UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 1
5 POST OFFICE SQUARE, SUITE 100
BOSTON, MASSACHUSETTS 02109-3912

FACT SHEET

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

NPDES PERMIT NO.: MA0100030

PUBLIC COMMENT PERIOD: December 3, 2014 – January 2, 2015

NAME AND ADDRESS OF APPLICANT:

Paul Dawson
Town of Marion
50 Benson Brook Road
Marion, MA 02738

NAME AND ADDRESS OF FACILITY WHERE DISCHARGE OCCURS:

Marion Water Pollution Control Facility (WPCF)
50 Benson Brook Road
Marion, Massachusetts 02738

RECEIVING WATER: Unnamed Brook to Aucoot Cove (Buzzards Bay – 95)
HUC12: 010900020305

CLASSIFICATION: Class B (Unnamed Brook), Class SA & Shellfishing (Aucoot Cove)

TABLE OF CONTENTS

APPENDICES

TABLES

FIGURES

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

The above-named applicant has requested that the U.S. Environmental Protection Agency Region 1 reissue its NPDES permit to discharge into the designated receiving water. The facility is engaged in collection and treatment of domestic wastewater. See **Figures 1 and 2** for facility location and treatment process diagrams, respectively. The outfall discharges to an unnamed brook (sometimes called Effluent Brook) that flows into Aucoot Cove.

Table 1. General Discharge Information

Outfall	Description of Discharge	Receiving Water	Outfall Location
001	Treated Effluent	Unnamed Brook to Aucoot Cove	41º, 42', 09" N 70º, 46', 39" W

The collection system is 100% separate sanitary sewers. There have been no reported sanitary sewer overflows (SSOs) during the current permit term.

II. Recent Permit History

EPA and MassDEP issued the existing permit on September 29, 2006. On October 31, 2006, the Town of Marion (Town) filed a petition for review with the EPA Environmental Appeals Board (EAB) appealing certain conditions in the Final Permit. The contested portions of the permit were stayed, while the uncontested conditions went into effect on March 1, 2007. EPA and the Town reached a settlement in which EPA modified certain conditions of the permit, and the Town withdrew its appeal. The final modified permit became effective August 1, 2007.

The changes made to the existing permit as a result of the settlement were as follows:

- A requirement for the Town to conduct receiving water monitoring to evaluate the effects of the effluent on the biota of the unnamed brook was transferred to MassDEP.
- A requirement to sample fecal coliform 3 times per week was changed to a 3 times/week requirement for the first year of the permit, then 2/week if monitoring data showed that Marion Water Pollution Control Facility (WPCF) was consistently meeting its fecal coliform limit.
- A 6-month compliance schedule was established for the Town to procure and install flow-proportional sampling equipment so that it could take 24-hour composite samples, as required by the permit.

In 2007, MassDEP completed the biological evaluation of the unnamed brook, which included macroinvertebrate and algal community identification (see Appendix A). Aquatic invertebrates have specific habitat needs, and the presence or absence of certain sensitive groups can be an indicator of ecosystem health.

Overall, the study results indicated nutrient enrichment at all sampling stations in the unnamed brook, including the one upstream station. The study found that the macroinvertebrate community upstream of the discharge was similar to that 1 km downstream of the discharge, but that both communities were dominated by organisms tolerant of organic pollution. Stoneflies (Plecoptera), a pollution-intolerant group, were absent after being found at the upstream location in 2000. Algal coverage was higher at the downstream stations than at the upstream station. The report cited nearby residential development as a possible cause for the change in species assemblage.

III. Description of Discharge and Receiving Water

Quantitative descriptions of the discharge in terms of significant effluent parameters, based on discharge monitoring reports (DMRs) submitted from September 2010 through August 2014, are shown in Appendix B of this fact sheet.

The water quality classification of the unnamed brook receiving the Marion WPCF discharge is not specifically listed in the Buzzards Bay table of the MA Surface Water Quality Standards (SWQS) (see 314 CMR 4.06(5), Table 25), nor does the map of the Buzzards Bay watershed (see 314 CMR 4.06(5) Figure 25) show the water quality classification for this water. Therefore, pursuant to 314 CMR 4.06(4), the brook is a Class B High Quality Water. Under MA SWQS, such waters must have consistently good aesthetic value and, where designated, must be suitable as a source of public water supply with appropriate treatment, as well as for irrigation and other agricultural uses. *Id.* at 314 CMR 4.05(3)(b). They must also be free of floating, suspended or settleable solids that are aesthetically objectionable or could impair uses. *Id.* at 314 CMR 4.05(3)(b)(5). Changes to color or turbidity of the waters that are aesthetically objectionable or use-impairing are also prohibited. *Id.* at 314 CMR 4.05(3)(b)(6). Dissolved oxygen levels in Class B waters must not be less than 5.0 mg/L. *Id.* at 314 CMR 4.05(3)(b)(1).

Aucoot Cove is classified in the tables of the MA SWQS (314 CMR 4.06 (5), Table 25) as Class SA and for shellfishing (the listing is under the heading "Sippican River"). Class SA waters are designated as 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. In certain waters, excellent habitat for fish, other aquatic life and wildlife may include, but is not limited to, sea grass. Where designated in the tables to 314 CMR 4.00 for shellfishing, these waters shall be suitable for shellfish harvesting without depuration (Approved and Conditionally Approved Shellfish Areas). These waters shall have excellent aesthetic value.

In addition to criteria specific to Class SA and B waters, Massachusetts imposes minimum narrative criteria applicable to all surface waters, including aesthetics ("free from pollutants in concentrations or combinations that settle to form objectionable deposits; float as debris, scum or other matter to form nuisances; produce objectionable odor, color, taste or turbidity; or produce undesirable or nuisance species of aquatic life"); bottom pollutants and alterations ("free from pollutants in concentrations or combinations or from alterations that adversely affect the physical or chemical nature of the bottom, interfere with the propagation of fish or shellfish, or adversely affect populations of non-mobile or sessile benthic organisms"); nutrients[1] ("unless naturally occurring, all surface waters shall be free from nutrients in concentrations that would cause or contribute to impairment of existing or designated uses…"); and toxics ("free from pollutants in concentrations that are toxic to humans, aquatic life or wildlife"). *See* 314 CMR 4.05(5)(a),(b), (c) and (e).

The Commonwealth implements its narrative toxics standard at 314 CMR 4.05 (5)(e) by specifying that, "[f]or pollutants not otherwise listed in 314 CMR § 4.00, the *National Recommended Water Quality Criteria: 2002, EPA 822R-02-047, November 2002* ["Recommended Criteria"] published by EPA pursuant to Section 304(a) of the [CWA], are the allowable receiving water concentrations for the affected waters, unless the Department

[1] Massachusetts Standards do not establish a numeric criterion for total phosphorus or for nitrogen.

…establishes a site specific criterion or determines that naturally occurring background conditions are higher[.]"

Section 303(d) of the CWA requires states to identify those waterbodies that are not expected to meet surface water quality standards after the implementation of technology-based controls and, as such, require the development of total maximum daily loads (TMDL). Inner Aucoot Cove (MA95-71)[2] is listed in the Massachusetts 2012 Integrated List of Waters (303d) (2012 Integrated List) as Category 5: Waters Requiring a TMDL. Inner Aucoot Cove is listed as impaired and requiring a TMDL for total nitrogen, dissolved oxygen, fecal coliform and nutrient/eutrophication biological indicators. A Final Pathogen TMDL has been approved for all waters in the Buzzards Bay watershed. The draft permit is consistent with the assumptions and requirements of the WLA for the discharge.

IV. Limitations and Conditions

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

V. Permit Basis and Explanation of Effluent Limitation Derivation

A. Process Description

The Marion WCPF, located in Marion, Massachusetts, is a 0.588-MGD wastewater treatment facility. Treatment units include inlet aerated chamber with air handling and odor control, mechanical bar screens, vortex grit chamber with classifier, sequencing batch reactors (SBRs), equalization tank, disc filters, and ultraviolet (UV) disinfection. Treated effluent is discharged to an unnamed brook that discharges to Aucoot Cove. Scum, waste activated sludge from the SBRs, and filter backwash are discharged to onsite aerated lagoons. The lagoons are also used for equalization and storage of wastewater during high flows exceeding SBR capacity and when one of the SBRs is down for service.

B. Effluent Limitations and Monitoring Requirements

1. Overview of Federal and State Regulations

EPA is issuing this permit pursuant to Section 402(a) of the Clean Water Act. The Commonwealth of Massachusetts is also issuing this permit pursuant to Massachusetts General Laws ch. 21, § 43 (2004).

Under Clean Water Act ("CWA" or "Act") section 402, 33 U.S.C. § 1342, EPA may issue National Pollutant Discharge Elimination System ("NPDES") permits "for the discharge of any pollutant, or combination of pollutants" if the permit conditions assure that the discharge complies with certain requirements, including those of section 301 of the CWA, 33 U.S.C. § 1311.

CWA section 303 requires each State to adopt water quality standards for its waters. *See* 33 U.S.C. § 1313(a)-(c). Water quality standards consist of (1) designated "uses" of the water, such as propagation of fish, aquatic life, and wildlife, recreation and aesthetics; (2) "criteria," expressed either in numeric or narrative form, which, *inter alia*, specify the amounts of various pollutants that may be present in those waters without impairing the designated uses; and (3) an

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[2] Impaired area defined as "From the confluence with Aucoot Creek, Marion to the boundary of Division of Marine Fisheries designated shellfishing growing area BB31.1, north and southwest from Haskell Island, Marion (formerly part of segment 95-09).

antidegradation policy to maintain and protect existing uses and high quality waters. *See id.* § 1313(c)(2)(A); *see also* 40 CFR §§ 131.2, 131.3, 131.6, 131.10, 131.11, 131.12.

The Massachusetts Surface Water Quality Standards at 314 Commonwealth of Massachusetts Regulation (CMR) 4.00 (MA SWQS) establish designated uses of the State's waters, criteria to protect those uses, and an antidegradation provision to ensure that existing uses and high quality waters are protected and maintained. They also include requirements for the regulation and control of toxic constituents and specify that EPA's recommended water quality criteria, established pursuant to Section 304(a) of the CWA, shall be used unless a site-specific criterion is established.

Section 301 of the CWA provides for two types of effluent limitations to be included in NPDES permits: "technology-based" limitations and "water quality-based" limitations. *See* 33 U.S.C. §§ 1311, 1313, 1314(b); 40 CFR Parts 122, 125, 131 and 133. As a class, Publicly Owned Treatment Works ("POTWs") must meet technology-based requirements based on "secondary treatment." *See id.* § 1311(b)(1)(B). Section 301(b)(1)(C), 33 U.S.C. § 1311(b)(1)(C), of the Act requires that NPDES permits include effluent limits more stringent than technology-based limits whenever necessary to meet water quality standards, treatment standards, or schedules of compliance, established pursuant to any State law or regulations…or any other Federal law or regulation, or required to implement any applicable water quality standard established pursuant to [the CWA].

NPDES permits must contain effluent limitations necessary to attain and maintain water quality standards, without consideration of the cost, availability or effectiveness of treatment technologies. *See Upper Blackstone Water Pollution Abatement Dist. v. U.S. EPA*, 690 F.3d 9, 33 (1st Cir. 2012), *cert. denied*, 133 S. Ct. 2282 (2013); *In re City of Moscow*, 10 E.A.D. 135, 168 (EAB 2001); *In re City of Fayetteville, Ark.*, 2 E.A.D. 594, 600-601 (CJO 1988) (Section 301(b)(1)(C) "requires unequivocal compliance with applicable water quality standards, and does not make any exceptions for cost or technological feasibility.").

