective, it will be discharging effluent that has received at least primary or equivalent treatment.” 40 C.F.R. § 125.60(a). *See also* 33 U.S.C. 1311(h)(9). “Primary or equivalent treatment” is defined as “treatment by screening, sedimentation, and skimming adequate to remove at least 30 percent of the biochemical oxygen demanding material and of the suspended solids in the treatment works influent, and disinfection, where appropriate.” 40 C.F.R. § 125.58(r). *See also* 33 U.S.C. 1311(h)(9).

³ Application, Table 5 at 10.

In accordance with this provision, the WPCF's current permit requires it to maintain a minimum of 30 percent removal of both total suspended solids (TSS) and biochemical oxygen demand (BOD) on a semi-annual basis. Since 2006, the WPCF has consistently complied with these requirements. See [Table 2](#).

Given this history of compliance with primary treatment requirements, and in the absence of any information indicating that the removal percentages would change under a renewed modification, EPA concludes that Gloucester has demonstrated that, if its modification was to be renewed, it would be discharging effluent that had received at least primary or equivalent treatment.

Table 2: BOD and TSS Semi-Annual Removal Percentages (2006 -2008)

Date	BOD	TSS
	% Removal	% Removal
Jun-06	45.	67.
Dec-06	43.	67.
Jun-07	53.	67.
Dec-07	49.	74.
Jun-08	48.	67.
Dec-08	54.	77.

B. COMPLIANCE WITH WATER QUALITY STANDARDS APPLICABLE TO THE POLLUTANT(S) FOR WHICH A SECTION 301(H) MODIFIED PERMIT IS REQUESTED

Under section 301(h)(1) and 40 C.F.R. § 125.61, there must be a water quality standard(s) applicable to the pollutant(s) for which a section 301(h) modified permit is requested, including standards for biochemical oxygen demand or dissolved oxygen, 40 C.F.R. § 125.61(a)(1), standards for suspended solids, turbidity, light transmission, light scattering or maintenance of the euphotic zone, 40 C.F.R. § 125.61(a)(2), and standards for pH. 40 C.F.R. § 125.61(a)(3). See also 33 U.S.C. § 1311(h)(1). In addition, the applicant is required to:

- (1) Demonstrate that the modified discharge will comply with the above water quality standard(s); and
- (2) Provide a determination signed by the State or interstate agency(s) authorized to provide certification under §§124.53 and 124.54 that the proposed modified discharge will comply with applicable provisions of State law including water quality standards. This determination shall include a discussion of the basis for the conclusion reached.

40 C.F.R. § 125.61(b). Each of these requirements is addressed in turn.

1. Water Quality Standards Applicable to Pollutant(s) for which a Section 301(h) Modified Permit is Requested

The applicant has requested modified requirements for BOD and suspended solids. There is no Massachusetts water quality standard for BOD *per se*, but there is a standard for dissolved oxygen, which is directly affected by BOD and will be considered in this context. See 40 C.F.R. § 125.61(a)(1) (applicable water quality standards include those for dissolved oxygen). Moreover, while the MSWQS do not specify a numeric criterion for TSS, they do impose a narrative criterion for suspended solids, as well as for floating and settleable solids. For SA waters, the MSWQS specify the following:

1. Dissolved Oxygen. Shall not be less than 6.0 mg/l. Where natural background conditions are lower, DO shall not be less than natural background. Natural seasonal and daily variations that are necessary to protect existing and designated uses shall be maintained.

* * *

2. Solids. These waters shall be free from floating, suspended and settleable solids in concentrations or combinations that would impair any use assigned to this class, that would cause aesthetically objectionable conditions, or that would impair the benthic biota or degrade the chemical composition of the bottom.

314 CMR 4.05(4)(a)(1) and (5).

2. Demonstration of Compliance with State Water Quality Standards for BOD and Suspended Solids

Ambient monitoring data provided by Gloucester in its 301(h) Monitoring Annual Reports indicate that all of its sampling locations have consistently satisfied minimum dissolved oxygen and TSS standards.

3. State Determination of Compliance with State Law

If this tentative decision had recommended approval of the 301(h) variance, a determination of compliance with water quality standards by the Commonwealth of Massachusetts would have been needed, in accordance with 40 C.F.R. § 125.61(b)(2). No State determination is necessary at this time, however, because EPA has tentatively decided not to grant the variance under section 301(h) and, instead, to issue a permit with secondary treatment-based effluent limits.

C. ATTAINMENT OR MAINTENANCE OF WATER QUALITY WHICH ASSURES PROTECTION OF PUBLIC WATER SUPPLIES; ASSURES THE PROTECTION AND PROPAGATION OF A BALANCED INDIGENOUS POPULATION OF SHELLFISH, FISH, AND WILDLIFE; AND ALLOWS RECREATIONAL ACTIVITIES

EPA's section 301(h) regulations address four different types of water quality impacts:

- a. Whether the physical characteristics of the discharge would enable water quality standards (and in certain cases EPA water quality criteria) to be attained;
- b. the impact of the discharge on public water supplies;
- c. the biological impact of the discharge; and

d. the impact of the discharge on recreational activities.

40 C.F.R. § 125.62(a)-(d). *See also* 33 U.S.C. § 1311(h)(2) & (9). In addition, EPA's regulations require an applicant proposing an improved or altered discharge to submit additional analysis of the expected effects of the improvements or alterations. 40 C.F.R. § 125.62(e).

The following sections address each of these components in turn.

1. Attainment of Water Quality Standards

As noted in section VI. above, in order to receive a 301(h) waiver, the WPCF's outfall and diffuser must be located and designed to provide adequate initial dilution, dispersion, and transport (*i.e.*, the "physical characteristics") of the wastewater discharge so that all applicable State water quality standards will be met at and beyond the boundary of the ZID. 40 C.F.R. § 125.62(a)(i).⁴ In addition, 40 C.F.R. § 125.59(b)(1) prohibits issuance of a permit with modified limits under section 301(h) if the limits would not assure compliance with all applicable requirements of Part 122, one of which is that a permit must ensure compliance with all water quality standards, 40 CFR §§ 122.4(d) and 122.44(d).

As noted above, Massachusetts Bay is designated as a Class SA water under the MSWQS. Therefore, water quality standards for Class SA waters, as codified at 314 CMR § 4.05(4) & (5), are applicable to Gloucester's application. In order to receive renewal of its 301(h) waiver, the discharge from the WPCF must not exceed any of these standards at or beyond the ZID.

