Connecticut
Department of Energy &
Environmental Protection

National Pollutant Discharge Elimination System Permit Factsheet

NPDES Permit Summary	
Applicant	University of Connecticut, Department of Marine Sciences
Permit No.	CT0028631
Application No.	202505184
Date Application Received	July 15, 2025
Location Address	1080 Shennecossett Road Groton, CT 06340
Facility Contact	Jennifer Williams, Environmental Health and Safety Specialist Office Phone: (860) 486-8148 Email: Jennifer.m.williams@uconn.edu
Mailing Address	1080 Shennecossett Road Groton, CT 06340
DMR Contact	Christopher Mills, Marine Sciences Equipment Technician Office Phone: (860) 405-9142 Email: christopher.mills@uconn.edu
Secretary of State Business ID	Not applicable
Permit Term	5 Years
Permit Category	National Pollutant Discharge Elimination System Minor
SIC & NAICS Code(S)	8221 & 611310
Applicable Effluent Guidelines	None
Permit Type	Reissuance
Ownership	State
Receiving Water	Long Island Sound EB Inner - Baker Cove, Groton
Waterbody Segment ID	CT-E1_013
Waterbody Classification	SA
Discharge Locations (Latitude, Longitude)	DSN 001-1: 41° 18’ 55”, 72° 03’ 47” DSN 001-2: 41° 18’ 55”, 72° 03’ 46”
Intake Location (Latitude, Longitude)	Intake: 41° 18’ 54”, 72° 03’ 45”
Compliance Schedule/Actions	None
Staff Engineer	Oluwatoyin Fakilede, Environmental Engineer 3 Phone: (860) 418-5986 E-Mail: Oluwatoyin.fakilede@ct.gov

Table of Contents

Section 1.0 Facility Summary

1.1 Permit Fees

1.1.1 Application Fee:

Filing Fee:	Invoice No.: DEP 434266	Amount: $1,300.00	Date Paid: 7/15/2025
Processing Fee:	Invoice No.: DEP 439203	Amount: $2,625.00	Date Paid: 9/9/2025

1.1.2 Annual Fee:

Wastewater Category (per Regulations of Connecticut State Agencies ("Regs. Conn. State Agencies") Section 22a-430-7)	**Flow Category** Gallons per day ("gpd")	**DSN**	**Annual Fee** (per Regs. Conn. State Agencies Section 22a-430-7 and Connecticut General Statutes ("Conn. Gen. Stat.") Section 22a-6f)
See comments below*	> 50,000 (720,000)	001-1	$ 2,290.00
	> 50,000 (54,600)	002-1	
TOTAL AMOUNT			$ 2,290.00
* University of Connecticut, Department of Marine Sciences is a research and teaching facility that conducts biological oceanography research. The discharges do not fall under any wastewater category specified in Regs. Conn. State Agencies Section 22a-430-7. A large portion of the wastewater is flow-through seawater that does not come in contact with the facility operations and is withdrawn to maintain a flow velocity that prevents mussel build-up within the facility's piping system. The non-contact cooling water annual fee was applied because it is the closest fee category in terms of water quality.			

1.2 Application Submittal Information

On July 5, 2025, the Department of Energy and Environmental Protection ("DEEP") received an application (Application No. 202505184) from University of Connecticut, Department of Marine Sciences ("the Permittee", "the Applicant", "the facility") in Groton, for the renewal of its NPDES Permit No. CT0028631, expiring on December 31, 2025 ("the previous permit").

Consistent with the requirements of Section 22a-6g of the Conn. Gen. Stat., the Permittee published a Notice of Permit Application in the New London Day on June 21, 2025. On September 24, 2025, the application was determined to be timely and administratively sufficient.

The Permittee seeks authorization for the following in Application No. 202505184:

DSN	**Proposed Maximum Daily Flow**	**Proposed Wastestreams**	**Treatment Type**	**Discharge to**
001-1	720,000 gpd	Aquarium water, aquarium maintenance rinse water, sand filter back flush, floor rinse water and flow through seawater.	No treatment	Long Island Sound
002-1	54,600 gpd	Aquarium maintenance rinse water, floor rinse water and occasional incidental stormwater.	No treatment	Long Island Sound

Intake	Design Intake Flow	Intake Water Description	Source Water
001M	774,600 gpd	Intake cooling water	Long Island Sound

1.3 Other Permits

The Permittee has permit coverage for other wastewater discharges under the following permitting mechanism:

- Non-contact cooling water (2,000 gallons per year) and miscellaneous laboratory wastewater (1,000 gallons per week) discharged to the City of Groton Water Pollution Control Facility. This low volume discharge gets automatic coverage (registration is not required) under the "*General Permit for Discharges from Miscellaneous Industrial Users*".