EPA has implemented its Sections 301(b)(1)(C) and 402 of the Act through numerous regulations, which specify when the Region must include permit conditions, water quality-based effluent limitations or other requirements in NPDES permits.[3] For example, 40 CFR § 122.4(d) *prohibits* issuance of an NPDES permit "[w]hen the imposition of conditions cannot *ensure* [emphasis added] compliance with the applicable water quality requirements of all affected States." Section 122.44(d)(1) is similarly broad in scope and obligates the Region to include in NPDES permits "any requirements…necessary to: (1) Achieve water quality standards established under section 303 of the CWA, including State narrative criteria for water quality."

"Congress has vested in the Administrator [of EPA] broad discretion to establish conditions for NPDES permits" in order to achieve the statutory mandates of Section 301 and 402. *Arkansas v. Oklahoma*, 503 U.S. 91, 105 (1992).

Section 401(a)(1) of the CWA forbids the issuance of a federal license for a discharge to waters of the United States unless the state where the discharge originates either certifies that the discharge will comply with, among other things, state water quality standards, or waives certification. EPA's regulations at 40 CFR §122.44(d)(3), §124.53 and §124.55 describe the manner in which NPDES permits must conform to conditions contained in state certifications.

[3] Effluent limits are restrictions on the quantities, rates, and concentrations of pollutants that may be discharged from point sources. 33 U.S.C. § 1362(11).

Section 402(o) of the CWA provides, generally, that the effluent limitations of a renewed, reissued, or modified permit must be at least as stringent as the comparable effluent limitations in the previous permit. Unless certain limited exceptions are met, "backsliding" from effluent limitations contained in previously issued permits that were based on CWA §§ 301(b)(1)(C) or 303 is prohibited. EPA has also promulgated anti-backsliding regulations, which are found at 40 CFR §122.44(l). Unless statutory and regulatory backsliding requirements are met, the limits in the reissued permit must be at least as stringent as those in the previous permit.

When technology-based effluent limits are included in a permit, compliance with those limitations is from the date the issued permit becomes effective. *See* 40 CFR §125.3(a)(1). Compliance schedules and deadlines not in accordance with the statutory provisions of the CWA cannot be authorized by an NPDES permit. Compliance schedules to meet water quality based effluent limits may be included in permits only when the state's water quality standards clearly authorize such schedules and where the limits are established to meet a water quality standard that is either newly adopted, revised, or interpreted after July 1, 1977. Finally, the permitting authority must make a reasonable determination that a compliance schedule is "appropriate" and that compliance is required "as soon as possible." *See* 40 CFR §122.47(a), §122.47(a)(1).

2. Development of Water Quality-based Limits

Receiving stream requirements are established according to numerical and narrative standards adopted under state law for each stream classification. When using chemical-specific numeric criteria from the state's water quality standards to develop permit limits, both the acute and chronic aquatic life criteria are used and expressed in terms of maximum allowable in-stream pollutant concentration. Maximum daily limits are generally derived from the acute aquatic life criteria, and the average monthly limit is generally derived from the chronic aquatic life criteria. Chemical specific limits are established in accordance with 40 CFR §122.44(d) and §122.45(d).

EPA's regulations set out the process for the Region to determine whether permit limits are "necessary" to achieve state water quality standards and for the formulation of these requirements. *See* 40 CFR § 122.44(d). Permit writers are first required to determine whether pollutants "are or may be discharged at a level which will cause, have the reasonable potential to cause, or contribute to an excursion" of the narrative or numeric criteria set forth in state water quality standards. *Id.* § 122.44(d)(1)(i). EPA guidance directs that this "reasonable potential" analysis be based on "worst-case" conditions. *In re Washington Aqueduct Water Supply Sys*., 11 E.A.D. 565, 584 (EAB 2004); *Am. Iron & Steel Inst. v. EPA*, 115 F.3d 979, 1001 (D.C. Cir. 1997) (discussing EPA's policy that reasonable potential analysis be based on the worst case scenario). If a discharge is found to cause, have the reasonable potential to cause, or contribute to an excursion of a state water quality criterion, then a permit *must* contain effluent limits as stringent as necessary to achieve state water quality standards; see 40 CFR § 122.44(d)(1), (5). An excursion occurs if the projected or actual instream concentration resulting from the discharge exceeds the applicable criterion.

In determining reasonable potential, EPA considers: (1) existing controls on point and non-point sources of pollution; (2) pollutant concentration and variability in the effluent and receiving water as determined from the permit application, monthly discharge monitoring reports (DMRs), and State and Federal water quality reports; (3) sensitivity of the species to toxicity testing; (4) statistical approach outlined in *Technical Support Document for Water Quality-based Toxics Controls,* March 1991, EPA/505/2-90-001 in Section 3; and, where appropriate, (5) dilution of the effluent in the receiving water. In accordance with the MA SWQS at 314 CMR 4.03(3), available dilution for rivers and streams is based on a known or estimated value of the lowest mean flow which occurs for seven (7) consecutive days with a recurrence interval of once in ten (10) years (7Q10).

Establishing water quality-based effluent limitations that are sufficiently protective to meet in-stream water quality criteria requires the Region to account for both effluent and receiving water flows. When deriving permit effluent limits, EPA accounts for the effluent wastewater flow under POTW design flow conditions (40 CFR § 122.45(b)(1)); the concentration of a given pollutant in the effluent (discharge concentration); the percentage of effluent in the receiving water immediately downstream of the discharge under the critical low flow conditions identified in the state water quality standards (available dilution); and the concentration of pollutants upstream of the discharge (background) to determine how much the discharge can contribute such that the resulting mix downstream does not exceed the criterion. Where the discharge concentration exceeds the criterion, and the receiving water has no available dilution or remaining assimilative capacity for the pollutant, then the permit writer may establish the permit limit at the criterion level, to ensure the resulting discharge will not cause or contribute to an exceedance of the numeric criterion in-stream.

Narrative standards have the same force and effect as other state water quality standards; unlike numeric criteria, however, narrative water quality standards are necessarily subject to translation prior to their application. *See American Paper Inst. v. United States EPA*, 996 F.2d 346, 351 (D.C. Cir. 1993).

EPA in issuing an NPDES permit must, by necessity, also translate existing narrative criteria into instream numeric threshold concentrations over the course of developing water quality-based numeric effluent limitations. As explained by the D.C. Circuit:

> "As long as narrative criteria are permissible…and must be enforced through limitations in particular permits, a permit writer will inevitably have some discretion in applying the criteria to a particular case. The general language of narrative criteria can only take the permit writer so far in her task. Of course, that does not mean that the language of a narrative criterion does not cabin the permit writer's authority at all; rather, it is an acknowledgement that the writer will have to engage in some kind of interpretation to determine what chemical-specific numeric criteria--and thus what effluent limitations--are most consistent with the state's intent as evinced in its generic standard."

See American Paper Inst., 996 F.2d at 351 (citations omitted). This process of translating a narrative criterion is governed under EPA regulations by 40 CFR § 122.44(d)(1)(vi), which implements Sections 301 and 402 of the Act. Subsection (A) of that provision mandates at the outset a calculation of a protective ambient threshold concentration for the pollutant:

> "Where a State has not established a water quality criterion for a specific chemical pollutant that is present in an effluent at a concentration that causes, has the reasonable potential to cause, or contributes to an excursion above a narrative criterion within an applicable State water quality standard, the permitting authority must establish effluent limits using one or more of the following options:
>
> (A) Establish effluent limits *using a calculated numeric water quality criterion* [emphasis added] for the pollutant which the permitting authority demonstrates will attain and maintain applicable narrative water quality criteria and will fully protect the designated use."

See also Upper Blackstone Water Pollution Abatement Dist. v. United States EPA, 690 F.3d 9, 23 (1st Cir. 2012) ("Because both Massachusetts and Rhode Island employ narrative water quality criteria for the relevant pollutants, the EPA translated these into numeric limits under its procedures set out in 40 CFR § 122.44(d)(1)(vi).").

3. Conventional Pollutants

A) Biochemical Oxygen Demand (BOD_5) and Total Suspended Solids (TSS)

The current permit contains BOD_5/TSS average weekly and average monthly limits of 13 mg/L and 9 mg/L, respectively. The mass limits are 63 lbs/day average weekly and 42 lbs/day average monthly. Though the effluent flow limit was increased in the current permit, pollutant loads stayed the same, consistent with antidegradation provisions in the MA SWQS (314 CMR 4.04). Thus, the 13 mg/L and 9 mg/L limits were calculated to maintain load levels from the previous 15 mg/L and 10 mg/L limits, respectively. From September 2010 through August 2014, there were no violations of the BOD_5 or TSS limits.

The effluent limitations and monitoring requirements for BOD_5 and TSS in the draft permit are the same as those in the current permit. These limits are sufficient to ensure attainment of water quality standards and have been carried forward from the current permit in accordance with antibacksliding requirements. The monitoring frequency remains once per week.

B) Bacteria

The current permit limits fecal coliform to 14 cfu/100 mL (colony forming units per 100 mL water) monthly geometric mean and 43 cfu/100 mL maximum daily. These limits were based on state certification requirements. Sampling frequency was 3/week for the first year of the permit, then 2/week for the remainder of the permit term. There were no violations of this limit from September 2010 through August 2014, with values considerably lower than the permit limit. The range of reported fecal coliform values was 1-8 cfu/100 mL.

There have been two key developments concerning bacteria limits since the issuance of the existing permit. First, MassDEP has revised the criteria for bacteria in the MA SWQS for protecting shellfishing and recreational uses. The metric for recreational uses has changed from fecal coliform to *enterococci*, and the single sample maximum for shellfishing was revised from 43 cfu/100 mL to 28 cfu/100 mL. Second, MassDEP finalized a TMDL for bacteria in Buzzards Bay. Because of the lack of dilution and the short travel time to Aucoot Cove, limits have been established in accordance with the SWQS to prevent impairment to Aucoot Cove. For point sources discharging to Class SA waters, the SWQS fecal coliform criteria are 14 mpn/100 mL monthly geometric mean and that no more than 10% of samples exceed 28 cfu/100 mL.

Fecal Coliform Bacteria - The MA SWQS (314 CMR § 4.05(4)(a)4) require that in SA waters designated for shellfishing: "fecal coliform shall not exceed a geometric mean Most Probable Number (MPNc) of 14 organisms per 100 mL, nor shall more than 10% of the samples 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." The monthly average limit in the current permit (14 cfu/100 mL) is consistent with the current MA SWQS and has been retained in the draft permit. The maximum daily limit in the current permit is 43 cfu/100 mL, which was based on previous Massachusetts Surface Water Quality Standards for waters designated for shellfishing, and are less stringent than the criteria in the current Massachusetts water Quality Standards (28 MPN/100 mL). Accordingly, the maximum daily limit in the draft permit has been lowered to 28 cfu/100 mL. These limits are in accordance with the Buzzards Bay Pathogen TMDL. The monitoring frequency (twice per week) proposed in the draft permit is the same as in the current permit.

Enterococci Bacteria - MassDEP added new criteria to its surface water quality standards for bacteria in a revision to the MA SWQS (314 CMR 4.00) on December 29, 2006. EPA approved the changes to the bacteria criteria on September 19, 2007. The criteria require that, to preserve recreational uses, no single Enterococci sample exceed 104 colonies per 100 mL and that the geometric mean of all samples taken within the most recent six months based on a minimum of five samples shall not exceed 35 Enterococci colonies per 100 mL. MassDEP views the use of the 90% upper confidence level of 276 cfu/100mL as appropriate for setting the maximum daily limit for Enterococci. Thus, in the draft permit, EPA has established a monthly average (geometric mean) effluent limit of 35 cfu/100mL and a daily maximum effluent limit of 276 cfu/100mL for Enterococci to ensure that the discharge does not cause or contribute to exceedances of MA SWQS. The draft permit requires sampling twice per week.

pH

Due to the lack of information on receiving water pH levels and the variability and complexity of pH chemistry, EPA and the state have determined that establishing limits equal to the criteria range will be protective of designated uses. Where the receiving water has sufficient dilution and buffering capacity, EPA will consider limits outside of this range. Because that is not the case here, limits have been established equal to the criteria range.