At the time of the last renewal of Gloucester's 301(h) waiver in 2001, EPA determined, based on ambient monitoring data, monthly Discharge Monitoring Reports (DMRs) and initial dilution modeling, that the outfall was designed and located to provide adequate dilution, dispersion and transport of wastewater such that MSWQS for Class SA waters would be met at and beyond the ZID. EPA Region 1, Tentative Decision Document: Analysis of the Application for a Section 301(h) Secondary Treatment Waiver for the City of Gloucester, Massachusetts (Feb. 2001). [hereinafter EPA 2001 Tentative Decision] at 11. Since that time, however, Gloucester has submitted additional data in the form of DMRs and annual biological monitoring reports (including ambient monitoring data). In addition, the MSWQS were most recently revised on December 28, 2006, including significant revisions to the standards for bacteria in SA waters. (EPA approved the new bacteria standards and certain other parts of the state's revisions on March 27, 2007 and September 19, 2007.) It is, therefore, necessary for EPA to revisit the determination it made in 2001.

⁴ In addition to meeting all state water quality standards, the discharge must meet (at and beyond the ZID) "[a]ll applicable EPA water quality criteria for pollutants for which there is no applicable EPA-approved water quality standard that directly corresponds to the EPA water quality criterion for the pollutant." 40 C.F.R. § 125.62(a)(i). *See also* 33 U.S.C. § 1311(h)(9). In the instant case, there are no EPA water quality criteria that fall into this category.

In reviewing Gloucester's application, EPA Region 1 reviewed the relevant data and all applicable water quality standards and determined that the WPCF's discharge was potentially causing exceedances of water quality standards for toxicity, bacteria, and oil and grease.

a. Whole Effluent Toxicity Limits

The MSWQS set a narrative criterion for toxicity requiring that "[a]ll surface waters shall be free from pollutants in concentrations or combinations that are toxic to humans, aquatic life or wildlife." 314 CMR § 4.05(5)(e). EPA regulations require states that adopt narrative criteria for toxic pollutants to protect designated uses to provide information, as a part of the standards or in other documents, identifying the method by which the state intends to regulate point source discharges of toxic pollutants on water quality-limited segments based on such narrative criteria. 40 C.F.R. § 131.11(a)(2). In accordance with this requirement, MassDEP has issued the "Massachusetts Water Quality Standards Implementation Policy for the Control of Toxic Pollutants in Surface Waters" (Feb. 23, 1990) ("MassDEP Toxics Policy"), to explain the method by which the narrative toxic criterion is to be applied. This Policy explains that:

Toxic effects to aquatic life can be either short-term or long-term. Short-term, or acute effects are evinced in a few days. Long-term, or chronic effects, are more subtle and may involve the impairment of an organism's competitive ability, survival behavior or reproductive potential.

* * *

In terms of biotoxicity tests the Division interprets its narrative criterion for the protection of aquatic life to mean that the acceptable receiving water concentration whole effluent toxicity is the highest measured continuous concentration of an effluent that causes no observed acute or chronic effect on a representative standard test organism.

* * *

As a general rule the Division prefers to use acute toxicity tests in the permit process. The normal end point measured by the acute test is the LC₅₀ or the concentration that is lethal to 50% of the test organisms. An LC₅₀ value, measured in percent, represents the degree of toxicity on an inverse logarithmic scale. A more convenient unit of expression is the toxic unit (T.U.). A toxic unit is defined as 100 divided by the LC₅₀:

$$T.U. = \frac{100}{LC_{50}}$$

Therefore an LC₅₀ of 100% equals 1 T.U.

MassDEP Toxics Policy § V.A.

Under the MassDEP Toxics Policy, effluent limits are set based on available dilution. *Id.* § V.B. The Policy explains that:

The standards allow mixing zones to exceed criteria so long as there is safe and adequate passage for swimming and drifting organisms with no deleterious effects on their populations. It is assumed that chronic toxicity is not a concern in mixing zones because swimming and drifting organisms will not be in the zone long enough for chronic exposure. Acute toxicity is a concern but is also dependent on time-exposure relationships. In the absence of detailed site-specific time-exposure histories for all important species, it is necessary to set a conservative (non-time dependent) acute limit.

The recommended criterion to prevent acutely toxic effects is 0.3 T.U. This is based on an adjustment factor of one-third used to extrapolate the LC₅₀ to an LC₁ (concentration at which 1% of the test organisms die). In order to assure that this limit is met within a short distance of the effluent pipe the Division has established an end-of-pipe limit of 1.0 T.U. for dilution factors less than or equal to 100 and 2.0 T.U. for dilution factors greater than 100.

Id.

As noted in section VI. A above, the wet-weather and dry-weather critical initial dilution values for the Gloucester WPCF are less than 100. Therefore, an end-of-pipe WET limit of 1 TU is required by the Toxics Policy. This limit was included in the WPCF's 2001 Permit as a daily LC₅₀ limit of 100%. The permit also required quarterly two species whole effluent toxicity (WET) testing with a LC₅₀ limit of 100%.

The WPCF conducted 46 WET tests (23 for each test organism) during the period of December 1, 2003 through December 31, 2009. The effluent exceeded the end-of-pipe WET limit of 1 TU in 20 out of 23 tests for Inland Silverside, and 17 out of 23 tests for Mysid Shrimp. On average, the facility's WET levels were approximately 3.5 TU for Inland Silverside and 1.9 TU for Mysid Shrimp during this time. *See* Table 3.