- The Permittee also had a diversion permit (DIV-200300460) that expired on June 30, 2023, that authorized the withdrawal of 1.3 million gallons of water per day from Long Island Sound. The withdrawal is now covered under the "*General Permit for the Diversion of Water for Consumptive Use: Non-filing Categories*".

1.4 Facility Description

The Permittee has maintained an NPDES permit with DEEP since June 1992, but the discharge began in March 1995. The permitted activities occur at the John S. Rankin Laboratory ("lab") at the University of Connecticut, Avery Point Campus. The lab is a research and teaching facility that is located at the end of the Eastern Point Road on Avery Point in Groton. The campus sits on a peninsula bordered by the Thames River and the Long Island Sound. The campus is about 46 acres, and the lab is about 7,400 square feet.

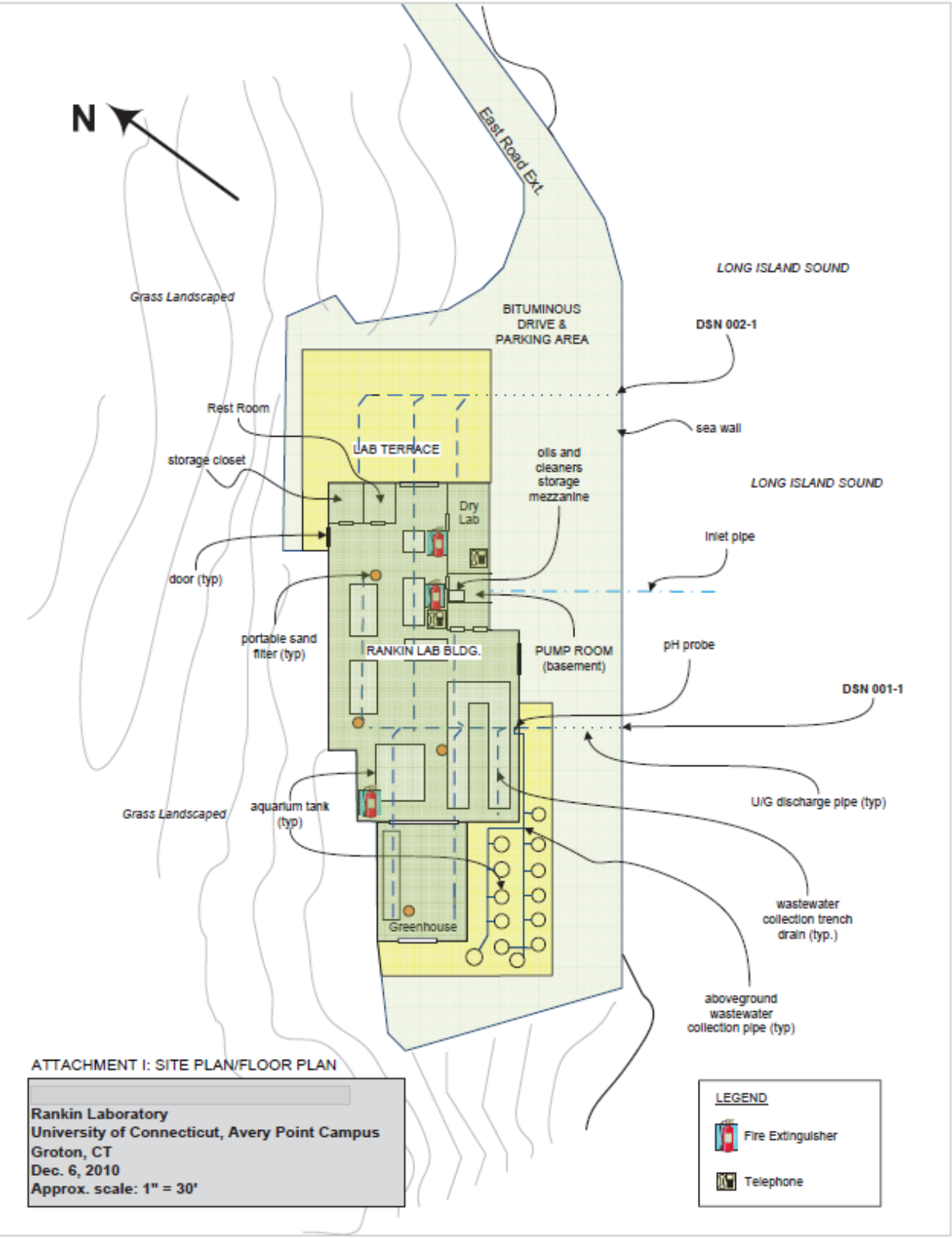
The discharge consists of aquarium seawater used solely for holding live marine organisms such as microalgae, plankton, vertebrates, and invertebrates for marine biology research. Lab studies conducted within the facility focus on biological oceanography and growth, recruitment, competition, and behavioral observation in marine organisms.