The current permit limits effluent pH to a minimum of 6.5 and a maximum of 8.3 at any time. These limits are based on the MA SWQS. Sampling frequency is daily. There have been no violations of the pH limits during the September 2010 through August 2014 review period. The lowest minimum daily pH was 6.7 Standard Units (S.U.), and the highest daily maximum pH was 7.7 S.U.

The limits in the existing permit will be carried forward to the draft permit. Monitoring frequency remains daily.

C) Dissolved Oxygen

The draft permit includes a seasonal (June – October) limitation of not less than 5.0 mg/L for dissolved oxygen (DO). The limit has been established equal to the criteria to ensure that low DO discharge does not cause instream oxygen levels to fall below the criteria values. From September 2010 through August 2014, there were no violations of the minimum dissolved oxygen limit. The monitoring frequency remains once per day.

4. Non-Conventional Pollutants

A) Effluent Flow and Available Dilution

Sewage treatment plant discharge is encompassed within the definition of "pollutant" and is subject to regulation under the CWA. The CWA defines "pollutant" to mean, *inter alia*, "municipal . . . waste" and "sewage…discharged into water." 33 U.S.C. § 1362(6).

EPA may use design flow of effluent to both determine the necessity for effluent limitations in the permit that comply with the Act, and to calculate the limits themselves. EPA practice is to use design flow as a reasonable and important worst-case condition in EPA's reasonable potential and water quality-based effluent limitation (WQBEL) calculations to ensure compliance with water quality standards under Section 301(b)(1)(C). Should the effluent discharge flow exceed the flow assumed in these calculations, the instream dilution would decrease and the calculated effluent limits would not be protective of WQS. Further, pollutants that did not have the reasonable potential to exceed WQS at the lower discharge flow may have reasonable potential at a higher flow due to the decreased dilution. In order to ensure that the assumptions underlying the Region's reasonable potential analyses and derivation of permit effluent limitations remain sound for the duration of the permit, the Region may ensure its "worst-case" effluent wastewater flow assumption through imposition of permit conditions for effluent flow. Thus, the effluent flow limit is a component of WQBELs because the WQBELs are premised on a maximum level of flow. In addition, the flow limit is necessary to ensure that other pollutants remain at levels that do not have a reasonable potential to exceed WQS.

Using a facility's design flow in the derivation of pollutant effluent limitations, including conditions to limit wastewater effluent flow, is fully consistent with, and anticipated by NPDES permit regulations. Regarding the calculation of effluent limitations for POTWs, 40 CFR § 122.45(b)(1) provides, "permit effluent limitations…shall be calculated based on design flow." POTW permit applications are required to include the design flow of the treatment facility. *Id.* § 122.21(j)(1)(vi).

Similarly, EPA's reasonable potential regulations require EPA to consider "where appropriate, the dilution of the effluent in the receiving water," 40 CFR § 122.44(d)(1)(ii), which is a function of *both* the wastewater effluent flow and receiving water flow. EPA guidance directs that this "reasonable potential" analysis be based on "worst-case" conditions. EPA accordingly is authorized to carry out its reasonable potential calculations by presuming that a plant is operating at its design flow when assessing reasonable potential.

The limitation on sewage effluent flow is within EPA's authority to condition a permit in order to carry out the objectives of the Act. *See* CWA §§ 402(a)(2) and 301(b)(1)(C); 40 CFR §§ 122.4(a) and (d); 122.43 and 122.44(d). A condition on the discharge designed to protect EPA's WQBEL and reasonable calculations is encompassed by the references to "condition" and "limitations" in 402 and 301 and implementing regulations, as they are designed to assure compliance with applicable water quality regulations, including antidegradation. Regulating the quantity of pollutants in the discharge through a restriction on the quantity of wastewater effluent is consistent with the overall structure and purposes of the CWA.

In addition, as provided in Part II.B.1 and 40 CFR § 122.41(e), the permittee is required to properly operate and maintain all facilities and systems of treatment and control. Operating the facilities wastewater treatment systems as designed includes operating within the facility's design effluent flow. Thus, the permit's effluent flow limitation is necessary to ensure proper facility operation, which in turn is a requirement applicable to all NPDES permits. *See* 40 CFR § 122.41.

Review of facility flow between December 2011 and November 2013 shows that the average flow was 0.51 MGD. During this period, the range of monthly average effluent flows was between 0.245 and 0.845 MGD.

The existing permit limits the 12-month rolling average flow to 0.588 MGD. From December 2011 through November 2013, the range of 12-month rolling average flows was 0.407 MGD to 0.555 MGD. The draft permit carries forward the flow limit, expressed as a 12-month rolling average.

Water quality-based limits are established with the use of a calculated available dilution. As previously stated, 314 CMR 4.03(3)(a) requires that effluent dilution be calculated based on the receiving water 7Q10. The 7Q10 is the lowest observed mean river flow for 7 consecutive days, occurring over a 10-year recurrence interval. Additionally, the facility design flow is used to calculate available effluent dilution.

Because the unnamed brook to which Marion WPCF discharges has minimal or no flow of its own during dry periods, the 7Q10 is considered zero.

$$\text{Dilution Factor} = \frac{\text{7Q10} + \text{facility flow}}{\text{facility flow}} = \frac{0 + 0.588}{0.588} = 1$$

Thus, the dilution factor is 1.

B) Ammonia Nitrogen

Ammonia is a toxic pollutant which may be harmful to aquatic organisms, and nitrogen is a nutrient that can contribute to excessive plant growth in receiving waters, thus depleting dissolved oxygen in the water column necessary for aquatic life. The ammonia limitations in the permit are water quality-based effluent limitations necessary to prevent toxicity in the receiving water.

The existing permit contains monthly average ammonia limits of 1.74 mg/L from June 15 to October 15 and 2.6 mg/L from May 1 to June 14. The current limits were calculated using recommended 1994 water quality criteria for ammonia at a pH of 6.75 S.U. and 25 degrees Celsius (C) for the period from June 15 to October 1, and at a pH of 6.75 S.U. and 15 degrees C for the period of May 1 to June 14.

There was one violation of the ammonia limit in May 2012, when the reported concentration was 6.75 mg/L, higher than the limit of 2.6 mg/L.

The most current recommended ammonia criteria are found in the 1999 Update of Ambient Water Quality Criteria for Ammonia (EPA-822-R-99-014). The recommended chronic criteria for total ammonia, at a pH of 6.75 and 25 degrees C, is 3.24; and at a pH of 6.75 and 15 degrees C is 6.15 mg/L.

The draft permit retains the limits that were established to ensure attainment of the 1994 ammonia criteria, and these limits have been retained to ensure consistency with antibacksliding requirements. The facility has been able to consistently attain these limits. The draft permit proposes an average monthly ammonia limit of 2.6 mg/L during May, and 1.74 mg/L from June 1st through October 31st.

The ammonia discharges during the winter have been far below the criteria; hence the draft permit does not propose winter ammonia limits. The permittee must report average monthly ammonia from November 1st through April 30th, and must report the maximum daily ammonia discharge concentration year-round. The monitoring frequency remains once per week from May 1 through October 31 and monthly for the remainder of the year.

The proposed draft permit also contains ammonia loading limits of 12.8 lbs/day in May, and 8.53 lbs/day from June through October.

Loading (lbs/day) = Design flow (MGD) x Limit (mg/L) x 8.34 (conversion factor)

Monthly Average Load - May (lbs/day) =
0.588 MGD x 2.6 mg/L x 8.34 = **12.75 lbs/day**

Monthly Average Load – June-October (lbs/day) =
0.588 MGD x 1.74 mg/L x 8.34 = **8.53 lbs/day**

C) Total Nitrogen

The basic cause of nutrient problems in estuaries and nearshore coastal waters is the enrichment of freshwater with nitrogen (N) on its way to the sea and by direct inputs within tidal systems. EPA defines nutrient overenrichment as the anthropogenic addition of nutrients, in addition to any natural processes, causing adverse effects or impairments to beneficial uses of a waterbody. Eutrophication is an aspect of nutrient overenrichment and is defined as an increase in the rate of supply of organic matter to a waterbody. Cultural eutrophication has been defined as the human-induced addition of wastes containing nutrients to surface waters that results in excessive plant growth and/or a decrease in dissolved oxygen.

Estuaries, especially large, productive ones like Buzzards Bay, are extremely significant aquatic resources. An estuary is a partially enclosed coastal body of water located between freshwater ecosystems (lakes, rivers, and streams; freshwater and coastal wetlands; and groundwater systems) and coastal shelf systems where freshwater from the land measurably dilutes saltwater from the ocean. This mixture of water types creates a unique transitional environment that is critical for the survival of many species of fish, birds, and other wildlife. Estuarine environments are among the most productive on earth, creating more organic matter each year than comparably sized areas of forest, grassland, or agricultural land (EPA, 2001).

Maintaining water quality within an estuary is important for many reasons. Estuaries provide a variety of habitats such as shallow open waters, freshwater and saltwater marshes, sandy beaches, mud and sand flats, rocky shores, oyster reefs, tidal pools, and seagrass beds. Tens of thousands of birds, mammals, fish, and other wildlife depend on estuarine habitats as places to live, feed, and reproduce. Many species of fish and shellfish rely on the sheltered waters of estuaries as protected places to spawn. Moreover, estuaries also provide a number of recreational values such as swimming, boating, fishing, and bird watching. Estuaries in addition have an important commercial value since they serve as nursery grounds for two thirds of the nation's commercial fish and shellfish, and support tourism drawing on the natural resources that estuaries supply. (EPA, 1998). Consequently, EPA believes sound environmental policy reasons favor a pollution control approach that is both protective and undertaken expeditiously to prevent degradation of these critical natural resources.

Because estuaries are the intermediary between oceans and land, both these geographic features influence their physical, chemical, and biological properties. In the course of flowing downstream through a watershed to an estuary, tributaries pick up materials that wash off the land or are discharged directly into the water by land-based activities. Eventually, the materials that accumulate in the tributaries are delivered to estuaries. The types of materials that eventually enter an estuary largely depend on how the land is used. Undisturbed land, for example, will discharge considerably fewer pollutants than an urban center or areas with large amounts of impervious cover. Accordingly, an estuary's overall health can be heavily impacted by surrounding land uses.

Unlike free-flowing rivers, which tend to flush out sediments and pollutants relatively quickly, an estuary will often have a lengthy retention period as up-estuary saltwater movement interacts with down-estuary freshwater flow (EPA, 2001). Estuaries are particle-rich relative to coastal systems and have physical mechanisms that tend to retain particles. These suspended particles mediate a number of activities (e.g., absorbing and scattering light, or absorbing hydroscopic materials such as phosphate and toxic contaminants). New particles enter with river flow and may be re-suspended from the bottom by tidal currents and wind-wave activity. Many estuaries are naturally nutrient-rich because of inputs from the land surface and geochemical and biological processes that act as "filters" to retain nutrients within estuaries (EPA, 2001). Consequently, waterborne pollutants, along with contaminated sediment, may remain in the estuary for a long time, magnifying their potential to adversely affect the estuary's plants and animals.