Table 3: WET Test Data (Dec. 1, 2003 - Dec. 31, 2009)

WET Test Date	Inland Silverside LC ₅₀ %	Toxic Units	Mysid Shrimp LC ₅₀ %	Toxic Units
12/31/03	28.7	3.5	100	1.0
03/31/04	9.2	10.9	27.7	3.6
06/30/04	22.5	4.4	39.2	2.6
09/30/04	59.5	1.7	100	1.0
03/31/05	34.3	2.9	33	3.0
06/30/05	25.4	3.9	21	4.8
09/30/05	8.8	11.4	27.2	3.7
12/31/05	32.4	3.1	68.2	1.5
03/31/06	24	4.2	73.2	1.4
06/30/06	100	1.0	100	1.0
09/30/06	37.9	2.6	61.6	1.6
12/31/06	34.7	2.9	100	1.0
03/31/07	67.1	1.5	56.4	1.8
06/30/07	40.6	2.5	48.7	2.1
12/31/07	35.3	2.8	45.6	2.2
03/31/08	100	1.0	100	1.0
06/30/08	12.5	8.0	38.3	2.6
09/30/08	38.6	2.6	67.2	1.5
12/31/08	100	1.0	78.1	1.3
03/31/09	45.8	2.2	58.	1.7
06/30/09	34.7	2.9	83.5	1.2
09/30/09	69.5	1.4	85.	1.2
12/31/09	74.5	1.3	100	1.0

In short, the WPCF's effluent has frequently exceeded the existing permit's state water quality standards-based effluent limit for preventing acutely toxic effects.⁵

⁵ The Mixing Zone Policy provides an alternative method for demonstrating compliance with the acute criterion for toxics within a "short distance" of the outfall on a site-specific basis, based on EPA's Technical Support Document for Water Quality-based Toxics Control (March 1991). Mixing Zone Policy Part IV(b). The Policy notes that "[i]n any such site-specific demonstration the Division considers 2.0 [TU] the technology-based upper limit for WET. In order to exceed this limit the proponent must further demonstrate the technology to meet 2.0 [TU] in the effluent is not reasonably available or feasible." *Id* Thus, to demonstrate compliance with the acute criterion on a site-specific basis, a permittee must demonstrate that its effluent meets the 2.0 TU limit or that the technology to meet this limit is not reasonably available or feasible. This alternative, site-specific method was not applied to the existing Gloucester permit, but even if a limit of 2.0 TU was to be allowed under MA DEP's alternative method, the data in Table 3 indicates that the WPCF's outfall would still fail to provide adequate initial dilution to ensure water quality standards are met at or beyond the ZID, as required by 40 CFR § 125.62(a)(1)(i). Moreover, a limit greater than 2.0 TU would not be justified because secondary treatment is both reasonably available and feasible, and would be expected to reduce the level of toxics in the WPCF's effluent sufficiently to meet a limit of 2.0 TU or lower.

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.

b. Oil, Grease and Total Petroleum Hydrocarbon Limits

The MSWQS provide that Class SA waters, “. . .shall be free from oil and grease and petrochemicals.” 314 CMR § 4.05(4)(a)(7). Consistent with the language of the standard, MassDEP and EPA interpret this standard to mean that there shall be no detectable oil and grease in discharges to Class SA waters.⁶

Prior to 1991, Gloucester discharged to Gloucester Harbor, which is a Class SB water. 314 CMR 4.06, Table 23; Fact Sheet for Draft NPDES Permit for WPCF at 6 (Feb. 2001) (hereinafter “2001 Fact Sheet”). The average monthly oil and grease limit of 15 mg/l in the 1985 permit was therefore based on the narrative criterion for Class SB waters, which provides that “[t]hese waters shall be free from oil, grease and petrochemicals that produce a visible film on the surface of the water, impart an oily taste to the water or an oily or other undesirable taste to the edible portions of aquatic life, coat the banks or bottom of the water course, or are deleterious or become toxic to aquatic life.” 314 CMR 4.05(b)(7).

In 1991, the WPCF's outfall was extended to its current location in Massachusetts Bay, 2001 Fact Sheet at 6, thereby making the Class SA standard of oil and grease applicable to the WPCF's discharge. When the WPCF's permit was renewed in 2001, monitoring data indicated that, “most of the oil & grease in the discharge is in the form of food based oils and grease and a small portion is attributable to total petroleum hydrocarbons (TPH).” Response to Public Comments for Final NPDES Permit for WPCF at 4 (Aug. 2001)(*hereinafter* “2001 RTC”). The limit for oil and grease in the permit and was increased, inappropriately in consideration of the receiving water narrative criteria, to an average monthly concentration of 25 mg/l, and an average monthly limit on TPH of 5.0 mg/L was added to the permit. *Id.*

More recent monitoring data show that the WPCF's discharge violated the 5 mg/l TPH limit nine times out of the last thirty-nine sampling events. See [Table 4](#)~~Table 4~~~~Table 4~~. In addition, although the WPCF has consistently met the 25 mg/l monthly average oil and grease limit, *id.*, meeting this limit does not ensure that the discharge will not cause a violation of the applicable “free from oil and grease” water quality criterion. The permit limit for both oil and grease and TPH will be 0 mg/l based on the “free from” criterion, with a compliance limit of 5 mg/l based on the minimum level (ML).⁷

⁶ 04/01/2010 E-Mail from Kimberly Groff, MassDEP Water Quality Standards, to Michele Barden, EPA, RE: SA Oil and Grease criteria

⁷ Minimum Level (ML) is the lowest level at which the analytical system gives a recognizable signal and acceptable calibration point for the analyte. The ML represents the lowest concentration at which an analyte can be measured with a known level of confidence.

Based on this data, EPA Region 1 concludes that the applicant has failed to show that, at the time the renewed variance would become effective, its discharge would meet the standards for oil and grease and TPH at and beyond the ZID.

Table 4: WPCF TPH and O&G Discharge Monitoring Data (Jan. 2006-Aug. 2008)

Date	TPH	O & G	Date	TPH	O & G
1/31/2006	7.5	10	9/30/2007	1.2	9.8
2/28/2006	9.8	14.1	10/31/2007	3.9	11.2
3/31/2006	6.5	23	11/30/2007	1.1	11.7
4/30/2006	6.4	17	12/31/2007	2.1	10.
5/31/2006	0.8	11	1/31/2008	.5	9.
6/30/2006	5.2	11	2/29/2008	0.	11.
7/31/2006	.8	18.	3/31/2008	5.	8.
8/31/2006	3.5	24.	4/30/2008	1.4	8.
9/30/2006	5.	21.7	5/31/2008	1.6	10.
10/31/2006	4.8	21.6	6/30/2008	.9	10.
11/30/2006	7.3	10.	7/31/2008	1.4	10.9
12/31/2006	4.9	14.	8/31/2008	2.6	9.7
1/31/2007	3.8	12.	9/30/2008	2.	9.2
2/28/2007	6.5	24.8	10/31/2008	.7	8.4
3/31/2007	9.1	13.	11/30/2008	2.3	9.4
4/30/2007	1.1	12.	12/31/2008	1.2	8.6
5/31/2007	0.	10.	1/31/2009	1.8	14.
6/30/2007	1.4	9.	2/28/2009	6.8	14.5
7/31/2007	.7	8.	3/31/2009	3.6	16.5
8/31/2007	5.	16.			

c. Primary Contact Bacterial Limits

Prior to 2006, the MSWQS provided that in Class SA waters, not designated for shellfishing, fecal coliform bacteria:

Shall not exceed a geometric mean of 200 organisms per 100 ml in any representative set of samples, nor shall more than 10% of the samples exceed 400 organisms per 100 ml.

