

Clean Water Act Section 403(c) Ocean Discharge Criteria Evaluation

Seabrook WWTF

March 2024

I. Introduction

EPA has determined that the Seabrook Wastewater Treatment Facility outfall is seaward of the territorial sea baseline and, therefore, is subject to Section 403 of the Clean Water Act (CWA).

The Ocean Discharge Criteria regulations found at 40 CFR Part 125 – Subpart M establish ocean discharge guidelines from which a permit writer must make a judgment that a discharge will, or will not, cause “unreasonable degradation” of the marine environment.

A determination of whether “unreasonable degradation” will occur is based on consideration of the 10 guidelines found in 40 CFR §125.122. “Unreasonable degradation” of the marine environment is defined in the Ocean Discharge Criteria as any of the following:

1. Significant adverse changes in ecosystem diversity, productivity, and stability of the biological community within the area of discharge and surrounding biological communities;
2. Threat to human health through direct exposure to pollutants or through consumption of exposed aquatic organisms; or
3. Loss of aesthetic, recreational, scientific or economic values which is unreasonable in relation to the benefit derived from the discharge.

If a determination can be made that no “unreasonable degradation” will result, a permit is issued including appropriate conditions to ensure that unreasonable degradation does not take place. These conditions may include a requirement for an ongoing monitoring program. If EPA determines that a discharge will cause unreasonable degradation despite the application of all possible permit conditions, it may not issue a permit authorizing the discharge of pollutants.

If, because of insufficient information, a determination cannot be made prior to the issuance of a permit that no unreasonable degradation will result, then additional conditions must be satisfied.

II. Criteria Evaluation

The determination of no “unreasonable degradation” is to be made based on a consideration of the 10 guidelines found in 40 CFR § 125.122. The 10 guidelines are discussed below:

1. Quantities, composition, and potential for bioaccumulation or persistence of the pollutants to be discharged.

The Seabrook WWTF has an average monthly design flow of 1.8 million gallons per day (MGD). A summary of effluent parameters taken from monthly discharge monitoring reports (DMRs) is shown in Table 1. The following is an assessment of the effluent:

- a. Type: The effluent is composed mainly of domestic sewage from the Town of Seabrook. The Town also receives wastewater from three industrial users within the collection system. The Town of Seabrook is presently not required to administer a pretreatment program under 40 CFR § 122.44(j), 40 CFR § 403, and Section 307 of the Clean Water Act. However, the permit contains conditions that ensure that pollutants from industrial users will not pass through the facility and cause water quality standard violations or cause interference with the operation of the treatment facility.
- b. Sources: The facility receives domestic wastewater from a population of approximately 10,000 people in the Town of Seabrook. The facility also receives wastewater from three industrial users within the collection system.
- c. Amounts: The plant has an average monthly design flow of 1.8 MGD. For the period January 1, 2019 through December 31, 2023, the median monthly flow from the plant has been 0.6805 MGD. For the same timeframe the highest daily flow was 1.25 MGD.
- d. For the period from January 1, 2019 through December 31, 2023, the flows from the plant have been relatively consistent. The rolling annual average flow ranged from 0.57 to 0.786 MGD.
- e. Physical, Chemical, and Toxicological Properties: The plant provides secondary treatment for the wastewater generated within the Town. The permit contains effluent limitations and/or monitoring requirements for effluent flow, biochemical oxygen demand, total suspended solids, pH, total residual chlorine, Enterococci bacteria, fecal coliform bacteria, and whole effluent toxicity.

Summary:

The Seabrook WWTF treats wastewater generated by the Town of Seabrook to secondary standards. Secondary treatment effluent should not contain significant amounts of pollutants that bioaccumulate or that are toxic. The permit has and will continue to prohibit the discharge of pollutants in toxic amounts. The facility has been, and will continue to be, required to conduct whole effluent toxicity (WET) testing and to submit those results to EPA. The facility has been able to comply with the toxicity requirements in the past and is expected to be able to continue to operate in compliance in the future.