1.4.1 Intake Water

The Permittee has an intake structure that withdraws water from the Long Island Sound. The intake structure consists of an 18" diameter PVC conduit containing two 4" diameter flexible PVC intake lines, supported by 13 one-cubic yard concrete pedestals or stone pipe supports pinned to the bedrock. The conduit extends approximately 90 linear feet waterward of the high tide line and the intake lines extend another 45 linear feet waterward beyond the terminus of the conduit. Approximately 100 cubic yards of armor stones pinned to ledge riprap, traprock and gravel provide pipe protection. Two 25 square foot inverted drywells provide protection for the termini of the intake lines.

During this permit term, the Permittee is proposing a new eelgrass mesocosm experiment. The proposed change may result in the addition of two intake lines and an increase in the number of pumps in the pump room from four to six, to allow the supply of additional water needed for the experiment. This addition will not result in intake water that exceeds the NPDES permitted flow.

Figure 1.4. Image of Site Plan



1.5 Description of Industrial Process

The Permittee proposes to discharge aquarium wastewater via outfalls DSN-001-1 and DSN-002-1 to the Long Island Sound. The wastewater consists of sand-filter back flush water, aquarium water used in tanks to maintain various aquatic organisms, either as cultures or for experiments, and equipment maintenance wash water and seawater bypass. Below is a more detailed description of the wastewater. Wastewater flow rates are presented in Figure 1.5.

1.5.1 DSN 001-1

The wastewater primarily consists of seawater diverted from the Long Island Sound and used in flow-through research aquariums. Aquarium wastewater is collected via a network of floor trenches throughout the laboratory. In addition to aquarium seawater, the lab discharges the following related wastewaters:

Sand-filter back flush water - The lab operates four small sand filters to filter solids from incoming seawater. The filters are occasionally backflushed for proper operation.

Aquarium maintenance rinse water - Aquariums require maintenance to remove accumulated sediment and algae. The lab uses seawater to wash the aquariums and implements best management practices ("BMPs") to minimize the pollutants within the discharge. The BMPs are listed in Section 1.6 of this fact sheet.

Seawater bypass - Seawater that is diverted from the Long Island Sound, but is not used in any research application, is discharged back to the Long Island Sound. The flow velocity through the seawater intake and distribution piping must be high enough to prevent buildup of mussels and other organisms that would cause blockage. To maintain the required scouring velocity, more seawater is withdrawn than what is typically demanded for use in the aquariums. As such, a portion of the intake water bypasses the aquariums and combines with the final effluent.