314 CMR 4.05(4)(a)(4) (2000). Permit limits based on these state water quality criteria were incorporated into Gloucester’s 2001 permit as an average monthly limit of 200 colony forming units (“cfu”) per 100 ml and a daily maximum of 400 cfu/100 ml.⁸

⁸ Massachusetts has traditionally not allowed dischargers to meet bacteria criteria through dilution. This is consistent with EPA policy regarding the inappropriateness of using mixing zones to achieve bacteria criteria. See Memorandum from Ephraim S. King, Director of Office of Science and Technology to William Spratlin, Director, Water Wetlands and Pesticides (Nov. 12, 2008)(stating that “mixing zones that allow for elevated levels of bacteria in rivers and streams designated for primary contact recreation are inconsistent with the designated use and should not be permitted. . .”).

Discharge monitoring data collected under Gloucester’s current permit show that the WPCF has frequently violated its permit limits for fecal coliform. See [Table 5](#)~~Table 5~~~~Table 5~~. Between June 1, 2006, and February 28, 2009, the WPCF violated the maximum daily fecal coliform limits 11 times or one third of the time. The most extreme exceedance was a 399,900% violation of the maximum daily limit. During that same period the geometric average monthly limit was violated twice.

Table 5: WPCF Fecal Coliform Discharge Monitoring Data (June 2006 – Feb. 2009)

Month	Geometric Mean (cfu /100mL)	% Exceed.	Daily Max. (cfu /100mL)	% Exceed.
Jun-06	145		7600	1800
Jul-06	59		3900	875
Aug-06	366	83	440000	109900
Sep-06	197		95000	23650
Oct-06	654	227	1600000	399900
Nov-06	16		350	
Dec-06	7		210	
Jan-07	4		550	38
Feb-07	2		20	
Mar-07	2		30	
Apr-07	1		10	
May-07	2		80	
Jun-07	25		290	
Jul-07	13		570	43
Aug-07	65		61000	15150
Sep-07	8		250	
Oct-07	18		39200	9700
Nov-07	4		780	95
Dec-07	8		84	
Jan-08	2		10	
Feb-08	7		40	
Mar-08	5		173	
Apr-08	2		30	
May-08	7		80	
Jun-08	9		60	
Jul-08	64		38000	9400
Aug-08	11		240	
Sep-08	3		2800	600
Oct-08	2.		70.	
Nov-08	2.		210.	
Dec-08	2.		10.	
Jan-09	3.		20.	
Feb-09	2.		20.	

In 2006, MassDEP revised the bacteria criteria for coastal and inland waters designated for primary contact recreation from a fecal coliform-based standard to an enterococci-based standard. The current MSWQS provide that:

at bathing beaches as defined by the Massachusetts Department of Public Health in 105 CMR 445.010, no single enterococci sample taken during the bathing season shall exceed 104 colonies per 100 ml, and the geometric mean of the five most recent samples taken within the same bathing season shall not exceed a geometric mean of 35 enterococci colonies per 100 ml. In non bathing beach waters and bathing beach waters during the non bathing season, no single enterococci sample shall exceed 104 colonies per 100 ml and the geometric mean of all samples taken within the most recent six months typically based on a minimum of five samples shall not exceed 35 enterococci colonies per 100 ml.

314 CMR 4.05(4)(a)(4) (2009). Massachusetts Department of Public Health regulations provide that “Bathing Beach means the land where access to the bathing water is provided” and “Bathing Water means fresh or salt water adjacent to any public bathing beach or semi- public bathing beach at the location where it is used for bathing and swimming purposes.” 105 CMR 445.010.

The WPCF outfall is not adjacent to a bathing beach, and is therefore subject to the “non bathing beach limits” for enterococci. Nevertheless, primary contact recreation, in addition to being a designated use for Class SA waters, is also an existing use in this area of Massachusetts Bay. The Nina T and the Poling are two shipwrecks that are popular scuba diving sites and are within a thousand meters of the outfall.

Gloucester has not submitted any data concerning enterococci levels in the WPCF’s effluent. As a result, the applicant has not demonstrated that, at the time the renewed modification would become effective, its discharge would meet the primary contact standard for bacteria in Class SA waters at and beyond the ZID.

Not only did Gloucester fail to submit any enterococci data for its discharge, but EPA neither has nor is aware of any such data from another source. Therefore, EPA considered whether the existing data concerning fecal coliform levels in the WPCF discharge would support any conclusions about enterococci levels. In this regard, EPA reviewed concurrent sampling of fecal coliform and enterococci bacteria in primary-treated effluent from the Portsmouth, NH, WPCF and this data indicates that it is more difficult to meet enterococci limits with primary treatment than it is to meet fecal coliform limits. In addition, a series of recent studies comparing ambient levels of various bacteria in marine waters in Southern California⁹ found fecal coliform and enterococci to be strongly correlated under storm conditions, less well correlated during winter conditions, and poorly correlated during the summer conditions (dry weather). R.T. Noble et al., *Comparison of Total Coliform, Fecal Coliform, and Enterococcus Bacterial Indicator Response for Ocean Recreational Water Quality Testing*, 37 Water Research 1637, 1639 (2003).

⁹ The studies were conducted at over 200 sites along the coastline of the Southern California Bight including open beach areas, rocky shoreline, and areas near fresh water outlets that drain land-based runoff

Under all conditions, however, enterococci was the indicator that exceeded the applicable single sample standard¹⁰ most frequently. *Id.* Thus, although fecal coliform and enterococci were not found to be well correlated under all conditions, the enterococci standard was more frequently exceeded than the fecal coliform standard. This result 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. Thus, there is no evidence that the WPCF would be better able to meet the enterococci-based water quality requirements limits than it has been for the fecal coliform-based limits.