Increased nutrient inputs promote a progression of symptoms beginning with excessive growth of phytoplankton and macroalgae to the point where grazers cannot control growth (NOAA, 2007). Phytoplankton is microscopic algae growing in the water column and is measured by chlorophyll *a*. Macroalgae are large algae, commonly referred to as "seaweed." The primary symptoms of nutrient overenrichment include an increase in the rate of organic matter supply, changes in algal dominance, and loss of water clarity and are followed by one or more secondary symptoms such as loss of submerged aquatic vegetation, nuisance/toxic algal blooms and low dissolved oxygen. (EPA, 2001). In U.S. coastal waters, nutrient overenrichment is a common thread that ties together a diverse suite of coastal problems such as red tides, fish kills, some marine mammal deaths, outbreaks of shellfish poisonings, loss of seagrass and bottom shellfish habitats, coral reef destruction, and hypoxia and anoxia now experienced as the Gulf of Mexico's "dead zone." (EPA, 2001). **Figure 3** shows the progression of nutrient impacts on a water body.

Estuarine nutrient dynamics are complex and are influenced by flushing time, freshwater inflow and stratification, among other factors. The deleterious physical, chemical, and biological responses in surface water resulting from excessive plant growth impair designated used in both receiving and downstream waterbodies. Excessive plant growth can result in a loss of diversity and other changes in the aquatic plant, invertebrate, and fish community structure and habitat. For example, losses of submerged aquatic vegetation (SAV), such as eelgrass, occur when light is decreased due to turbid water associated with overgrowth of algae or as a result of epiphyte growth on leaves (NOAA, 2007 and EPA, 2001). Excess nitrogen and phosphorus cause an increased growth of phytoplankton and epiphytes (plants that grow on other plants). Phytoplankton growth leads to increased turbidity, blocking light attenuation, and epiphytic growth further blocks sunlight from reaching the SAV surface. When sunlight cannot reach SAV, photosynthesis decreases and eventually the submerged plants die. (State-EPA Nutrient Innovations Task Group, 2009). The loss of SAV can have negative effects on the ecological functioning of an estuary and may impact some fisheries because the SAV beds serve as important habitat. Because SAV responds rapidly to water quality changes, its health can be an indicator of the overall health of the coastal ecosystem.

Nutrient-driven impacts on aquatic life and habitat are felt throughout the eutrophic cycle of plant growth and decomposition. Nutrient-laden plant detritus can settle to the bottom of a water body. In addition to physically altering the benthic environment and aquatic habitat, organic materials (*i.e.*, nutrients) in the sediments can become available for future uptake by aquatic plant growth, further perpetuating and potentially intensifying the eutrophic cycle.

Excessive aquatic plant growth, in addition, degrades aesthetic and recreational uses. Unsightly algal growth is unappealing to swimmers and other stream users and reduces water clarity. Decomposing plant matter also produces unpleasant sights and strong odors. Heavy growths of algae on rocks can make streambeds slippery and difficult or dangerous to walk on. Algae and macrophytes can interfere with angling by fouling fishing lures and equipment. Boat propellers and oars may also get tangled by aquatic vegetation.

When nutrients exceed the assimilative capacity of a water body, the ensuing eutrophic cycle can negatively impact in-stream dissolved oxygen levels. Through respiration, and the decomposition of dead plant matter, excessive algae and plant growth can reduce in-stream dissolved oxygen concentrations to levels that could negatively impact aquatic life. During the day, primary producers (*e.g.*, algae, plants) provide oxygen to the water as a by-product of photosynthesis. At night, however, when photosynthesis ceases but respiration continues, dissolved oxygen concentrations decline. Furthermore, as primary producers die, they are decomposed by bacteria that consume oxygen, and large populations of decomposers can consume large amounts of dissolved oxygen. Many aquatic insects, fish, and other organisms become stressed and may even die when dissolved oxygen levels drop below a particular threshold level.

Nutrient overenrichment of estuaries and nearshore coastal waters from human-based causes is now recognized as a national problem on the basis of CWA Section 305(b) reports from coastal States (EPA, 2001). Most of the nation's estuarine and coastal waters are moderately to severely polluted by excessive nutrients, especially nitrogen and phosphorus (NOAA, 2007; NOAA, 1999; EPA, 2006; EPA, 2004; and EPA, 2001).

When permitting nutrient discharges, the Region analyzes available record materials from a reasonably conservative standpoint, as it regards one key function of a nutrient limit as preventative. This protective approach is appropriate because, once begun, the cycle of eutrophication can be difficult to reverse due to the tendency of nutrients to be retained in the sediments. Nutrients can be re-introduced into a waterbody from the sediment, or by microbial transformation, potentially resulting in a long recovery period even after pollutant sources have been reduced. Eutrophic conditions are often exacerbated around impoundments and in other slow moving reaches of rivers, where detention times increase relative to free flowing segments of rivers and streams. In addition, in flowing systems, nutrients may be rapidly transported downstream and the effects of nutrient inputs may be uncoupled from the nutrient source, which complicates source control. Thus, a second key function of a nutrient limit is to protect downstream receiving waters regardless of their proximity in linear distance.

Facility Performance

The existing permit requires Marion to operate the treatment facility within the design "target effluent quality" of 7-10 mg/L and report effluent total nitrogen on the monthly DMR. The Marion WPCF has achieved a high level of nitrogen removal during the current permit term, resulting in an average effluent concentration of 3.46 mg/L from September 2010 through August 2014. The May through October average effluent total nitrogen concentration was 3.8 mg/L during this period. However, impairments for nutrient enrichment and low DO persist, as evidenced by the information presented below. Inner Aucoot Cove is listed on the 2012 Integrated List of waters, and total nitrogen concentrations in Aucoot Cove exceed threshold targets identified by MassDEP for similar waters above which adverse nutrient-related impacts are expected to occur.

Reasonable Potential Analysis

The reasonable potential analysis examines the effects of nitrogen on water quality in Aucoot Cove rather than the unnamed brook. In freshwater systems, such as the unnamed brook, aquatic plant growth is typically limited by phosphorus, meaning that excess nitrogen does not increase plant growth. Please see page 25 of this fact sheet for a reasonable potential analysis of phosphorus in the unnamed brook.

Aucoot Cove is a deep, well flushed embayment of approximately 0.5 square miles area. The water quality classification of Aucoot Cove is SA, the most protective classification for saline waters. It is also a designated shellfishery. Inner Aucoot Cove is listed as impaired for total nitrogen, dissolved oxygen, and nutrients/eutrophication biological indicators. To interpret the narrative nutrient criteria, consistent with 122.44 (d)(1)(vi), and determine the appropriate threshold concentration, EPA reviewed nitrogen, dissolved oxygen and algal data collected by the Buzzards Bay Coalition at various locations in Aucoot Cove.

The water quality criterion for dissolved oxygen is 6.0 mg/L in Class SA Waters, such as Aucoot Cove. Aquatic plants and algae give off oxygen from photosynthesis during the day, but absorb oxygen during the night for respiration. Therefore, low dissolved oxygen (DO) in the early morning hours is one indication of eutrophication. Low DO events cause fish kills, noxious odors, and dead zones in estuaries.

Data collected by the Buzzards Bay Coalition indicates that the monitoring sites closest to the discharge have the highest likelihood for DO violations. Monitoring station AC7, at the mouth of the unnamed brook to Aucoot Cove, violated the DO criterion in 71% of monitoring events. Other monitoring stations in Aucoot Cove also frequently violate the DO criterion, with AC2 violating 45% of events, AC4 56%, and AC5a 45%.

Results from monitoring sites in Hiller's Cove, located adjacent to Aucoot Cove, show much lower violation frequencies. HL2 violated the 6.0 mg/L DO standard in 12% of sampling events, and HL1 violated the standard in only 7% of events. Hiller Cove, like Aucoot Cove, receives stormwater pollution from a developed area; but unlike Aucoot Cove has no POTW point sources.

The Massachusetts Department of Environmental Protection (MassDEP) has identified total nitrogen levels believed to be protective of eelgrass habitats as less than 0.39 mg/L and ideally less than 0.3 mg/L and *chlorophyll a* levels as 3-5 µg/L and ideally less than 3 µg/L (MADEP/SMAST, 2003))[4]. Monitoring station AC2, located in inner Aucoot Cove, has a median nitrogen concentration of 0.47 mg/L. In contrast, AC3, which currently supports eelgrass, has a median total nitrogen concentration of 0.35 mg/L[5].

To determine an appropriate threshold concentration, EPA considered the procedure developed by the Massachusetts Estuaries Project (MEP). This procedure identifies a target nitrogen concentration threshold based on a location within the estuary where water quality standards are not violated, in order to identify a nitrogen concentration consistent with unimpaired conditions. This approach is consistent with EPA guidance regarding the use of reference conditions for the purposes of developing nutrient water quality criteria.

EPA generally recommends three types of scientifically defensible empirical approaches for setting numeric criteria to address nitrogen/phosphorus pollution.[6] They are a reference condition

[4] Massachusetts Department of Environmental Protection, UMASS-Dartmouth School for Marine Science and Technology. 2003. Massachusetts Estuaries Project: Site-Specific Nitrogen Thresholds for Southeastern Massachusetts Embayments: Critical Indicators Interim Report. Massachusetts Department of Environmental Protection. July 21, 2003. Revised September 16, 2003 and December 22, 2003.

[5] Data available at http://www.savebuzzardsbay.org/ProtectBay/CleanWater/SoundScience/BayHealthMap

[6] Environmental Protection Agency. 2001. Nutrient Criteria Technical Guidance Manual: Estuarine and Coastal Marine Waters. U.S. Environmental Protection Agency, Office of Water, EPA-822-B-01-001. October 2001. Published Online:
http://water.epa.gov/scitech/swguidance/standards/criteria/nutrients/marine/index.cfm

approach, mechanistic modeling, and stressor-response analysis. The reference condition approach derives criteria from observations collected in reference waterbodies. Reference waterbodies represent least disturbed and/or minimally disturbed conditions within a region (Stoddard et al., 2006) that support designated uses (EPA, 2000a). Therefore, the range of conditions observed within reference waterbodies provides appropriate values upon which criteria can be based. The reference condition approach requires the ability to define and identify reference waterbodies, and relies on the availability of sufficient data from these reference waterbodies to characterize the distributions of different nutrient variables. Aucoot Cove is classified as an SA water and currently supports eelgrass in the middle cove, but not the inner cove. Based on its depth, strata, and other characteristics the inner cove would be expected to support eelgrass. Therefore, the primary water quality parameter considered in determining a reference location is eelgrass.

Eelgrass continues to grow in middle Aucoot Cove, but is receding from inner Aucoot Cove. This is a predictable result of the inner cove receiving nutrient inputs from point and non-point sources without the same degree of tidal flushing that characterizes the middle cove. GIS data collected by MassDEP and analyzed by EPA indicate that eelgrass coverage in Aucoot Cove has retreated from its historical extent. (see **Figure 5**). During a site visit on September 10, 2014, EPA staff observed eelgrass beds in Aucoot Cove that appeared patchy, yellowed, and shaded by attached algae. Some die-off may be expected late in the growing season. However, the thick algal cover seems to be the immediate cause of the poor condition of the eelgrass beds.

For this analysis, EPA is using monitoring station AC3 as the reference location. As shown in **Figure 4**, this location is in a current eelgrass bed. The median total nitrogen concentration at AC3 between 2007 and 2012 was 0.35 mg/L, which will be the target concentration for this analysis. EPA notes that this value is consistent with TN concentration thresholds to protect eelgrass beds identified in other estuaries. Moreover, AC3 has the lowest *chlorophyll a* levels of any monitoring station in Aucoot Cove for which these data are available. The average *chlorophyll a* level at AC3 between 2007 and 2012 was 7.0 μg/L, which is still higher than the MassDEP/SMAST protective level of 3-5 μg/L.

EPA has concluded that at existing levels, nitrogen in the Marion WPCF discharge has the reasonable potential to cause or contribute to water quality violations in Inner Aucoot Cove. as discussed in Section IV.B.3., Inner Aucoot Cove is listed as impaired and requiring a TMDL for total nitrogen, dissolved oxygen, and nutrient/eutrophication biological indicators. Monitoring stations closest to the discharge, such as AC2 and AC7, are more impaired than stations further out in the cove. While the Marion WPCF has attained an impressive level of nitrogen removal from its discharge, its average effluent nitrogen concentration of 3.46 mg/l is still ten times higher than the concentration needed to support eelgrass in the cove.