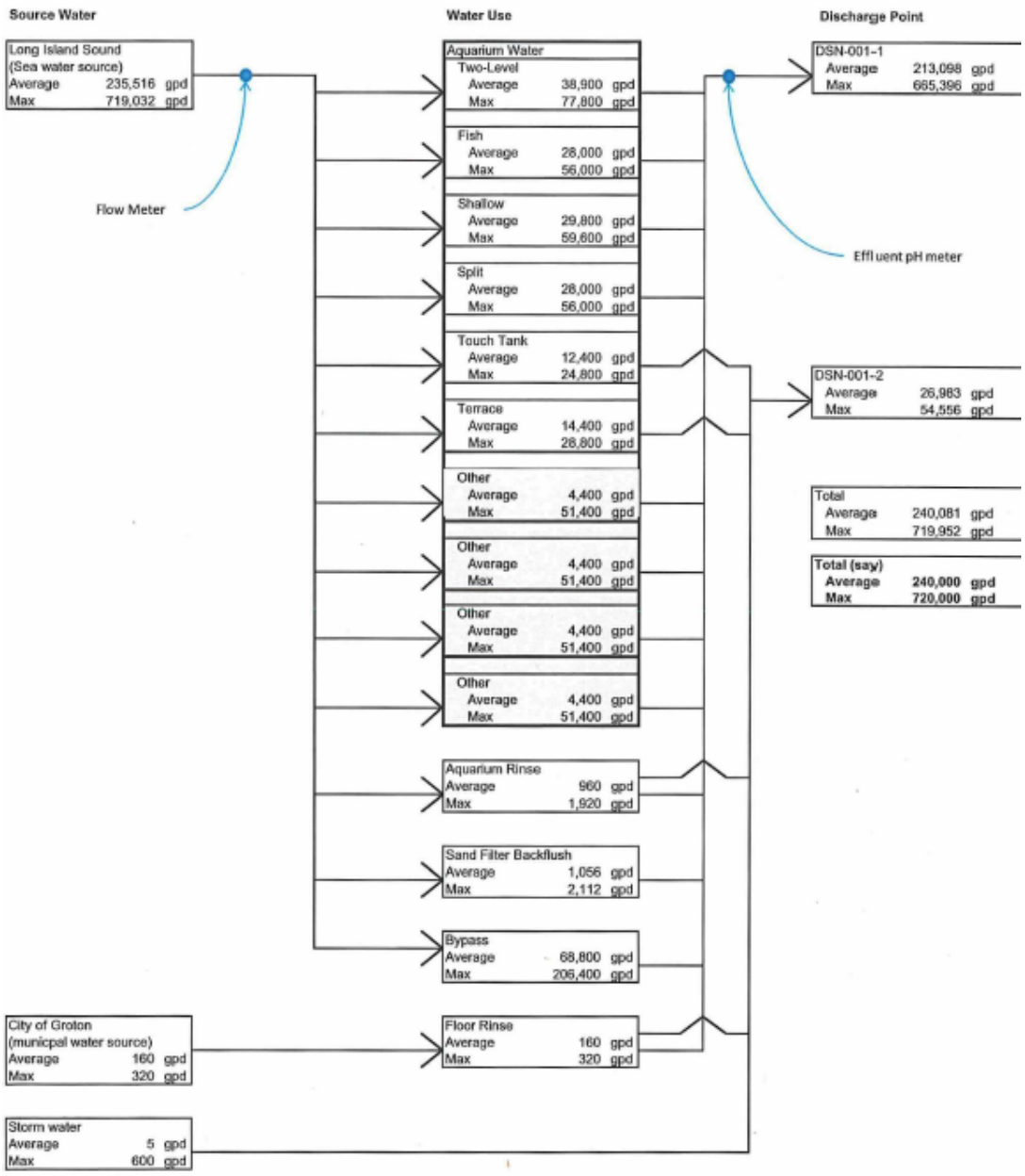
All wastewater is collected in a network of floor trenches. Aquariums are positioned above these trenches such that flow-through seawater and aquarium tank rinse water can be discharged directly to the collection system. The trenches are 6-inches wide and are lined with PVC.

During this permit term, the Permittee is proposing a new eelgrass mesocosm experiment. This activity doesn't involve feeding, new chemical additions, or increased discharge flow rates beyond existing permitted flow limits.

1.5.2 DSN 002-1

The wastewater discharge consists of untreated flow-through aquarium seawater. Other ancillary discharges include floor rinse water, aquarium tank rinse water, sand filter back flush water, and bypass water (seawater not used in any aquariums) and incidental stormwater because one aquarium for this outfall is on the terrace. The sources of wastewater in DSN 002 are similar in nature and quality to DSN 001 except for the incidental stormwater. This discharge outfall is not used frequently, and there has been no discharge from the DSN 002-1 outfall in the last five years.

Figure 1.5 Process flow diagram



1.6 Treatment System Description

The wastewater is not treated. However, the lab maintains the following BMPs for the purpose of minimizing pollutants.

1) Floor rinsing is performed using city water from a typical garden hose. No soaps, detergents or other cleaners are used to wash the floor. In the event that cleaners or detergents are used, the wastewater is contained, kept out of the floor drain system, collected by using mops and vacuums, and discharged to the sanitary sewer in accordance with the "*General Permit for Discharges from Miscellaneous Industrial Users"*.
2) Aquarium tank and equipment rinsing is performed by manually siphoning sea water (mixed with sediment that accumulated at the bottom of the tank) from the aquarium tank with a ¼"-inner diameter plastic hose. The small diameter tube restricts instantaneous flow to approximately 8 gallons per minute. No soaps, detergents or other cleaners are used to wash the aquariums.

3) The sand filters are back-flushed once per day by reversing the flow of seawater through the sand filter(s). The flow of back-flushing sea water is manually controlled with a ball valve. During back flushes, the valve is never opened more than halfway; this allows for an instantaneous flow rate of no more than 27 gallons per minute which results in turbidity control.

1.7 Facility Changes

The Regs. Conn. State Agencies require that permittees notify DEEP and obtain written approval of any facility expansion or process change that may result in an increased or new discharge or constitute a new source, and of any expansion or significant changes made to a wastewater collection system, treatment system, or its method of operation in accordance with Regs. Conn. State Agencies Section 22a-430-3(i). These regulatory provisions are commonly referred to as "3(i) determinations". DEEP will review the notification and determine if the change can be implemented under the current permit or if the requested change requires a permit modification to protect waters of the State in accordance with Regs. Conn. State Agencies Section 22a-430-4(p).

There were no changes to the facility since the previous permit was issued.

1.8 Compliance History

There were no effluent violations in the last five years.