Therefore, 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 primary contact standard for bacteria in Class SA waters at and beyond the ZID.

d. Shellfishing Bacteria Limits

The WPCF's outfall is located in Massachusetts Bay, which MassDEP has designated as a class SA water, with a specific qualifier of "shellfishing." 314 CMR § 4.06, Table 23. Under the MSWQS, a qualifier "indicates special considerations on uses applicable to the segment that may affect the application of criteria. . . ." 314 CMR § 4.06(1)(d). The MSWQS provide that SA waters designated in the MSWQS tables for shellfishing are to maintain water quality "suitable for shellfish harvesting without depuration (Approved and Conditionally Approved Shellfish Areas)." 314 CMR 4.05(4)(a). Moreover, waters designated with the qualifier for shellfishing:

. . . are subject to more stringent regulation in accordance with the rules and regulations of the Massachusetts Division of Marine Fisheries pursuant to M.G.L. c. 130, § 75. These include applicable criteria of the National Shellfishing Sanitation Program. Approval for use of areas designated for shellfishing is issued by the Massachusetts Division of Marine Fisheries.

314 CMR § 4.06(1)(d)(5).

The area of Massachusetts Bay where the outfall is located is currently closed to shellfishing. *See* Maps N14, N15, N16 and MB 14, available on the Massachusetts Division of Marine Fisheries website, <http://www.mass.gov/dfwele/dmf/programsandprojects/dsga.htm#shelsani>.

¹⁰ The single sample standard used for fecal coliforms in the study was >400 cfu or MPN/100 ml, which is equivalent to the single standard sample in Gloucester's existing permit. The single sample standard used for enterococci was >104CFU or MPN/100ml, which is equivalent to the current single sample standard for Class SA waters in the MSWQS.

Closure of the area to shellfishing does not, however, remove the shellfishing designation under the MSWQS.¹¹ Thus, the shellfishing-based standard for bacteria in Class SA waters must be met at and beyond the edge of the ZID.

The MSWQS sets the following numeric bacteria criterion for shellfishing in SA waters:

Waters designated for shellfishing: 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, or other values of equivalent protection based on sampling and analytical methods used by the Massachusetts Division of Marine Fisheries and approved by the National Shellfish Sanitation Program in the latest revision of the *Guide for the Control of Molluscan Shellfish*.

314 CMR § 4.05(4)(a)(4).

Annual 301(h) Monitoring Reports submitted by Gloucester indicate exceedances of the shellfishing-based water quality criteria for fecal coliform. In particular, 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. See 301(h) Monitoring Annual Reports.

Therefore, 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 at and beyond the ZID the water quality standards for bacteria in Class SA waters designated for shellfishing.

2. Impact of the Discharge on Public Water Supplies

In order to receive a section 301(h) variance, Gloucester's discharge must allow for the attainment or maintenance of water quality which assures protection of public water supplies. 301(h)(2); 40 CFR § 125.62(b). There are no existing or planned public water supply intakes in the vicinity of the WPCF's offshore outfall. Application at 44. Therefore, Gloucester satisfies this criterion for obtaining a section 301(h) variance.

3. Impact of the Discharge on Shellfish, Fish, and Wildlife

In order to receive a section 301(h) variance, 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." 301(h)(2) and 40 CFR § 125.62(c)(1). More specifically, such a balanced, indigenous population ("BIP") must exist:

¹¹ Prior to 2006, the MSWQS provided that, "[i]n approved areas [Class SA waters] shall be suitable for shellfish harvesting without depuration (Open Shellfish Areas)." 314 CMR 4.05(4)(a) (2000). This provision was amended in 2006 "to clarify that where a shellfishing use is designated for Class SA and Class SB waters, that goal remains in place regardless of whether the water is approved for use in accordance with the National Shellfishing Sanitation Program." Letter from Stephen S. Perkins, Director, Office of Ecosystem Protection, to Laurie Burt, Commissioner, MassDEP (Sept. 19, 2007) at 4. The current MSWQS provide, as quoted above, that "[w]here designated in the tables to 314 CMR 4.00 for shellfishing, [Class SA] waters shall be suitable for shellfish harvesting without depuration (Approved and Conditionally Approved Shellfish Areas)." 314 CMR 4.05(4)(a) (2009).

- (i) Immediately beyond the ... [ZID]; and
- (ii) In all other areas beyond the ... [ZID] where marine life is actually or potentially affected by the applicant's modified discharge.

40 CFR § 125.62(c)(2). BIP is defined by regulation as an ecological community which:

- (1) Exhibits characteristics similar to those of nearby, healthy communities existing under comparable but unpolluted environmental conditions; or
- (2) May reasonably be expected to become re-established in the polluted water body segment from adjacent waters if sources of pollution were removed.

40 CFR § 125.58(f). The terms shellfish, fish and wildlife include “any biological population or community that might be adversely affected by the applicant's modified discharge.” 40 CFR § 125.58(y).

In assessing the impacts of the proposed discharge on aquatic life, EPA policy recommends the “independent application” of three types of data: chemical-specific water quality data, whole effluent toxicity data, and biological monitoring data:

Since each method (chemical-specific, whole effluent, and bioassessment) has unique as well as overlapping attributes, sensitivities, and program applications, no single approach for detecting impact should be considered uniformly superior to any other approach. For example, the inability to detect receiving water impacts using a biosurvey alone is insufficient evidence to waive or relax a permit limit established using either of the other methods. The most protective results from each assessment conducted should be used in the effluent characterization process
...

EPA, *Technical Support Document for Water Quality-based Toxics Control* (1991) at 22. In this case, EPA has reviewed the relevant chemical-specific data, whole effluent toxicity data, and biological monitoring data to assess the impact of the WPCF's discharge on shellfish, fish, and wildlife.

As part of its biological monitoring program under the existing section 301(h) variance-based permit, Gloucester has compared the benthic community found close to the discharge to the community at control sites. The applicant found the discharge and control sites to have very similar abundance, composition and diversity of species. *Id.* In addition, EPA has not found any reasonable potential for the WPCF's effluent to violate chemical-specific standards established to protect aquatic life.

Nonetheless, as discussed in section VII. C.1.a above, WET tests of the WPCF's effluent indicate that the effluent has frequently exceeded effluent limitations based on criteria in the MSWQS for preventing acutely toxic effects.

Based on this data, Region 1 concludes 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 BIP.