Environmental Protection Agency. 2000a. Nutrient Criteria Technical Guidance Manual: Rivers and Streams. U.S. Environmental Protection Agency, Office of Water and Office of Science and Technology, EPA-822-B-00-002. July 2000. Published Online: http://water.epa.gov/scitech/swguidance/standards/criteria/nutrients/rivers/index.cfm

Environmental Protection Agency. 2000b. Nutrient Criteria Technical Guidance Manual: Lakes and Reservoirs. U.S. Environmental Protection Agency, Office of Water and Office of Science and Technology, EPA-822-B00-001. April 2000. Published Online: http://water.epa.gov/scitech/swguidance/standards/criteria/nutrients/lakes/index.cfm

<u>Contribution from Lagoons</u>
The Marion WPCF deposits sludge from its treatment processes in the sewage lagoons. EPA has determined that the lagoons are functioning as sludge disposal rather than treatment or storage sites under 40 CFR Part 503 regulations. The Marion WPCF has deposited sludge in its unlined sewage lagoons for many years without any plan for removal and disposal. According to 40 CFR Part 503 Subpart C, EPA considers land that contains sewage sludge for more than two years to be a disposal site. Because the sludge storage practices constitute disposal, the draft permit contains sludge-related requirements in Sections D, E and F.

The Buzzard's Bay Coalition commissioned a study by Horsley Witten (HW) that estimated the lagoons were leaching 33,400 lbs of nitrogen per year into the groundwater, including 16,700 lbs/year to groundwater that flows in a diffuse circuitous path and ultimately discharges to Aucoot Cove. The Town of Marion and its consultant CDM Smith dispute this result, asserting that the infiltration rate and nitrogen concentration of water exiting the lagoons were overestimated, and that there may be other sources of nitrogen in the groundwater, such as the landfill, a transfer station, and a composting site.[7] The CDM analysis represents a general critique of the HW report, and no effort is made to quantify lagoon loadings or loadings from the other non-point sources referenced. EPA also notes that the sources the Town has stated may be significant are under the Town's control. Furthermore, the results of the loading analysis would be similar if the actual lagoon loading were one half of the Horsley Witten estimate.

EPA believes that like the nitrogen contributed from the surface water discharge portion of the treatment works, nitrogen from the lagoons is also contributing to nutrient impairments in Aucoot Cove and Sippican Harbor. Disposal of nitrogen rich sludge and untreated wastewater in unlined lagoons is not proper operations and maintenance of the treatment plant. Being unlined, the lagoons have the potential to leach significant amounts of nitrogen into the groundwater, which would not occur if the lagoon portion of the treatment works were being properly operated and maintained. Federal regulations require all NPDES to include certain standard conditions, including with respect to proper operation and maintenance of the treatment works:

> "The permittee shall at all times properly operate and maintain all facilities and systems of treatment and control (and related appurtenances) which are installed or used by the permittee to achieve compliance with the conditions of this permit and with the requirements of storm water pollution prevention plans." 40 CFR § 122.41(e).

The lagoon system at the Marion WPCF is covered by this provision.[8] EPA has determined that the use of unlined lagoons for flow equalization and sludge disposal is not in compliance with the operation and maintenance requirements of 40 CFR § 122.41(e).

Furthermore, the regulations pertaining to sludge disposal (40 CFR 503.5) indicate that "on a case-by case basis, the permitting authority may impose requirements for the use or disposal of sewage sludge in addition to or more stringent than the requirements in this part when necessary to protect public health and the environment from any adverse effect of a pollutant in the sewage sludge."

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[7] http://www.marionma.gov/pages/selectmenpresent%2015NOV11.pdf

[8] The lagoon system subject to NPDES regulation as part of the "treatment works." Section 212(2)(A) of the Act defines treatment works to mean, *inter alia*, "intercepting sewers, outfall sewers, sewage collection systems, pumping, power and other equipment, and their appurtenances." POTW also "includes *any* devices and systems used in the *storage*, treatment, recycling and reclamation of municipal sewage or industrial wastes of a liquid nature." 40 CFR § 403.3(q) (emphasis added).

The EPA May 1990 document, "Guidance For Writing Case-by Case Permit Requirements For Municipal Sewage Sludge", indicates that "…many of the standard permit conditions that apply to effluent discharge activities will also apply to sludge use and disposal activities (e.g., duty to mitigate, duty of proper operation and maintenance,…" Chapter 9 of this document indicates that "Because most surface disposal sites were developed as a temporary or stop-gap sludge storage/disposal facility, EPA does not consider them to be environmentally acceptable solutions for ultimate disposal."

The EPA November 1991 document, "Guidance For NPDES Inspectors: Verifying Compliance With Sludge Requirements" indicates that, "When conducting the walk-through visual inspection of the facility, the inspector should be aware of, and look for, physical conditions that are indicative of potential or existing problems. Some of the more common indicators of potential problems are listed in Table 3-1." Table 3-1 includes "unlined sludge lagoons."

The regulations pertaining to sludge at 40 CFR Part 503.24 indicate that, "Sewage sludge placed on an active sewage sludge unit shall not contaminate an aquifer." The EPA September 1995 document, "Process Design Manual, Surface Disposal of Sewage Sludge and Domestic Septage", indicates that this management practice requires that proof be obtained that ground water is not contaminated. "This proof must be either (1) the results of a ground-water monitoring program developed by a qualified ground-water scientist, or (2) certification by a ground-water scientist that ground water will not be contaminated by the placement of sewage sludge on an active sewage sludge unit." The document further indicates that "The certification option is usually obtainable only if the active sewage sludge unit has a liner and leachate collection system. It is generally infeasible for a ground-water scientist to certify that ground water will not be contaminated in the absence of a liner unless ground water is very deep and there is a natural clay layer or unless the amount of material placed on the site is quite low."

For the above reasons, EPA has formulated special conditions relative to operation and maintenance of the lagoon system, and disposal of sludge, to assure compliance with all applicable requirements of the CWA and regulations. *See* CWA §§ 301(b)(1)(C), 402(a)(2); 40 CFR §§ 122.4(a), (d); 122.43. "Permit writers are…encouraged to be specific in formulating proper O&M requirements in the permit, especially where poor or inadequate O&M practices have caused problems in the past." 49 FR 38039 (September 26, 1984).[9] The special conditions in the permit require discontinuation of use of the unlined lagoons for equalization and disposal of sludge, and abatement of any ongoing adverse effects to the environment, including nitrogen contamination of the aquifer, resulting from the accumulated sludge and wastewater solids in the lagoons.

<u>Effluent Limitation Calculation</u>
A planned nitrogen loading study under Massachusetts Estuary Project (MEP) for Aucoot Cove has not been completed, nor is it expected in the near future. In the absence of such a modeling study or TMDL, EPA is required to use available information to establish water quality limits when issuing NPDES permits to impaired waters.

EPA's calculation of an effluent limitation for nitrogen consists of several steps. First, EPA determined a threshold nitrogen concentration in the water body that is consistent with

[9] *See also* NPDES Permit Writer's Manual (Chapter 9-21) ("Permits should clarify requirements for proper operation and maintenance of the collection system.")

unimpaired conditions. As discussed in the reasonable potential analysis, this concentration is 0.35 mg/L.

EPA next determined an allowable total nitrogen load from the watershed that would result in TN concentrations at or below the 0.35 mg/L TN threshold for Inner Aucoot Cove. EPA delineated a 0.1 square-mile portion of Aucoot Cove that includes both the inner harbor and the healthy eelgrass beds in middle harbor. This "reference area" is able to assimilate the existing nitrogen inputs and still supports eelgrass because it is larger and better flushed than the impaired area. EPA calculated the current TN loading per square mile of water area in Aucoot Cove for the reference area, then calculated the total watershed load that would meet that loading rate in the impaired area. To determine the allowable TN load from Outfall 001, EPA assumed that the sum of the watershed loads from various sources, including those beyond the purview of this permit, plus the load from Outfall 001, was equal to the total watershed load.

Thus, the watershed TN load is considered to have three components: (1) nonpoint sources (NPS) and stormwater point sources, (2) the discharge from the Marion WWTF Outfall 001, and (3) the exfiltration to groundwater from the Marion WWTF lagoons. The assumptions behind the calculation of each TN source are explained below.

In the absence of a detailed NPS and stormwater point sources loading analysis for the Aucoot Cove watershed, EPA used the nonpoint source and stormwater point source areal loading rate calculated for the Segreganset River watershed, which has similar land use patterns as Marion.[10] This rate, 2.32 lbs/day/sq.mi, was multiplied by the watershed area for Aucoot Cove, 4.06 square miles (from the Buzzards Bay Project), to yield a nonpoint source and stormwater point sources load of 9.40 lbs/day. This number represents stormwater runoff and nonpoint sources, including septic systems.

EPA calculated the Marion WPCF nitrogen load by multiplying the reported total nitrogen concentration for May through October 2011 through 2013 by the monthly average flow for the same time period and then multiplying by a conversion factor. The calculated WPCF nitrogen load is 13.75 lbs/day.

Finally, EPA added the nitrogen exfiltration from the Marion WPCF sludge lagoons. The best available estimate of the nitrogen loading to Aucoot Cove from the lagoons is 16,700 lbs/year, from the April 2011 Horsley Witten lagoon study,[11] which translates to 45.753 lbs/day.

Based on these three estimated loads, the total watershed nitrogen load from all three sources was calculated as 68.90 lbs/day (9.4 lbs/day + 13.75 lbs/day + 45.753 lbs/day).

EPA delineated the impaired area of Aucoot Cove as the inner half of the reference area where the nitrogen contributions from the watershed first enter the cove without the volume of water or mixing that occurs further out in the cove. As shown in Figure 6, the impaired area is 0.05 square miles, while the reference area, which includes the impaired area, is 0.1 square miles and extends outward from the unnamed brook to reference point AC3. EPA then determined the level of

[10] Calculated from the Taunton WWTP fact sheet. Drainage Area for Segreganset River = 14.9 sq. mi, total nitrogen loading = 34.5 lbs/day (see page 31 of fact sheet and Attachment A to fact sheet, respectively). http://epa.gov/region1/npdes/permits/draft/2013/draftma0100897permit.pdf

[11] Horsley & Whitten, 2011. Environmental Assessment of the Marion Wastewater Treatment Plant Sewage Lagoons. Prepared for Coalition for Buzzards Bay.

nitrogen contributions in Inner Aucoot Cove that would result in the same loading rate per unit area as currently exists for the larger area that encompasses the reference site, where it appears that nitrogen loading is not causing an impairment. **Figure 6** shows a map of the impaired and reference areas.

By dividing the loading rate by the surface area of the reference area, as shown below, EPA determined that the areal loading rate for the reference area is 689.0 lbs/day/sq.mi.

$$\frac{68.90 \text{ lbs/day}}{0.10 \text{ sq. mi.}} = 689.0 \text{ lbs/day/sq. mi.}$$

This is assumed to be an acceptable areal loading rate since the reference area extends outward to reference point AC3. To calculate the allowable daily load for the impaired area, EPA multiplied this loading rate by the area of the impaired area.