Is the Permittee subject to an ongoing enforcement action?	☐ Yes	☒ No
Did the previous permit have a compliance schedule?	☐ Yes	☒ No

1.8.1 Spill History

There were no reported spills at the facility in the last five years.

1.9 General Issues Related to the Application

1.9.1 Federally Recognized Indian Land

As provided in the permit application, the site is not located on federally-recognized Indian land.

1.9.2 Coastal Area/Coastal Boundary

The activity is located within a coastal boundary as defined in Conn. Gen. Stat. 22a-94(b), but this application does not propose any new exterior construction at the facility. Therefore, the activity is consistent with the Coastal Area Management Act.

1.9.3 Endangered Species

Based on the letter dated June 24, 2025, from the DEEP's Bureau of Natural Resources, the following extant populations of federal or state Endangered, Threatened or Special-Concern Species were identified in the vicinity:

1) Shortnose sturgeon *(Acipenser brevirostrum)*
2) Atlantic sturgeon *(Acipenser oxyrinchus oxyrinchus)*
3) Sand tiger shark *(Carcharias taurus)*
4) Atlantic seasnail *(Liparis atlanticus)*
5) Radiated shanny (*Ulvaria subbifurcata)*

DEEP's Fisheries Division determined that the permitted discharge will not significantly impact any fisheries and/or habitat of the species listed above.

1.9.4 Aquifer Protection Areas

As provided in the permit application, the site is not located within a protected area identified on a Level A or B map.

1.9.5 Conservation or Preservation Restriction

As provided in the permit application, the property is not subject to a conservation or preservation restriction.

1.9.6 Public Water Supply Watershed

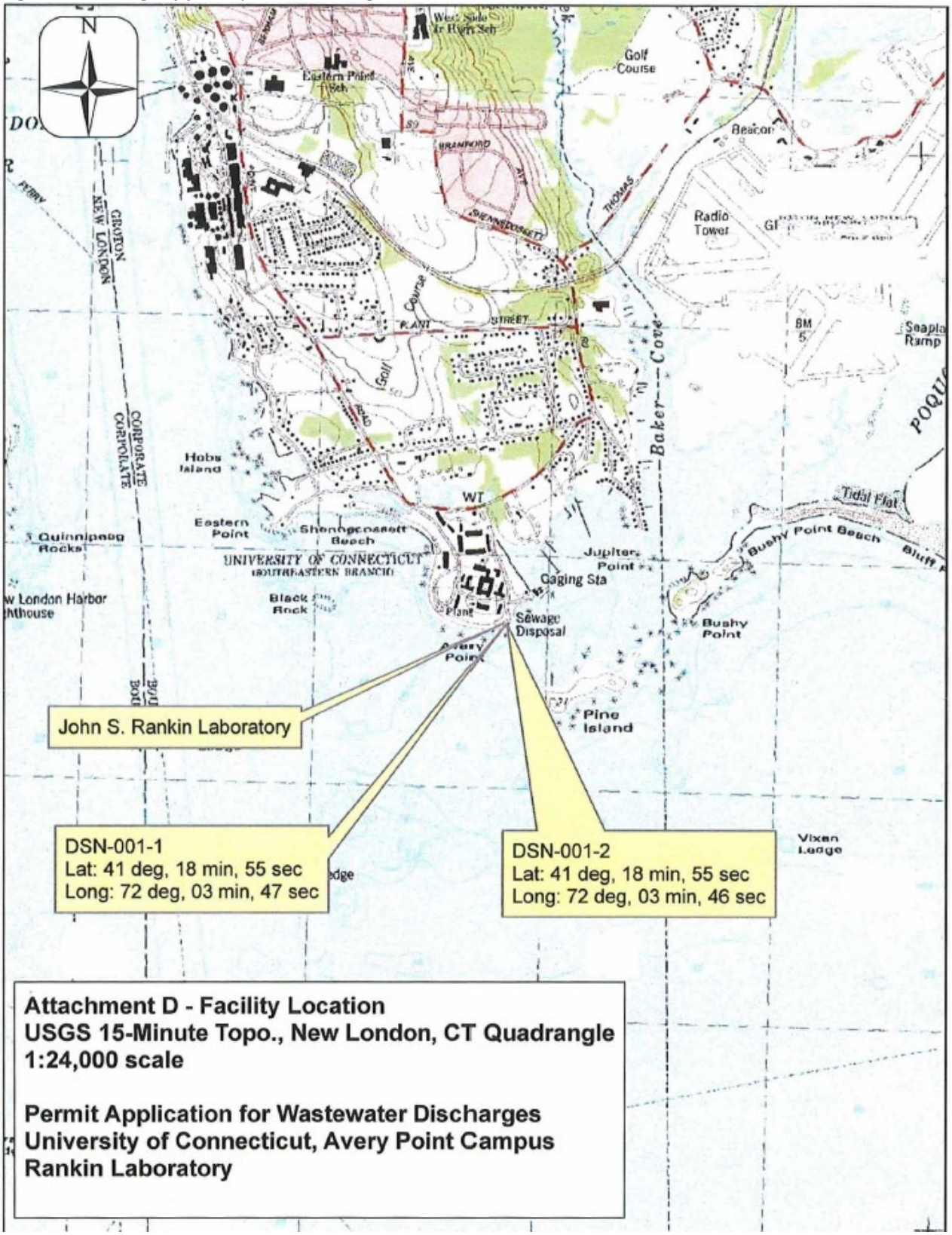
As provided in the permit application, the site is located within a public water supply watershed.