Impact of the Discharge on Recreational Activities

Consistent with section 301(h)(2) of the CWA, EPA regulations provide that “[t]he applicant’s modified discharge must allow for the attainment or maintenance of water quality which allows for recreational activities beyond the [ZID], including, without limitation, swimming, diving, boating, fishing and picnicking, and sports activities along shorelines and beaches.” 40 CFR § 125.62(d)(1).

Although Gloucester’s Application identifies swimming, fishing, and diving as “existing or potential recreational activities likely to be affected by the [WPCF’s] modified discharge beyond the [ZID],” it does not identify *how* these activities are likely to be affected. Application at 56. Moreover, the Application also states that the discharge “. . .has no impact on recreational activities including swimming and fishing and diving.” *Id.* However, as established in section VII. C.1.c above, the WPCF is very likely currently causing violations of the single sample, primary contact water quality criterion for Class SA waters under the MSWQS. Since the single sample value most closely represents the level of pathogenic bacteria to which swimmers and divers are actually exposed to on a given day, it reflects a threat to the health of persons engaged in water-contact recreation in these waters. Therefore, EPA concludes that the applicant has not demonstrated that its proposed discharge would allow for the attainment or maintenance of water quality which allows for recreational activities beyond the ZID.

4. Impact of Improved Discharge

As noted in section IV. C above, Gloucester’s application is based on an improved or altered discharge, and must therefore include:

- (1) A demonstration that such improvements or alterations have been thoroughly planned and studied and can be completed or implemented expeditiously;
- (2) Detailed analyses projecting changes in average and maximum monthly flow rates and composition of the applicant’s discharge which are expected to result from proposed improvements or alterations;
- (3) The assessments required by paragraphs (a) through (d) of this section based on its current discharge; and
- (4) A detailed analysis of how the applicant’s planned improvements or alterations will comply with the requirements of paragraphs (a) through (d) of this section.

40 CFR § 125.62(e). Gloucester has stated that its proposed improved discharge will comply with the requirements of 40 CFR 125.62(a) through (d), but has not provided any supporting analysis for its conclusions, as required by 40 CFR § 125.62(e). Application at 54.

D. ESTABLISHMENT OF A MONITORING PROGRAM

Under 40 CFR § 125.63, which implements section 301(h)(3), the applicant must have a monitoring program designed to evaluate the impact of the modified discharge on the marine biota, demonstrate compliance with applicable water quality standards, and measure toxic substances in the discharge. Gloucester has proposed to continue its current monitoring program which consists of the following components:

1. Biological Monitoring

Five benthic stations (Figure 2) are sampled in late March and early September annually. One site (Station 3A) is located at the edge of the ZID, 30 meters from the diffuser. Replicate benthic infaunal samples (5) are collected and the samples are sieved at 0.5 mm, preserved and sorted in the laboratory. Animals are identified to the species level.

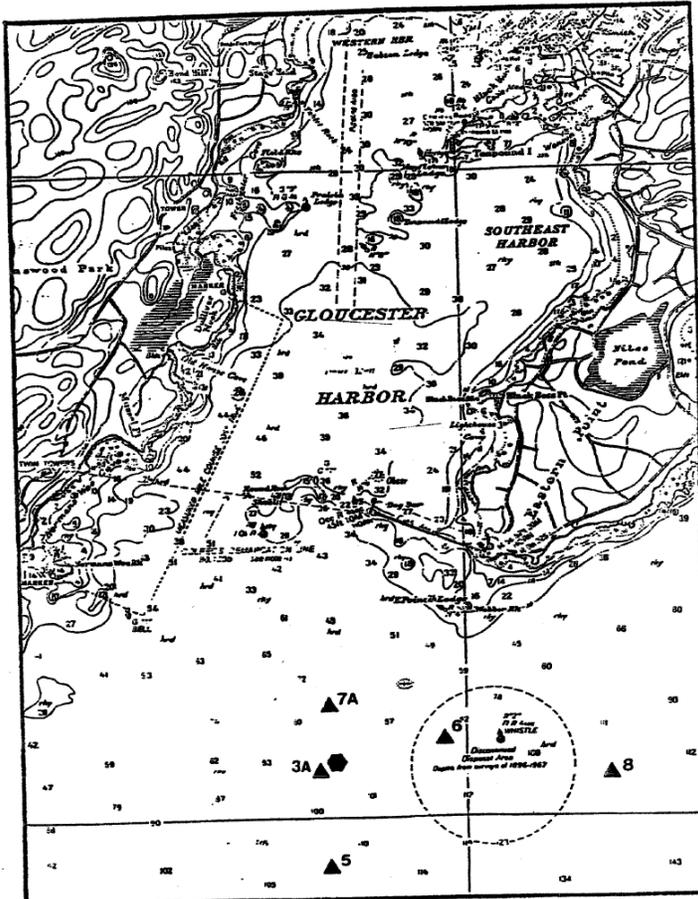


Figure 2: Biological Monitoring Stations

2. Water Quality Monitoring

Six stations are sampled 13 times a year (Figure 3). Parameters measured are temperature, salinity, pH, dissolved oxygen, fecal coliforms and chlorophyll.