Table 1
Effluent Characteristics for the Period January 1, 2019,
Through December 31, 2023

Effluent Parameter	Monthly Average	Range of Monthly Averages	Maximum of Daily Maximums
Flow (MGD)	0.708	0.513 – 0.836	1.25
pH (Standard Units) ¹	N/A	6.43 – 7.7	N/A
Fecal Coliform Bacteria (colonies/100 ml)	1.0	0 – 4.3	4.3
Enterococci	2.25	0.7 – 29.3	2,420
Total Residual Chlorine (mg/l)	0.035	0-0.111	0.93
BOD ₅ (mg/L)	8.3	1.3 – 19.9	30.1
BOD ₅ (lb/d)	49.5	6.7 – 116.8	243.3
BOD ₅ (% removal)	98	94 – 99	---
TSS (mg/L)	7.15	2.8 – 18.8	56.7
TSS (lb/d)	57.3	19 – 325.1	458.3
TSS (% removal)	98	95 – 99	---
LC50 (% effluent) ³ <i>Menidia beryllina</i>	100	100 – 100	100, 100, 100
LC50 (% effluent) ³ <i>Mysidopsis bahia</i>	100	100 – 100	100, 100, 100

1. Numbers listed are the minimum and maximum daily values

2. Daily values

2. Potential transport of pollutants by biological, physical, or chemical process.

The Seabrook WWTF outfall is located in coastal waters adjacent to Seabrook Beach, just north of the New Hampshire/Massachusetts state line, in the Gulf of Maine, Atlantic Ocean. The outfall is approximately 2,100 feet offshore and located close to the sea floor where depths are approximately 30 feet Mean Sea Level (MSL)¹. The Seabrook outfall is in a body of water generally opened to the ocean on north, south and east directions.

In general, the flow of currents off Seabrook Beach exhibit seasonal patterns. Approximately 28% of the time the current flow is to the north. This occurs primarily in summer and fall. Approximately 28% of the time the current flow is toward the south. This occurs primarily in spring and winter. Over 40% of the time, the flow direction is determined by tidal flows. Near surface current speeds range from 21.1 to 41.2 cm/sec, while mid-depth current speeds range from 10.8 to 30.9 cm/sec (EPA, 1999).

The 2010 NPDES individual permit was based upon a dilution factor of 72 which was determined by the Town of Seabrook's consultant in 1999 using the Cornell Mixing Zone Expert System (CORMIX). In 2001, the Town modified the existing diffuser on the effluent pipe by installing pinch valves on each of the twenty diffuser ports. CORMIX

¹ Earth Tech, 1999, "Final Report, Hydrodynamic Mixing Study, Seabrook Wastewater Treatment Plant, Town of Seabrook, NH"

modeling was performed by the New Hampshire Department of Environmental Services (NHDES) determined that this change would not affect the dilution factor. In 2019, NHDES re-modeled the diffuser using the most current version of CORMIX, CORMIX Version 11, and returned a dilution factor of 36. The 2021 NPDES individual permit was developed using a dilution factor of 36 which resulted in more stringent effluent limits for some pollutants. The 2023 Draft General Permit maintains the same dilution factor of 36 and carries forward all the more stringent limits from the 2021 NPDES individual permit.

Summary:

The lack of non-conventional pollutants combined with the available dilution and subsequent dispersion makes the transport and fate of pollutants from this discharge of little concern. However, the transport and fate of bacteria from this discharge is of concern based on the proximity of public beaches and shellfish beds. This concern will be discussed later in this document.

3. Composition and vulnerability of potentially exposed biological communities, including: unique species or communities, endangered or threatened species, and species critical to the structure or function of the ecosystem.

A number of endangered or threatened species are known to inhabit New Hampshire coastal waters. These include Atlantic sturgeon, shortnose sturgeon, green sea turtle, Kemp's ridley sea turtle, leatherback sea turtle, loggerhead sea turtle, North Atlantic right whale, and fin whale. These species are generally pelagic, with the exception of the sturgeon. The discharge is required to meet state water quality standards and the lack of nonconventional (*i.e.*, toxic) pollutants in the discharge greatly reduces the potential risk to these species.

EPA has made the determination that the proposed action may affect, but is not likely to adversely affect, endangered or threatened species found in the action area along with the designated North Atlantic right whale and Atlantic sturgeon critical habitats that overlaps the action area. EPA must consult with NOAA Fisheries to document concurrence with this determination. See Section 5.2 of the Fact Sheet.

4. Importance of the receiving water to the surrounding biological community such as spawning sites, nursery/forage area, migratory pathways, and areas necessary for critical life stages/functions of an organism.

Under the 1996 Amendments (PL 104-267) to the Magnuson-Stevens Fishery Conservation and Management Act (*see* 16 U.S.C. § 1801 *et. Seq.*, 1998), EPA is required to consult with the National Marine Fisheries Service (NOAA Fisheries) 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" (EFH) as: "waters and substrate necessary to fish for spawning, breeding, feeding, or growth to maturity." 16 U.S.C. § 1802(10). "Adverse impact" means any impact that reduces the quality and/or quantity of EFH, 50 C.F.R. § 600.910(a). Adverse effects may include direct (*e.g.* contamination or

physical disruption), indirect (*e.g.* loss of prey, reduction in species' fecundity), or site specific or habitat-wide impacts, including individual, cumulative or synergistic consequences of actions.