689.0 lbs/day/sq.mi. x 0.05 sq. mi. = 34.45 lbs/day total nitrogen <= Target Loading Rate for the impaired area

EPA believes that watershed loads need to be reduced to 34.45 lbs/day for the impaired area to meet water quality standards. EPA's calculations assume no reduction of nonpoint source and stormwater nitrogen. Therefore, the full nonpoint and stormwater source total was subtracted from the total loading to yield 25.05 lbs/day. This is the remaining nitrogen load allocated to the Marion WPCF outfall and lagoons combined. Because the estimated loading from the lagoons (45.753 lbs/day) exceeds the total load allocated for the Marion WPCF (25.05 lbs/day), point source reductions from the WPCF alone cannot achieve water quality standards in Aucoot Cove. If the lagoons were to continue their current mode of operation, the nitrogen allocation to the discharge would be negative.

In a scenario where the lagoon nitrogen source has been reduced to zero, the allocation to the Marion WPCF outfall would be 25.05 lbs/day TN. If the facility were running at design flow of 0.588 MGD, this flow would correlate to a TN concentration of 5.11 mg/L. However, because the lag time for groundwater to travel from the lagoons to Aucoot Cove is at least 20 years[12], nitrogen from the lagoons will continue to migrate to Aucoot Cove past the term of the next permit. WPCF effluent nitrogen concentrations need to be reduced well below 5 mg/L to achieve water quality standards in Aucoot Cove during the permit term.

The permit includes a total nitrogen limit of 3.0 mg/L, which is considered the limit of technology for nitrogen treatment, and this translates to a mass loading of 14.71 lbs/day. One permitting option considered by EPA was establishment of a limit equal to the instream target determined by EPA to implement narrative nutrient criteria. However, EPA determined that, as a first step, imposing a limit of 3 mg/L, which is consistent with maximizing nitrogen reductions based on available technology, is a reasonable at this time in order to allow the Town the opportunity to take steps to control nitrogen exfiltration from the lagoons.

[12] The distance from the lagoons to Aucoot Cove is approximately 1.5 miles. Assuming a high rate of hydraulic conductivity (ki = 1 foot/day), a hydraulic gradient of 0.006, and soil porosity of 30%, it would take the groundwater approximately 20 years to travel from the lagoons to Aucoot Cove. At lower rates of hydraulic conductivity, the groundwater would take longer to migrate to Aucoot Cove. Hydraulic rate, hydraulic gradient, and soil porosity numbers were taken from Horsley & Whitten, 2011 (Environmental Assessment of the Marion Wastewater Treatment Plant Sewage Lagoons. Prepared for Coalition for Buzzards Bay)

The Horsley Witten estimate of nitrogen discharged to Aucoot Cove via groundwater is more than three times the load discharge to the unnamed brook through the Marion treatment plant outfall (current WPCF TN load = 5,019 lbs/year). This suggests that controlling exfiltration from the lagoons may be a more significant benefit to Aucoot Cove than further control of nitrogen in the treatment plant discharge. Because alterations to the Marion lagoon system are required under the permit, and these operational changes will sharply reduce the nitrogen exfiltration from the lagoons going forward, EPA has determined this step-wise approach to restoring water quality in the receiving waters is reasonable. Furthermore, the compliance schedule to meet the 3 mg/L is also designed to allow the Town to pursue other watershed load reductions, which could lead to a limit less stringent than 3 mg/L, as explained below.

Design Flow (mgd) x Permit Limit (mg/L) x 8.34 (conversion factor) = Loading limit (lbs/day)

0.588 mgd x 3.0 mg/L x 8.34 = 14.71 lbs/day

The draft permit includes an interim limit of 5 mg/L and a 48-month compliance schedule for achieving the more stringent limit of 3 mg/L. Additionally, the permit provides a schedule, should the permittee choose to address stormwater and nonpoint sources of nitrogen identified above to attempt offset and WPCF reductions and document that WPCF nitrogen limits need not be reduced to 3.0 mg/L. If other nitrogen reductions obviate the need to go to 3.0 mg/L, the Town can request a permit modification. The schedule requires a plan evaluating, among other things, alternatives for removing the lagoons as a source of nitrogen through lining of the lagoons and/or abandonment and cleaning of the lagoons; alternatives for controlling other significant sources of nitrogen as necessary; and alternatives for achieving the 3.0 mg/L total nitrogen limit for the wastewater discharge. The schedule also requires implementation of lagoon controls and design and construction of WPCF improvements to achieve 3.0 mg/L. If, at any time, the Permittee can make a demonstration that stormwater and nonpoint source nitrogen improvements are sufficient to achieve water quality standards without further point source nitrogen reductions, the Permittee may submit a request for a permit modification. EPA will consider *net* nonpoint source and stormwater reductions in evaluating a modification request; i.e. any additional stormwater and nonpoint sources added in the interim, such as, but not limited to, new impervious area or septic systems, must be accounted for in the analysis.

The draft permit proposes a monitoring frequency of twice per week. The proposed draft permit also contains a loading limit of 14.7 lbs/day for total nitrogen.

The compliance schedule for achieving the total nitrogen limit incorporates reporting requirements relative to progress made in achieving the necessary net stormwater and nonpoint source reductions. Following issuance of the final permit, EPA will review the status of the stormwater and nonpoint source controls at 12 month intervals from the date of issuance.

In summary, the decision over how to frame the permit and its effluent limitations to achieve a protective in-stream nitrogen threshold is a difficult one given the overall environmental context. A variety of sources contribute to the nitrogen load in Aucoot Cove, including Outfall 001 of the publicly owned treatment work, the lagoons of the POTW, stormwater regulated as a point source, and nonpoint sources such as septic systems and unpermitted storm water. Nonpoint sources of nitrogen, particularly the lagoons, are the dominant contributors to Aucoot Cove's nitrogen pollution problem but, at this time, are neither subject to any effective treatment or control nor accounted for through a Total Maximum Daily Load. Given this, and in the absence of any TMDL, existing or planned, or other meaningful nonpoint source controls, EPA deems it necessary to maximize point source reductions as a pragmatic matter, while at the same time to provide a framework to address other sources of nitrogen in the watershed.

EPA recognizes the challenges associated with controlling nitrogen through nonpoint source controls. However, these challenges do not obviate the need to carry out substantial nonpoint controls in concert with strong controls on point sources. The upcoming reissuance of the Massachusetts Small MS4 (municipal separate storm sewer) General Permit will require stronger control of municipal stormwater sources, especially when stormwater is contributing to nutrient impairments. The draft permit recognizes that there may be an appropriate pause point in the future when stormwater and nonpoint sources of nitrogen are adequately accounted for and remedied and field data indicates that all of the Aucoot Cove ecosystem has recovered to a healthy state free of cultural eutrophication.

EPA also weighed the possibility that immediate default to a more stringent effluent limitation would not give sufficient opportunity, nor incentive, for Marion to pursue necessary nonpoint source controls. Accordingly, EPA determined that, as an initial matter, a limit of 3.0 mg/l TN is adequate to comply with Section 301 of the CWA if imposed in conjunction with other efforts to address the nonpoint source component of the nitrogen pollution problem afflicting the receiving waters.[13] In an effort to effect this more comprehensive environmental objective, which is in keeping with the overall objectives of the Clean Water Act "to restore and maintain the chemical, physical, and biological integrity of the Nation's waters" by a date long since passed, EPA is setting permit limits to require "a gross reduction in pollutant discharges" because "this ambitious statute is not hospitable to the concept that the appropriate response to a difficult pollution problem is not to try at all." NRDC v. Costle, 568 F.2d 1369, 1380 (D.C. Cir. 1977).

D) Total Phosphorus

State water quality standards require any point source discharge containing nutrients in concentrations that encourage eutrophication or growth of weeds or algae be provided with the highest and best practicable treatment to remove such nutrients. Phosphorus and other nutrients promote the growth of nuisance algae and aquatic plants. When these plants and algae undergo their decay processes, they generate strong odors, result in lower dissolved oxygen levels in the river, and impair the benthic habitat.

The MA SWQS (314 CMR 4.00) do not contain numerical criteria for total phosphorus. The narrative criteria for nutrients is found at 314 CMR 4.05(5)(c), which states that nutrients "shall not exceed the site specific limits necessary to control accelerated or cultural eutrophication." The Standards also require that "any existing point source discharge containing nutrients in concentrations that would cause or contribute to cultural eutrophication, including the excessive growth of aquatic plants or algae in any surface water, shall be provided with the most appropriate treatment as determined by the department, including, where necessary, highest and best practicable treatment" (314 CMR 4.05).

EPA has published national guidance documents that contain recommended total phosphorus criteria and other indicators of eutrophication. EPA's Quality Criteria for Water 1986 (the Gold Book) recommends, to control eutrophication, that in-stream phosphorus concentrations should

[13] This choice was consistent with EPA policy to address the complex nutrient pollution problems confronting the Nation's waterways. See Memorandum from Nancy K. Stoner, "Working in Partnership with States to Address Phosphorus and Nitrogen Pollution through Use of a Framework for State Nutrient Reductions," March 16, 2011 ("While EPA has a number of regulatory tools at its disposal, our resources can best be employed by catalyzing and supporting action by states that want to protect their waters from nitrogen and phosphorus pollution.").

be less than 100 µg/l (0.100 mg/L) in streams or other flowing waters not discharging directly to lakes or impoundments and less than 50 µg/l in flowing waters discharging to lakes or impoundments.

More recently, EPA released Ecoregional Nutrient Criteria, established as part of an effort to reduce problems associated with excess nutrients in water bodies in specific areas of the country. The ecoregion-specific criteria represent conditions in waters minimally impacted by human activities, and thus representative of water without cultural eutrophication. The Marion WPCF is within Ecoregion XIV, Eastern Coastal Plain, Northeastern Coastal Zone. Recommended criteria for this Ecoregion[14] includes a total phosphorus criteria of 23.75 µg/l (0.024 mg/L).

EPA has typically applied the Gold Book criterion because it was developed from an effects-based approach versus the reference conditions-based approach used to develop the ecoregion criteria. The effects-based approach is taken because it is more directly associated with an impairment to a designated use (e.g. fishing). The effects-based approach provides a threshold value above which water quality impairments are likely to occur. It applies empirical observations of a causal variable (i.e. phosphorus) and a response variable (i.e. algal growth) associated with designated use impairments. Referenced-base values are statistically derived from a comparison within a population of rivers in the same ecoregional class. They are a quantitative set of river characteristics (physical, chemical, and biological) that represent minimally impacted conditions.

The effects-based Gold Book threshold is a general target applicable in free-flowing streams. As the Gold Book notes, natural conditions of a water body can lead to an either increased or reduced eutrophication response to phosphorus inputs; in some waters more stringent phosphorus reductions may be needed, while in some others a higher total phosphorus threshold could be assimilated without inducing a eutrophic response. In this case EPA believes that a phosphorus target higher than 100 µg/L is justified due to the relatively short distance of the freshwater portion of the receiving water, the sandy substrate that predominates in the freshwater reach, and the near 100 percent canopy cover that blocks sunlight from reaching the stream. In site visits conducted on August 27, 2014 and September 10, 2014, EPA visually surveyed the receiving stream downstream of the discharge and noted the presence of only minor amounts of aquatic plant and algae growth, possibly due to a heavily shaded stream corridor.

<u>Reasonable Potential Analysis for Phosphorus</u>
The existing permit requires Marion to monitor effluent phosphorus but does not include a limit. From September 2010 through August 2014, the average phosphorus concentration was 1.60 mg/L, with a range of 0.54 mg/L to 3.79 mg/L. Because no dilution of the discharge occurs in the unnamed brook, the concentration of phosphorus in the brook equals that of the effluent during low flow conditions. While EPA concludes that instream concentrations of total phosphorus ranging from 0.54 mg/L to 3.79 mg/L clearly represent a reasonable potential to cause or contribute to an exceedance of the narrative nutrient criteria, we do not believe, for the reasons cited above, that an instream target of 100 µg/L is necessary in this particular stream. Consequently, EPA is establishing a technology based total phosphorus limit of 0.2 mg/L (200 µg/L) based on the Highest and Best Practical Treatment requirement of the Massachusetts Surface Water Quality Standards. Highest and Best Practical Treatment has been consistently defined by EPA and MassDEP in municipal permits as 0.2 mg/L. EPA believes that this limit will ensure attainment of the narrative nutrient criteria applicable to this particular receiving stream. However, if water quality monitoring indicates that excessive plant and algae growth is occurring

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[14] Ambient Water Quality Criteria Recommendations, Information Supporting the Development of State and Tribal Nutrient Criteria, Rivers and Streams in Ecoregion XIV, published in December, 2001

downstream of the discharge, the permit may be modified in order to incorporate a more stringent total phosphorus limit.