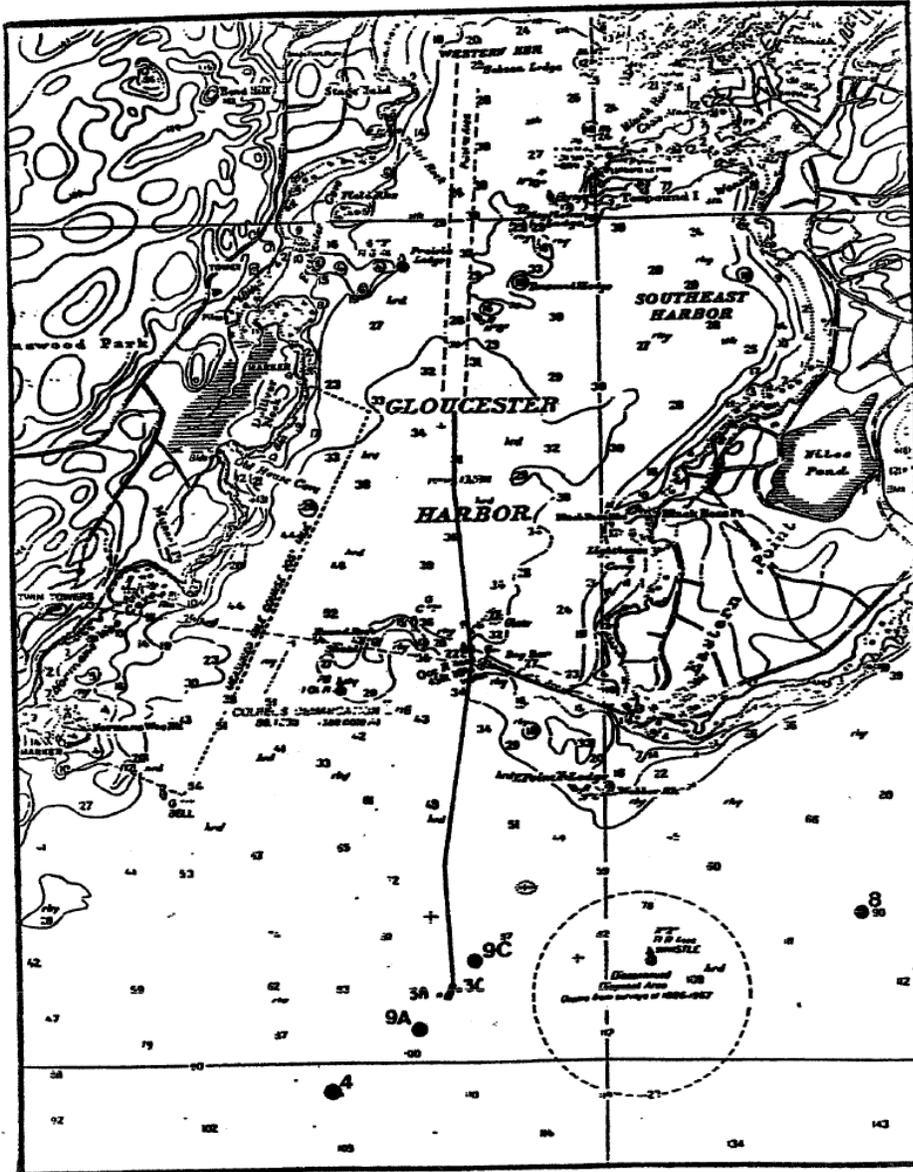


Figure 3: Water Quality Monitoring Stations

3. Effluent toxicity testing

A composite sample is collected from the treatment plant outflow channel during quarterly sampling events. The effluent is tested for toxicity using procedures documented in "Methods of Measuring the Acute Toxicity of Effluents to Freshwater and Marine Organisms" (1993; EPA 600/4-90/027F) as modified by EPA Region 1. The test organisms used are mysids (*Mysidopsis bahia*) and inland silversides (*Menidia beryllina*).

4. Effluent Toxicity Screen

Once a year in late summer a 24-hour composite sample is collected from the effluent channel at the treatment plant and screened for priority pollutants.

Application at 58.

EPA has determined that this monitoring program would be sufficient to meet the requirements of section 301(h)(3) of the CWA and 40 CFR § 125.63.

E. IMPACT OF MODIFIED DISCHARGE ON OTHER POINT AND NON-POINT SOURCES

Under 40 CFR § 125.64, which implements section 301(h)(4) of the CWA, the applicant's proposed modified discharge must not result in the imposition of additional pollution control requirements on any other point or nonpoint source. Given the remoteness of the WPCF's outfall (1 mile from the nearest land), EPA concludes that this criterion would be satisfied.

F. TOXICS CONTROL PROGRAM

40 CFR §§ 125.66 lays out pretreatment and toxics control requirements for 301(h) applicants. Because it has certified that "that there are no known or suspected water quality, sediment accumulation, or biological problems related to toxic pollutants or pesticides in its discharge," Gloucester has not established a schedule of activities designed to eliminate the entrance of toxic pollutants from nonindustrial sources into the treatment works. Application at 64.

As described in section VII. C.1.a above, the WPCF's effluent has frequently exceeded the state water quality standards-based, effluent limits set to prevent acutely toxic effects. Therefore, contrary to Gloucester's assertion, there do appear to be water quality problems related to toxic pollutants in the WPCF's discharge. Moreover, past efforts to eliminate toxicity from in the primary-treated effluent have not succeeded.

If EPA were to grant the 301(h) waiver, Gloucester would likely be required to implement a schedule of activities under 40 CFR §§ 125.66. However, EPA's tentative decision is to deny the waiver and require secondary treatment, which EPA believes, will alleviate the toxicity of the discharge.

G. INCREASE IN EFFLUENT VOLUME OR AMOUNT OF POLLUTANTS DISCHARGED.

Under 40 CFR § 125.67(a), which implements 301(h)(8), a 301(h) variance may not be granted if it would result in “substantially increased discharges of the pollutant to which the modification applies above the discharge specified in the section 301(h) modified permit.” Gloucester’s application estimates that annual average wastewater flows from the sewered population will increase by 10% over 20 years (2.5% every 5-year interval), and that TSS and BOD mass loadings from the sewered population flow will increase 20% over 20 years (5% every 5-year interval). Application at 7-8. EPA therefore concludes that a renewal of Gloucester’s waiver would not result in substantially increased discharges of both BOD and TSS, the two pollutants to which the waiver applies, above the levels specified in the current permit.

VIII. COMPLIANCE WITH PROVISIONS OF OTHER STATE, LOCAL OR FEDERAL LAWS

EPA regulations provide that any section 301(h) variance-based NPDES permit must comply with State, local, and other Federal laws or Executive Orders, including the Coastal Zone Management Act of 1972, as amended, 16 U.S.C. 1451, *et seq.*; the Endangered Species Act of 1973, as amended, 16 U.S.C. 1531, *et seq.*; and Title III of the Marine Protection, Research and Sanctuaries Act, as amended, 16 U.S.C. 1431, *et seq.* 40 CFR § 125.59(b)(3).

A. COASTAL ZONE MANAGEMENT ACT

An NPDES permit may not be issued unless the permit applicant certifies that the proposed discharge will comply with the applicable State coastal zone management program(s) approved under the Coastal Zone Management Act, and the state concurs with, or waives the need for, such certification. 16 U.S.C. § 1456(c)(3)(A). *See also* 40 C.F.R. §§ 122.49(d) and 125.59(b)(3). While the applicant in this case suggests that it would have obtained state concurrence with a certification that the state’s coastal zone management program would have been complied with even if the section 301(h) waiver was granted, EPA believes that is questionable. In any event, EPA is on other grounds tentatively denying the City’s request to renew the 301(h) variance. Ultimately, the secondary treatment-based permit will also need to be certified to be in compliance with the state’s coastal zone management program and obtain the concurrence of the state coastal zone management office. EPA believes that such concurrence can be obtained for a permit based on secondary treatment.