EFH is only designated for fish species for which federal Fisheries Management Plan exist. *See* 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.

A review of the relevant essential fish habitat information provided by NOAA Fisheries indicates that the outfall exists within designated EFH for 27 federally managed species and one Habitat Area of Particular Concern (HAPC). The EFH species and life stages are listed in Table 2. A discussion of potential impacts to EFH species and the HAPC is found in Section 5.3 of the Fact Sheet.

It is expected that the receiving water will also be used by species within the biological community for which there are not EFH designations for spawning, foraging, migration, and other functions.

Due to the nature of the discharge and the dispersive capabilities of the area, the impacts from the discharge on the biota are anticipated to be limited to the area immediately around the discharge point.

Table 2
EFH Species and life stages in the vicinity of Seabrook WWTF
Outfall at Latitude 42° 52' 22" N, Longitude 71° 11' 27" W

Species/Management Unit	Lifestage(s) Found at Location
Atlantic Sea Scallop	ALL
Atlantic Wolffish	ALL
Haddock	Juvenile
Winter Flounder	Eggs, Juvenile, Larvae/Adult
Little Skate	Juvenile, Adult
Ocean Pout	Adult, Eggs, Juvenile
Atlantic Herring	Juvenile, Adult
Atlantic Cod	Larvae, Adult, Juvenile, Eggs
Pollock	Juvenile
Red Hake	Adult, Eggs/Larvae/Juvenile
Silver Hake	Eggs/Larvae, Adult
Yellowtail Flounder	Adult, Juvenile, Larvae
Monkfish	Adult, Eggs/Larvae, Juvenile
White Hake	Larvae, Adult, Eggs, Juvenile
Windowpane Flounder	Adult
Winter Skate	Juvenile
Witch Flounder	Adult
American Plaice	Adult, Juvenile

Species/Management Unit	Lifestage(s) Found at Location
Bluefin Tuna	Adult, Juvenile
Porbeagle Shark	ALL
Northern Shortfin Squid	Adult
Longfin Inshore Squid	Juvenile, Adult
Atlantic Mackerel	Juvenile, Adult
Bluefish	Adult, Juvenile
Atlantic Butterfish	Adult, Juvenile
Spiny Dogfish	Adult Male
Atlantic Surfclam	Juvenile, Adult
Habitat Area of Particular Concern Name	
Inshore 20m Juvenile Cod	

5. The existence of special aquatic sites, including marine sanctuaries/refuges, parks, monuments, national seashores, wilderness areas, and coral reefs.

No special aquatic sites exist near the area of the proposed discharge.

6. Potential direct or indirect impacts on human health.

The coastal beach monitoring program in New Hampshire began in 1989. At that time, the NHDES inspected five coastal beaches. In October 2000, Congress amended the Clean Water Act to include the Beaches Environmental Assessment and Coastal Health (BEACH) Act. Under the BEACH Act, EPA was authorized to award grants to eligible states to develop and implement monitoring and notification programs. These programs protect the public from exposure to pathogenic microorganisms in coastal recreation waters.

NHDES first received BEACH grant funds in 2002. Since then coastal beach monitoring throughout the state has increased from nine beaches in 2002 to sixteen in 2020. Coastal beaches are monitored for the presence of fecal bacteria, *Enterococci*, which are present in the intestines of warm-blooded animals including humans. Fecal bacteria, when present in high concentrations and ingested, can commonly cause gastrointestinal illnesses such as nausea, vomiting and diarrhea. These indicator organisms signify the possible presence of other potentially disease-causing organisms in the waterbody. The NHDES used an instantaneous level of 104 enterococci/100 ml as the standard.

The Seabrook WWTF outfall is located approximately 2,100 feet offshore from Seabrook Town Beach. This is the closest swimming area to the outfall. There has been 1 advisory closure of this beach due to high levels of *Enterococci* bacteria for the period 2003-2019 (NHDES, 2019).

7. Existing or potential recreational and commercial fishing.

The discharge is located approximately 2,100 feet off the Seabrook Town Beach in Gulf of Maine (Atlantic Ocean). A closure zone was defined in February 2004 based on the results of a dye study performed by the U.S. Federal Drug Administration with assistance from NHDES and Massachusetts Division of Marine Fisheries (Nash, 2020). The closure zone attributable to the Seabrook is shown in Figure 1 below. It should be noted that the closure zone is not a reflection of the effluent quality coming from the outfall. Rather, the closure zone is a requirement under FDA for areas that contain a sanitary outfall.