Section 2.0 Receiving Water Body Information

The receiving waterbody, Long Island Sound EB Inner - Baker Cove, Groton is identified as CT-E1_013. This segment of the Long Island Sound is classified as a Class SA surface water. The size of the water segment is 0.314 square miles, and it spans from Avery Point and the tip of Pine Island to the mouth of Poquonuck River (South of Groton-New London Airport), Groton.

Figure 2.1. Image of discharge locations

Figure 2.2. Image of facility and discharge locations



2.1 Designated Uses

Surface waters classified as Class SA are identified on the map titled Water Quality Classifications on file with the DEEP. The classifications may be amended in accordance with subsections (d) through (g) of Section 22a-426 of the Conn. Gen. Stat. The designated uses for Class SA waters in Reg. Conn. State Agencies 22a-426-4(f) are: (1) Habitat for marine fish, other aquatic life and wildlife; (2) shellfish harvesting for direct human consumption; (3) recreation; (4) industrial water supply; and (5) navigation.

In accordance with 22a-426-4 of Regs. Conn. State Agencies, discharges to Class SA surface waters may be permitted by the Commissioner from public or private drinking water treatment systems, dredging activity and dredge material dewatering operations, including the discharge of dredged or fill material and clean water discharges. As defined in Regs. Conn. State Agencies, "clean water" means water which in the judgment of the Commissioner is of a quality substantially similar to that occurring naturally in the receiving stream under consideration. Clean water may include minor cooling waters, residential swimming pool water, and stormwater.

The facility discharges flow-through water from the Long Island Sound, incidental stormwater and research water, which is used for research on organisms that are found in the Long Island Sound. This water is substantially similar in quality to that which occurs naturally in the receiving stream, hence the discharge is considered a "clean water" and is authorized to a Class SA surface water.

2.2 Impairments and Total Maximum Daily Loads

"A Total Maximum Daily Load Analysis to Achieve Water Quality Standards for Dissolved Oxygen in Long Island Sound" (December 2000), based on control of nitrogen applies to the Long Island Sound. However, the Permittee's discharge has not been assigned a waste load allocation for nitrogen as part of this TMDL. Therefore, nitrogen monitoring requirements without numeric limitations have been included in the permit.

2.2.1 Fecal coliform

The 2022 Integrated Water Quality Report ("IWQR") (*Appendix A-3. Connecticut 305b Assessment Results for Estuaries*) identified the waterbody as impaired for the designated use of shellfish harvesting and the cause is fecal coliform. DEEP has adopted TMDL for fecal coliform. Although feces from fish may have fecal matter, fish populations are considered natural background sources. An analysis was conducted on the wastewater on October 6, 2025, which showed that fecal coliform was below 10 MPN/100 ml, which is below the water quality criteria. Therefore, monitoring requirements are not included in the permit.

Figure 2.3 Results of Applicable 2022 IWQR Waterbodies with Adopted TMDLs

Results of the 2022 IWQR with Adopted TMDLs					
Waterbody Segment ID	**TMDL**	**Waterbody Name**	**Impaired Designated Use**	**Cause**	**EPA Approved**
CT-E1_013	CT Statewide Bacteria TMDL Estuary 11	LIS EB Inner-Baker Cove	Shellfish harvesting	Fecal coliform	2013

Section 3.0 Permit Conditions and Effluent Limitations

3.1 Pollutants of Concern

3.1.1 DSNs 001-1 and 002-1

The following pollutants have monitoring requirements in the permit for the reasons noted below:

Pollutant	Reason for Inclusion			
	Pollutant with an Applicable Technology-based Limit	**Pollutant with a Waste Load Allocation from a TMDL**	**Pollutant Identified as Present in the Effluent through Sampling**	**Pollutant Otherwise Expected to be Present in the Effluent**
Ammonia			•	
Copper			•	
Lead			•	
Nitrates		•		•
Nitrites		•		•
Phosphorus			•	
Temperature				•
Total Kjeldahl Nitrogen		•		•
Total Nitrogen		•		
Total Residual Chlorine				•
Total Suspended Solids			•	
Zinc			•	
Acute toxicity monitoring requirements, consistent with Section 22a-430-3(j)(3) of the Regs. Conn. State Agencies, and pH monitoring, consistent with Section 22a-426-9(a)(1), are also included in the permit.				