B. MASSACHUSETTS OCEANS SANCTUARIES ACT

The outfall of the WPCF is located within the boundaries of the North Shore Ocean Sanctuary, as established by the Massachusetts Ocean Sanctuaries Act (“MOSA”). 132A M.G.L. § 12A, *et seq.* (2009). MOSA places a general prohibition on the discharge of municipal wastes to ocean sanctuaries. *Id.* § 15(4). However, the WPCF is covered by MOSA’s “grandfathering” provision which allows discharges to the North Shore Ocean Sanctuary from municipal waste treatment facilities where construction had commenced, or a construction grant had been awarded, prior to 1978 and certain other conditions were met. *Id.* § 16.

Under MOSA, any increase in the volume of a discharge from a wastewater treatment plant constitutes a “proposed discharge,” *id.* § 12(B), and thus requires authorization by a “variance” from MassDEP.¹² *Id.* §§ 16-16F. Among the prerequisites for such a variance is that: “[t]he proposed discharge must be treated to a secondary level, and such other treatment to remove nutrients or other pollutants which is found to be necessary to avoid degradation of the ecology, appearance and marine resources of the designated sanctuary and to meet water quality standards.” *Id.* § 16B(9).

In its application, the WPCF has projected a gradual increase in its annual average flow over the next fifteen years. *See*. Pursuant to the sections of MOSA cited above, the WPCF must install at least secondary treatment in order to obtain a variance that will allow it to increase its discharge.

C. ENDANGERED SPECIES ACT

Under the Endangered Species Act (ESA), federal government agencies generally may not take actions that are likely to jeopardize the continued existence of endangered or threatened species or would adversely affect the critical habitat of such species. *See* 16 U.S.C. § 1536(a)(2); 40 C.F.R. § 122.49(c). This prohibition applies to EPA’s issuance of NPDES permits, including permits with limits based on a variance under section 301(h) of the CWA.

There are a number of endangered or threatened species of whale and sea turtle that could be present in the area of the WPCF’s discharge. As a result, EPA must consult with the National Oceanic and Atmospheric Administration (NOAA) to ensure compliance with the ESA. Given that EPA has tentatively decided to deny Gloucester’s request to renew the existing section 301(h) variance, EPA has prepared a draft permit with secondary treatment based limits. Therefore, EPA’s analysis and consultation is based on the effects of a discharge receiving secondary treatment. ESA issues are discussed in detail in the Fact Sheet issued with the draft permit and this document.

D. MARINE SANCTUARIES

Pursuant to section 304(d) of the Marine Protection, Research and Sanctuaries Act, 16 U.S.C. § 1434(d), and its implementing regulations, a 301(h)-modified NPDES permit may not be issued for a discharge into a designated marine sanctuary if the regulations applicable to the sanctuary prohibit such a discharge, unless the National Marine Fisheries Service does not object to the permit.,

According to the applicant:

¹² The authority to grant such variances previously resided in the Massachusetts Department of Environmental Management (DEM). 132A M.G.L. § 16A (2006). DEM promulgated regulations at 302 CMR 5.10 that establish procedures for granting a variance to increase the volume of an existing discharge from a publicly owned treatment works. However, under the 2008 Amendments to MOSA, authority to grant such variances has been transferred to MassDEP. St. 2008, c. 114, § 11; M.G.L. c. 132A § 16A (2009).

The outfall is not located in any federally designated marine or estuary sanctuary. The Stellwagen Bank Sanctuary is located more than 10 miles offshore and due to the small volume of discharge and the direction of currents, is not affected by the effluent.

Application at 28.

Based on this information, EPA concludes that the proposed modified discharge would be in compliance with the Marine Protection, Research and Sanctuaries Act.

E. ESSENTIAL FISH HABITAT

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

Because EPA's tentative decision is to deny Gloucester's request for renewal of the section 301(h) waiver, it is not necessary for EPA to consult with NOAA regarding the potential for adverse effects on EFH to result from EPA issuance of an NPDES permit to Gloucester with primary treatment limits based on a section 301(h) waiver. EPA does, however, plan to consult with NOAA regarding the potential for effects on EFH from the discharge as it would be regulated by the secondary treatment limits and other requirements proposed in the draft permit. EPA has addressed the EFH issues related to the draft permit in the Fact Sheet issued in conjunction with the permit.

IX. REFERENCES AND ATTACHMENTS

EPA Region 1, Tentative Decision Document: Analysis of the Application for a Section 301(h) Secondary Treatment Waiver for the City of Gloucester, Massachusetts (Feb. 2001).

EPA Office of Water, Amended Section 301(h) Technical Support Document, EPA 842-B-94-007. U.S. Environmental Protection Agency, (1994).

EPA Region 1, Fact Sheet: Draft National Pollutant Discharge Elimination System (NPDES) Permit to Discharge to Waters of the United States (Aug. 21, 2001).

Gloucester WPCF 301(h) Waiver Renewal Application (2006).

MassDEP. Massachusetts Water Quality Standards Implementation Policy for the Control of Toxic Pollutants in Surface Waters (Feb. 23, 1990).

MassDEP. Massachusetts Surface Water Quality Standards Implementation Policy for Mixing Zones (Jan. 8, 1993).

A. D. Michael, Gloucester 301(h) Monitoring Program: Annual Reports (2003-2006).

Christine Millhouse, 2007, e-mail to Doug Corb, EPA Region 1 (Feb. 13, 2007).

Stephen S. Perkins, Director, Office of Ecosystem Protection, Letter to Laurie Burt, Commissioner, MassDEP (Sept. 19, 2007).

Tetra Tech, Technical Review of the Gloucester Wastewater Treatment Plant Section 301(h) Reapplication for Modification of Secondary Treatment Requirements for Discharge into Marine Waters (1990).

Tetra Tech, Evaluation of the City of Gloucester Initial Dilutions for Proposed 1995 Flows and Effluent Characteristics, and Modified Outfall Design (1989).