Figure 1

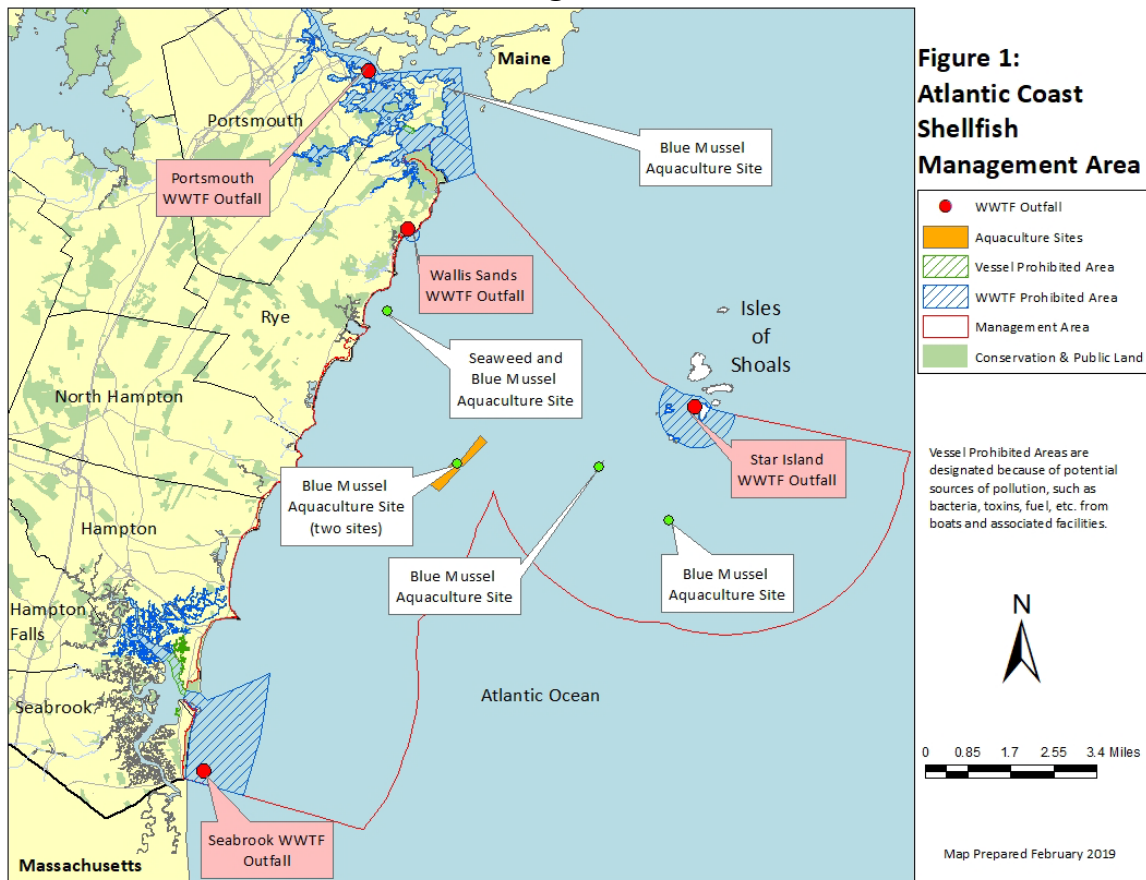


Figure 1: From 2016-2018 TRIENNIAL SHELLFISH MANAGEMENT AREA UPDATE FOR THE ATLANTIC COAST, GULF OF MAINE, NEW HAMPSHIRE (December 2019, authored by C. Nash and B. Dejadon of NHDES)

Paralytic Shellfish Poisoning (PSP) or Red Tide can extend over large stretches of the Maine, New Hampshire, and Massachusetts coasts, not just the Seabrook area. PSP is a serious illness caused by eating shellfish contaminated with harmful neurotoxins. These neurotoxins are produced by microscopic algae that can bloom in certain environmental conditions. NHDES conducts weekly sampling from April through October of blue mussel tissue at one nearshore site in the Hampton/Seabrook area and one offshore site at Isle of Shoals (Nash, 2020). Additional species and stations are added as needed. DES also collects weekly seawater samples and examines cell abundance of selected harmful algal bloom species at four locations, weekly from February through November. Additional stations and sampling runs are added as conditions dictate. “PSP is a recurrent

and widespread problem in the Gulf of Maine (GOM)...”² PSP outbreaks generally originate in waters further north off the coast of Maine and spread south, so it is not expected that Seabrook’s discharge causes or contributes to Red Tide outbreaks in the area.