3.1.2 Nitrates, Nitrites and Total Kjeldahl Nitrogen

In order to calculate total nitrogen as discussed in Section 2.2 of this fact sheet, nitrates, nitrites and total kjeldahl nitrogen need to be monitored. Total nitrogen is a summation of nitrates, nitrites and total Kjeldahl nitrogen.

3.1.3 Total Residual Chlorine

Chlorine monitoring is proposed because about 320 gpd of chlorinated city water may be used for floor rinsing. Therefore, some chlorine may be present in the wastewater.

3.1.4 Temperature

The Permittee uses portable heaters to warm up the water in the aquarium when necessary. A review of the discharge monitoring report showed that the discharge temperature is consistently below the water quality criteria. Therefore, temperature limits are not included, but monitoring is maintained in the permit.

3.2 Basis for Limits

Technology and water-quality based requirements are considered when developing permit limits. Technology-based effluent limits ("TBELs") represent the minimum level of control imposed under the Clean Water Act ("CWA"). Industry-specific technology-based limits are set forth in 40 CFR Sections 405 – 471 (EPA's Effluent Limitation Guidelines) and in Regs. Conn. State Agencies Section 22a-430-4(s)(2). Water quality-based limits are designed to protect water quality and are determined using the procedures set forth in EPA's *Technical Support Document for Water Quality-Based Toxics Control*, 1991 ("TSD"). When both technology and water quality-based limits apply to a particular pollutant, the more stringent limit would apply. In addition, water quality-based limits are required when any pollutant or pollutant parameter (conventional, non-conventional, toxic, and whole effluent toxicity) is or may be discharged at a level that causes, has reasonable potential to cause, or contributes to an excursion above any water quality criteria. Numeric water quality criteria are found in Regs. Conn. State Agencies Section 22a-429-9 of the *Connecticut Water Quality Standards* ("WQS").

3.3 Technology Based Effluent Guidelines

Technology-based treatment requirements represent the minimum level of control that must be imposed under CWA Section 301(b) and 402 to meet best practicable control technology currently available ("BPT") for conventional pollutants and some metals, best conventional control technology ("BCT") for conventional pollutants, and best available technology economically achievable ("BAT") for toxic and non-conventional pollutants. See 40 CFR Section 125 Subpart A and Regs. Conn. State Agencies Section 22a-430-4(l)(4)(A).

Subpart A of 40 CFR Section 125 establishes criteria and standards for the imposition of technology-based treatment requirements in permits under Section 301(b) of the CWA, including the application of EPA promulgated Effluent Limitation Guidelines ("ELGs") and case-by-case determinations of effluent limitations under CWA Section 402(a)(1). EPA promulgates New Source Performance Standards ("NSPS") under CWA Section 306 and 40 CFR Section 401.12. See also 40 CFR Section 122.2 (definition of "new source") and 122.29.

In the absence of published technology-based effluent guidelines, the permit writer is authorized under CWA Section 402(a)(1)(B) and Regs. Conn. State Agencies Section 22a-430-4(m) to establish effluent limitations on a case-by-case basis using best professional judgment ("BPJ").

The concentrated aquatic animal production point source category at 40 CFR Section 451 was reviewed to determine its applicability to the permitted discharge. This Section applies to the discharges of pollutants from facilities that produce 100,000 pounds or more of aquatic animals per year in a flow-through, recirculating, net pen or submerged cage system.

A concentrated aquatic animal production facility is defined at 40 CFR Section 122.24 as follows:
1) Facilities that contain, grow or hold cold water fish species or other cold water aquatic animals (which include, but are not limited to, the *Salmonidae* family of fish; e.g., trout and salmon), in ponds, raceways, or other similar structures which discharge at least 30 days per year but does not include:

a) Facilities which produce less than 9,090 harvest weight kilograms ("kg") (approximately 20,000 pounds) of aquatic animals per year; and
b) Facilities which feed less than 2,272 kg (approximately 5,000 pounds) of food during the calendar month of maximum feeding.

2) Facilities that contain, grow or hold warm water fish species or other warm water aquatic animals (which include, but are not limited to, the *Ameiuride, Centrarchidae* and *Cyprinidae* families of fish; e.g., respectively, catfish, sunfish and minnows), in ponds, raceways, or other similar structures which discharge at least 30 days per year, but does not include:

a) Closed ponds which discharge only during periods of excess runoff; or
b) Facilities which produce less than 45,454 harvest weight kg (approximately 100,000 pounds) of aquatic animals per year.