The draft permit contains a monthly average limit of 200 μg/L for the growing season months of April through October and a monthly average limit of 1 mg/L from November through March. The monitoring frequency is twice per week from April through October, and once per month from November through March.

In the event of increased effluent flow, the concentration limit may not protect water quality in Aucoot Cove. Hence, the proposed draft permit also contains phosphorus loading limits of 0.98 lbs/day for total phosphorus in April through October and 4.9 lbs/day from November through March.

Loading (lbs/day) = Design flow (MGD) x Limit (mg/L) x 8.34 (conversion factor)

Monthly Average Load: May - October (lbs/day)
= 0.588 MGD x 0.2 mg/L x 8.34 = **0.98 lbs/day**

Monthly Average Load: November - March (lbs/day)
= 0.588 MGD x 1.0 mg/L x 8.34 = **4.9 lbs/day**

Because it is likely to take time for the permittee to meet a total phosphorus limit of 200 μg/L, EPA has included a 24-month compliance schedule, with a progress report due after 12 months. Given that the existing treatment facility is capable of meeting a total phosphorus limit of 200 μg/L with the addition of chemical precipitation capabilities, 24 months allows sufficient time for evaluating/piloting chemical addition and construction of chemical storage and dosing facilities. During this period, the interim year round limit will be 1 mg/L.

E) <u>Metals</u>

Certain metals in water can be toxic to aquatic life. It is necessary to limit effluent toxic metal concentrations where the discharge has the reasonable potential to cause or contribute to water quality standards violations, including aquatic life impairment. An evaluation of the facility's effluent metals concentration from September 2011 to September 2013 (n=8) was used to determine reasonable potential for toxicity caused by aluminum, cadmium, chromium, copper, lead, nickel and zinc.

Metals may be present in both dissolved and particulate forms in the water column. However, extensive studies suggest that it is the dissolved fraction that is biologically available, and therefore, presents the greatest risk of toxicity to aquatic life inhabiting the water column. Water Quality Standards Handbook: Second Edition, Chapter 3.6 and Appendix J (EPA 823-B-94-005a) (EPA 1994). Also see
http://water.epa.gov/scitech/swguidance/standards/handbook/chapter03.cfm#section6.
As a result, water quality criteria are established in terms of dissolved metals.

However, regulations at 40 CFR § 122.45(c) require, with limited exceptions, that metals limits in NPDES permits be expressed as total recoverable metals. This accounts for the potential for a transition from the particulate to dissolved form as the effluent mixes with the receiving water (*The Metals Translator: Guidance for Calculating a Total Recoverable Permit Limit from a Dissolved Criterion)* (EPA-823-B96-007) (EPA 1996).

For metals with hardness-based water quality criteria, the criteria were determined using the equations in the MA SWQS (314 CMR 4.00), using the appropriate factors for the individual metals found in the MA SWQS (see table below). Because the unnamed brook has no natural streamflow at the discharge location during 7Q10 conditions, the discharge concentration equals the downstream concentration. Hence, EPA used the median hardness of the effluent to calculate hardness-dependent metals criteria[15]. Table 2, below, presents the factors used to determine the acute and chronic total recoverable criteria for each metal.

Q_d = facility's design flow (0.588 mgd = 0.910 cfs)
C_d = maximum effluent concentration
Q_s = natural 7Q10 flow (0 cfs)
C_s = median upstream concentration
Q_r = downstream 7Q10 flow (0.910 cfs)
C_r = resultant downstream concentration

Because the 7Q10 at the discharge location equals zero, the unnamed brook provides no dilution. Reasonable potential occurs when the discharge concentration exceeds the applicable criteria. To assure compliance with water quality criteria, and to prevent instream toxicity to aquatic life in this situation, EPA must impose a limit equal to criteria at the end of the pipe.

Table 2. Hardness Dependent Metals Criteria (hardness = 98.5)

Metal	**Parameters**				**Total Recoverable Criteria**	
	ma	**Ba**	**mc**	**bc**	**Acute Criteria (CMC) (µg/L)**	**Chronic Criteria (CCC) (µg/L)**
Aluminum	—	—	—	—	750	87
Cadmium	1.0166	-3.9240	0.7409	-4.7190	2.57	0.309763
Copper	N/A	N/A	N/A	N/A	5.78	3.73
Lead	1.273	-1.46	1.273	-4.705	102.97	4.01
Nickel	0.846	2.255	0.846	0.0584	547.42	60.86

Acute Criteria (CMC) = exp{ma*ln(hardness)+ba}
Chronic Criteria (CCC) = exp{mc*ln(hardness)+bc}
Marine copper criteria are 4.8 µg/L and 3.1 µg/L, expressed as the dissolved fraction. They were converted to total recoverable using the conversion factor 0.83 (dissolved = total recoverable x 0.83).

As indicated in Table 3, based on the 95th percentile projected effluent concentrations, no reasonable potential exists (for either acute or chronic conditions) that the discharge of cadmium, nickel, lead or zinc will cause or contribute to an exceedance of the applicable water quality criteria. However, the discharge does have reasonable potential to cause or contribute to an excursion from the marine chronic and/or acute water quality criteria for copper.

[15] The median is used for hardness calculations and upstream pollutants because it is less sensitive to extreme values that may be caused by measurement error. Also, the median is considered a better statistic for small sample sizes.

Although discharges of aluminum from the Marion WPCF have no reasonable potential to cause an excursion from water quality standards, this situation may change if Marion opts to use aluminum-based chemicals for phosphorus removal. Because the unnamed brook provides no dilution to the Marion discharge, the facility must ensure that its aluminum discharges stay below the chronic aquatic life water quality criterion of 87 µg/L to avoid an aluminum effluent limit in future permits. EPA will be monitoring aluminum data from WET test reports to ensure that aluminum levels do not cause or contribute to an excursion from water quality standards in the unnamed brook.

Table 3. Metals Reasonable Potential Analysis.

Metal	Cd (Max observed)	Cr = Cd	Criteria (expressed as total recoverable)		Reasonable Potential	Limit = Criteria (if needed) (total recoverable)	
	µg/L	µg/L	Acute (µg/L)	Chronic (µg/L)	Cr > Criteria	Acute (µg/L)	Chronic (µg/L)
Aluminum	21	21	750	87	N	N/A	N/A
Cadmium	<4	<4	2.10	0.268	N	N/A	N/A
Copper	63	63	5.78	3.73	Y	5.78	3.73
Lead	<1	<1	80.09	3.12	N	N/A	N/A
Nickel	1	1.0	463.21	51.50	N	N/A	N/A
Zinc	54	54	95.14	85.62	N	N/A	N/A

*In shaded cells, marine water quality criteria were used because they were more stringent than the freshwater criteria.

Copper

Copper is toxic to aquatic life at low concentrations. The current permit includes a monthly average limit of 7.7 µg/L and a maximum daily limit of 13.1 µg/L. These limits were calculated using a hardness value of 80 mg/L for the receiving water and a dilution factor of 1. After the Marion WPCF failed to meet the limits, EPA issued an Administrative Order with an interim maximum daily limit of 20 µg/L on October 22, 2007. An examination of the DMR and WET test data from September 2010 through August 2014 indicates that the monthly average effluent copper ranged from non-detect to 63 µg/L, and the maximum daily copper ranged from 0 µg/L to 71 µg/L. There have been 13 violations of the 20 µg/L interim limit between September 2010 and August 2014.

In the National Recommended Water Quality Criteria: 2002, EPA updated its national recommended water quality criteria for toxic metals such as copper. 314 CMR 4.05(5)(e) Toxic Pollutants of the State water quality standards specifies, "[t]he Department shall use the water quality criteria for the protection of aquatic life expressed in terms of the dissolved fraction of metals." EPA has used conversion factors provided by the National Recommended Water Quality Criteria: 2002 to translate criteria expressed as total dissolved to total recoverable for reasonable potential analysis and effluent limit derivation.

In December 2006, the MA SWQS were revised to include site-specific copper criteria that were developed for certain water bodies in the State where national criteria are overly protective due to site-specific physical, chemical, or biological considerations, and do not exceed the safe exposure levels determined by toxicity testing [314 CMR 4.05(5)(e) Table 28]. MassDEP adopted an acute dissolved copper criterion of 25.7 µg/L and a chronic dissolved criterion of 18.1 µg/L for the unnamed brook that drains to Aucoot Cove. The total recoverable acute copper criterion is 26.8 µg/L and the total recoverable chronic copper criteria is 18.9 µg/L. EPA approved these criteria on March 26, 2007. However, the marine chronic copper criterion is 3.1 µg/L, and the marine acute copper criterion is 4.8 µg/L, both expressed as dissolved copper. These criteria are not hardness dependent. These criteria apply in Aucoot Cove.

Because the unnamed brook provides no dilution, a limit equal to the freshwater copper criteria at the end of the pipe would assure compliance with water quality standards for the unnamed brook. Therefore, the limits to protect the freshwater brook would be a maximum daily limit of 26.8 µg/L and a monthly average limit of 18.9 µg/L.

However, marine water quality criteria must be met where the unnamed brook flows into Aucoot Cove. To determine if the limits above are protective of Aucoot Cove, EPA must first determine the copper concentration at the mouth of the unnamed brook, where marine criteria apply. According to USGS Streamstats, the natural (i.e. absent WWTF effluent) 7Q10 of the unnamed brook is 0.0213 cfs.

Table 4. Marion WPCF WET Test Background Copper

Date	**Copper conc., µg/L**
9/1/11	64
12/5/11	42
3/5/12	20
7/1012	15
9/19/12	12
12/10/12	14
6/1013	6
9/9/13	5
median	14.5

Because, as shown in Table 4 above, the copper concentration of the unnamed brook (14.5 µg/L) exceeds the acute and chronic copper marine criteria, it does not provide dilution to the effluent. EPA has imposed a limit equal to the criteria to protect the shellfishing uses and SA designation of Aucoot Cove. Therefore, the draft permit proposes a monthly average limit of 3.73 µg/L and a maximum daily limit of 5.78 µg/L (expressed as total recoverable). The monitoring frequency will be once per week.

The proposed draft permit also contains loading limit of 0.045 lbs/day for copper.

Loading (lbs/day) = Design flow (MGD) x Limit (mg/L) x 8.34 (conversion factor)
Monthly Average Load (lbs/day) = 0.588 MGD x 0.00373 mg/L x 8.34
Monthly Average Load (lbs/day) = 0.018 lbs/day

F) Whole Effluent Toxicity

National studies conducted by the EPA have demonstrated that domestic sources contribute toxic constituents to POTWs. These constituents include metals, chlorinated solvents, aromatic hydrocarbons and others.

Therefore, based on the potential for toxicity from domestic contributions, water quality standards and in accordance with EPA regional policy, the draft permit includes acute and chronic effluent toxicity limitations and monitoring requirements (LC50). (See, e.g., "Policy for the Development of Water Quality-Based Permit Limitations for Toxic Pollutants": 50 Fed. Reg. 30, 784 (July 24, 1985).

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

The toxicity limits in the current permit were established using the Massachusetts Toxics Policy. The Policy requires that for discharges with dilution factors of 10 and under, the C-NOEC must equal or exceed the receiving water concentration (RWC) of the effluent, which is the inverse of the dilution factor.