Areas around the discharge can be utilized for recreational fishing for species such as lobster, flounder, striped bass, and mackerel. Additionally, commercial fishing for lobster takes place in this area as does gill netting. The New Hampshire Fish and Game has not received any reports concerning reduced catches or diseases associated with lobsters and finfish (Patterson, 2020).

The discharge is not expected to have any negative impact to any recreationally or commercially sought fish or lobsters. This is due to the fact that the plant does not discharge any nonconventional pollutants that tend to bioaccumulate and considerable dilution is provided by the ocean water. Additionally, the permit has, and continues to, require Whole Effluent Toxicity testing on *Mysid bahia* and *Menidia beryllina*. The permit limit is, and continues to be, 100% effluent. This means that a sample composed of 100% effluent shall cause not greater than 50% mortality to the identified species. As shown in Table 1 above, the Seabrook WWTF has consistently complied with the LC50 limit for both species.

8. Any requirements of an approved Coastal Zone Management Plan (CZMP).

An NPDES permit may not be issued for a discharge to marine or estuarine waters without a review for consistency with the State of New Hampshire Coastal Zone Management Plan. This review has not yet been performed and typically occurs after the permit has been placed on public notice. It is not anticipated that the Seabrook WWTF will have any issues complying with the New Hampshire Coastal Zone Management Plan consistency review.

9. Other factors relating to the effects of the discharge as may be appropriate.

Two other effects often associated with treatment plant discharges in New England are enhanced primary productivity and low ambient dissolved oxygen concentrations. Seabrook has a small discharge volume and receives considerable dilution when it mixes with the ocean. Consequently, the potential for nuisance algal blooms or episodes of high primary productivity are low. (EPA, 1999)

The potential for episodes of extremely low dissolved oxygen in the area of Seabrook’s discharge is low for several reasons. The quantity of organic matter discharged in the effluent is low, so the oxygen demand of the effluent will be low. Also, ambient water temperatures are low, which means the solubility of oxygen in this area would be high. These two factors combine to make the occurrence of low dissolved oxygen events unlikely. (EPA, 1999)

² https://coastalscience.noaa.gov/data_reports/bloom-dynamics-of-the-red-tide-dinoflagellate-alexandrium-fundyense-in-the-gulf-of-maine-a-synthesis-and-progress-towards-a-forecasting-capability/

10. Marine water quality criteria.

Based on the initial dilution and the anticipated low concentrations of nonconventional pollutants, this discharge is expected to meet all applicable water quality criteria.

III. Determination of No Unreasonable Degradation to the Marine Environment

Seabrook, NH is a small coastal community with limited industrial inputs into its municipal wastewater. The average monthly design flow of 1.8 MGD is relatively small and receives considerable dilution from the Gulf of Maine (Atlantic Ocean). It is not anticipated that the discharge will result in the bioaccumulation of nonconventional pollutants. Additionally, the facility has not, and is not expected to in the future, adversely affect any special aquatic sites, endangered species, recreational or commercial fishing, or human health. Based on a review of discharge monitoring reports the facility is in compliance the vast majority of the time.

Based upon available information, EPA finds that this discharge will not cause unreasonable degradation of the marine environment.

References

1. EPA. 2010. Fact Sheet to National Pollutant Discharge Elimination System Permit, NH0101303.
2. EPA. 2010. National Pollutant Discharge Elimination System Permit, NH0101303.
3. EPA. 2010. Clean Water Act Section 403(c) Ocean Discharge Criteria Evaluation, Seabrook POTW.
4. Town of Seabrook. 2015. National Pollutant Discharge Elimination System Permit application.
5. C. Slayton. 2020. Town of Seabrook. Personal communication.
6. Discharge Monitoring Reports. November 1, 2014 – October 31, 2019.
7. C. Nash. 2020. New Hampshire Department of Environmental Services. Personal communication.
8. C. Williams. 2020. New Hampshire Department of Environmental Services. Personal communication.
9. C. Patterson. 2020. New Hampshire Fish and Game. Personal communication.
10. Woods Hole Oceanographic Institute. 2019. Northeast PSP, New England Harmful Algal Bloom/Red Tide Information. <https://www.whoi.edu/northeastpsp/>
11. New Hampshire Department of Environmental Services. FAQs – Red Tide. <https://www.wildlife.state.nh.us/marine/redtide.html#faqs>
12. National Marine Fisheries Service – North East Regional Office. List of Endangered or Threatened Species under the Jurisdiction of NOAA Fisheries Service Northeast Region.
13. New Hampshire Department of Environmental Services. Seabrook Town Beach, 2014 Annual Report.
14. New Hampshire Department of Environmental Services. Seabrook Town Beach, 2019 Annual Report.