From September 2010 through August 2014, there were three violations of the daphnid chronic limit, the most recent being in June 2012. There was also one violation each of the daphnid acute limit and the minnow chronic limit. There were no violations of the minnow acute limit during this time period.

C-NOEC ≥ RWC = 1/dilution factor
= 1/1
= 1 (100%)

The draft permit carries forward the requirements for quarterly chronic and acute toxicity tests using the species *Pimiphales promelas* and *Ceriodaphnia dubia*. The acute toxicity endpoint, expressed as LC50, must equal or exceed 100% effluent. The chronic toxicity endpoint, expressed as C-NOEC (no effect concentration), must also equal or exceed 100% effluent. The tests must be performed in accordance with the test procedures and protocols specified in **Permit Attachment A**. The tests will be conducted four times a year, during the following months: March, June, September and December.

The requirements for WET testing recently changed such that the modified acute toxicity test in the current permit, which is conducted as part of the chronic toxicity test, is no longer used for compliance. Thus, the modified acute testing requirement is being replaced by a standalone acute toxicity test. The acute toxicity testing protocol is **Permit Attachment B**.

VI. Operations and Maintenance

EPA regulations set forth a standard condition for "Proper Operation and Maintenance" that is included in all NPDES permits. *See* 40 CFR § 122.41(e). This condition is specified in Part II.B.1 (Standard Conditions) of the draft permit and it requires the proper operation and maintenance of all wastewater treatment systems and related facilities installed or used to achieve permit conditions.

EPA regulations also specify a standard condition to be included in all NPDES permits that specifically imposes on permittees a "duty to mitigate." *See* 40 CFR § 122.41(d). This condition is specified in Part II.B.3 of the draft permit and it requires permittees to take all reasonable steps – which in some cases may include operations and maintenance work - to minimize or prevent any discharge in violation of the permit which has the reasonable likelihood of adversely affecting human health or the environment.

Proper operation of collection systems is critical to prevent blockages and equipment failures that would cause overflows of the collection system (sanitary sewer overflows, or SSOs), and to limit the amount of non-wastewater flow entering the collection system (inflow and infiltration or I/I). I/I in a collection system can pose a significant environmental problem because it may displace wastewater flow and thereby cause, or contribute to causing, SSOs. Moreover, I/I could reduce the capacity and efficiency of the treatment plant and cause bypasses of secondary treatment. Therefore, reducing I/I will help to minimize any SSOs and maximize the flow receiving proper treatment at the treatment plant. The permittee reports that approximately 220,400 gallons per day of (I/I) enters the sewer system. MassDEP has stated that the inclusion in NPDES permits of I/I control conditions is a standard State Certification requirement under Section 401 of the CWA and 40 CFR § 124.55(b).

Therefore, specific permit conditions have been included in Part I.B., and I.C. and I.D. of the draft permit. These requirements include mapping of the wastewater collection system, preparing and implementing a collection system operation and maintenance plan, reporting unauthorized discharges including SSOs, maintaining an adequate maintenance staff, performing preventative maintenance, controlling infiltration and inflow to the extent necessary to prevent SSOs and I/I related-effluent violations at the wastewater treatment plant, and maintaining alternate power where necessary. These requirements are intended to minimize the occurrence of permit violations that have a reasonable likelihood of adversely affecting human health or the environment, such as SSOs.

Several of the requirements in the draft permit are not included in the existing permit, including collection system mapping, and preparation of a collection system operation and maintenance plan. EPA has determined that these additional requirements, such as collection system mapping and preparing an Operations and Maintenance Plan, are necessary to ensure the proper operation and maintenance of the collection system to prevent SSO and treatment upsets. The draft permit includes schedules for completing these requirements.

VII. Sludge

The permit prohibits any discharge of sludge to waters of the U.S. Section 405(d) of the Clean Water Act requires that sludge conditions be included in all NPDES permits.

Currently, the Marion WPCF deposits sludge from its treatment processes in the sewage lagoons. EPA has determined that the lagoons are, in effect, sludge disposal sites under 40 CFR Part 503 regulations. The Marion WPCF has deposited sludge in its unlined sewage lagoons for over 30 years without any apparent plan for removal and disposal. According to 40 CFR Part 503 Subpart C, EPA considers land that contains sewage sludge for more than two years to be a disposal site.

Because the sludge storage practices constitute disposal, the draft permit contains standard sludge requirements in Section D. A description of further permit conditions related to sludge disposal and the lagoons can be found in the "Contribution of Lagoons" section of V.4.(C) of this fact sheet and Parts I.D. and I.E. of the draft permit.

VIII. Pretreatment

The permittee does not have any major industries contributing industrial wastewater to the WWTF, and thus is not required to have a pretreatment program. Pollutants introduced into POTWs by a non-domestic source shall not pass through the POTW or interfere with the operation or performance of the treatment works.

IX. Antidegradation

This draft permit is being reissued with an allowable wasteload identical to the current permit and no change in outfall location. The State of Massachusetts has indicated that there will be no lowering of water quality and no loss of existing water uses and that no additional anti-degradation review is warranted.

X. Essential Fish Habitat (EFH)

Under the 1996 Amendments (PL 104-267) to the Magnuson-Stevens Fishery Conservation and Management Act (16 U.S.C. § 1801 et seq.(1998)), EPA is required to consult with National Marine Fisheries Service (NMFS) if EPA's action or proposed actions that it funds, permits, or undertakes, may adversely impact any essential fish habitat.16 U.S.C. § 1855(b). The Amendments 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. 50CFR.§ 600.910(a). Adverse effects may include direct (e.g., contamination or physical disruption), indirect (e.g., loss of prey, reduction in species' fecundity), site-specific or habitat-wide impacts, including individual, cumulative, or synergistic consequences of actions.

Essential fish habitat is only designated for fish species for which federal Fisheries Management Plans exist. 16 U.S.C. § 1855(b)(1)(A). EFH designations for New England were approved by the U.S. Department of Commerce on March 3, 1999.

EPA has determined that direct and indirect impacts associated with the proposed draft permit to the EFH species, their habitat and forage, have been minimized to the extent that no significant adverse impacts are expected. Further mitigation is not warranted. An EFH analysis containing information that supports EPA's determination is included in Appendix D of this fact sheet. NMFS Habitat Division will be notified if adverse impacts to EFH are detected as a result of this permit action or if new information becomes available that changes the basis for these conclusions.

XI. Endangered Species

The Endangered Species Act of 1973, as amended (ESA), imposes requirements on Federal agencies related to the potential effects of their actions on endangered or threatened species of fish, wildlife, or plants (listed species) and their designated "critical habitat."

Section 7 of the ESA requires, in general, that Federal agencies insure that any actions they authorize, fund, or carry out, in the United States or upon the high seas, are not likely to jeopardize the continued existence of any listed species or result in the destruction or adverse modification of designated "critical habitat" for those species. Federal agencies carry out their responsibilities under the ESA in consultation with, and assisted by, the Departments of Interior (DOI) and/or Commerce (DOC), depending on the species involved. The United States Fish & Wildlife Service (USFWS) of the DOI administers Section 7 consultations for freshwater species, while the National Oceanic and Atmospheric Administration (NOAA) of DOC does so for marine species and anadromous fish.

The federal action being considered in this case is EPA's proposed draft NPDES permit to the Marion Water Pollution Control Facility. The draft permit is intended to replace the existing NPDES permit in regulating wastewater discharges from the Town's WPCF, as discussed above. The single outfall discharges into an unnamed brook (locally known as Effluent Brook) that travels about a mile before entering Aucoot Cove (Buzzards Bay – 95; HUC12: 010900020305). The brook and the inner Aucoot cove are considered the action area of this draft permit.

Coastal areas of Massachusetts provide habitat for a number of federally protected marine species, including: mammals (whales: North Atlantic Right, Humpback, Fin, Sei, Sperm, Blue – all endangered); reptiles (sea turtles: Kemp's Ridley, Leatherback, Green – all endangered; Loggerhead – Threatened but proposed for listing as endangered). In addition, the protected anadromous fish species shortnose sturgeon and Atlantic sturgeon are expected to be in Massachusetts coastal waters.

However, EPA does not consider the area influenced by facility discharge (the action area) to be suitable habitat for the species listed above. Based on the normal distribution of these species, it is extremely unlikely that there would be any NMFS listed species in the vicinity of the unnamed brook and the inner Aucoot Cove of Buzzards Bay. EPA has determined that no protected species are present in any area influenced by the discharge. Therefore, no section 7 consultation is required.

XII. Monitoring and Reporting

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

The Draft Permit requires the permittee to continue to electronically report monitoring results obtained during each calendar month as Discharge Monitoring Report (DMRs) to EPA and the state using NetDMR no later than the 15th day of the month following the completed reporting period.

NetDMR is a national web-based tool for regulated CWA permittees to submit DMRs electronically via a secure internet application to U.S. EPA through the Environmental Information Exchange Network. NetDMR allows participants to discontinue mailing in hard copy forms under 40 CFR § 122.41 and § 403.12. NetDMR is accessed from the following url: http://www.epa.gov/netdmr. Further information about NetDMR can be found on the EPA Region 1 NetDMR website located at http://www.epa.gov/region1/npdes/netdmr/index.html.

In most cases, reports required under the permit shall be submitted to EPA as an electronic attachment through NetDMR. Certain exceptions are provided in the permit such as for providing written notifications required under the Part II Standard Permit Conditions. With the use of NetDMR to report DMRs and reports, the permittee is no longer be required to submit hard copies of DMRs or other reports to EPA and is no longer required to submit hard copies of DMRs to MassDEP. However, permittees must continue to send hard copies of reports other than DMRs to MassDEP until further notice from MassDEP. State reporting requirements are further explained in the draft permit.

XIII. State Certification Requirements

EPA may not issue a permit unless the Massachusetts Department of Environmental Protection with jurisdiction over the receiving waters certifies that the effluent limitations contained in the permit are stringent enough to assure that the discharge will not cause the receiving water to violate State Water Quality Standards. The staff of the Massachusetts Department of Environmental Protection has reviewed the draft permit. EPA has requested permit certification by the state pursuant to 40 CFR § 124.53 and expects that the draft permit will be certified.

XIV. Public Comment Period, Public Hearing, and Procedures For Final Decision

All persons, including applicants, who believe any condition of the draft permit is inappropriate must raise all issues and submit all available arguments and a supporting material for their arguments in full by the close of the public comment period, to Robin Johnson, U.S. EPA, Office of Ecosystem Protection, 5 Post Office Square, Suite 100, Boston, Massachusetts 02109-3912. Any person, prior to such date, may submit a request in writing to EPA and MassDEP for a public hearing to consider the draft permit. Such requests shall state the nature of the issues proposed to be raised in the hearing. A public hearing may be held after at least thirty days public notice whenever the Regional Administrator finds that response to this notice indicates significant public interest. In reaching a final decision on the draft permit, the Regional Administrator will respond to all significant comments and make these responses available to the public at EPA's Boston Office. Following the close of the comment period, and after a public hearing, if such hearing is held, the Regional Administrator will issue a final permit decision and forward a copy of the final decision to the applicant and each person who has submitted written comments or requested notice.

XV. EPA Contact

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

Robin Johnson
Municipal Permits Branch
U.S. Environmental Protection Agency
5 Post Office Square, Suite 100 (OEP 6-1)
Boston, MA 02109-3912
Telephone: (617) 918-1045
E-Mail: johnson.robin@epa.gov

Claire Golden
MassDEP Surface Water Permitting Program
205B Lowell St
Wilmington, MA 01887
978-694-3244
Email: claire.golden@state.ma.us

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Date

Ken Moraff, Director
Office of Ecosystem Protection
U.S. Environmental Protection Agency
Boston, MA