The Permittee contains, grows or holds 30 kg per year of cold or warm water fish species or other aquatic animals and uses about 120 kg of food per year to feed the aquatic organisms. The organisms held and food used are lower than the specified quantities in the concentrated aquatic animal production point source category at 40 CFR Section 451. Therefore, the activities performed by the Permittee do not fall under the definition of a concentrated aquatic animal production facility as found in 40 CFR Section 122.24 and TBELs are not applicable.

3.4 Zone of Influence

Section 22a-426-4(l) of the Regs. Conn. State Agencies states that "The Commissioner may, on a case-by-case basis, establish zones of influence ("ZOI") when authorizing discharges to surface waters under Sections 22a-430 and 22a-133(k) of the Conn. Gen. Stat. in order to allocate a portion of the receiving surface waters for mixing and assimilation of the discharge."

100:1 dilution was granted during the last permitting cycle. The dilution is retained in this permit renewal. Based on the permitted discharge flow of 720,000 gpd for DSN 001-1, the calculated ZOI is 2,970,000 gallons per hour ("gph") and the instream waste concentration ("IWC") is 1.0 %. In the case of DSN 002-1, the previous ZOI of 268,092 gph is being revised to 225,225 gph to maintain 100:1 dilution at the reduced effluent flow of 54,600 gpd.

3.5 Waterbody Ambient Conditions

The following data represents the upstream ambient water quality conditions.

Table B3.5: Ambient data for pH, Salinity and Temperature	
pH (S.U.)	8.0 S.U
Salinity	23 ppt
Temperature	25°C

3.6 Reasonable Potential Analysis

Pursuant to CWA Section 301(b)(1)(C) and 40 CFR Section 122.44(d)(1), NPDES permits must contain any requirements in addition to TBELs that are necessary to achieve water quality standards established under Section 303 of the CWA. See also 33 United States Code (USC) Section 1311(b)(1)(C). In addition, limitations "must control any pollutant or pollutant parameter (conventional, non-conventional, or toxic) which the permitting authority determines are or may be discharged at a level which will cause, have the reasonable potential to cause, or contribute to an excursion above any water quality standard, including State narrative criteria for water quality." 40 CFR Section 122.44(d)(1)(i). To determine if the discharge causes, or has the reasonable potential to cause, or contribute to an excursion above any WQS, EPA considers: 1) existing controls on point and non-point sources of pollution; 2) the variability of the pollutant or pollutant parameter in the effluent; 3) the sensitivity of the species to toxicity testing (when evaluating whole effluent toxicity); and 4) where appropriate, the dilution of the effluent by the receiving water. See 40 CFR Section 122.44(d)(1)(ii).

If the permitting authority determines that the discharge of a pollutant will cause, has the reasonable potential to cause, or contribute to an excursion above WQSs, the permit must contain Water Quality Based Effluent Limits ("WQBELs") or require additional monitoring if there is insufficient data to develop a WQBEL, for that pollutant. See 40 CFR Section 122.44(d)(1)(i).

The reasonable potential analysis ("RPA") was conducted for DSN 001 using procedures consistent with EPA's Technical Support Document for Water Quality-based Toxics Control" ("TSD"). An RPA was not conducted on DSN 002 because the Permittee has not discharged from the outfall during the last five years. However, the sources of wastewater in DSN 002 are similar in nature and quality to DSN 001; therefore, consistent monitoring requirements have been imposed.

To conduct the RPA, DEEP determines the project maximum concentration ("PMC") for each pollutant of concern in the receiving stream and compares it to the applicable flow adjusted water quality criteria ("WQC"). When the PMC is lower than the flow adjusted WQC, there is no potential for the discharge to exceed the WQC. When the PMC is higher than the flow adjusted WQC, there is a potential for the discharge to exceed the WQC (and permit limits are needed).

In the RPA, the PMC is calculated by multiplying maximum reported concentration with a statistical multiplier. The statistical multiplier is determined using the equation $C_{99} = \exp(2.326\sigma - 0.5\sigma^2)$, where $\sigma^2 = \ln(Cv^2 + 1)$ or from Table 3-1 of the TSD for 20 data set or less.

The reasonable potential analysis indicates that limits are not required. The RPA results, except for ammonia, are included in the Appendix. Ammonia results are included in Section 3.6.3, below.

3.6.1 Total Residual Chlorine

A review of the discharge monitoring report ("DMR") from August 2020 – July 2025 showed that total residual chlorine was always below the minimum level of the analytical test. The analysis in the previous permit cycle showed that about 320 gallons of city water results in negligible increase in the concentration of chlorine in the wastewater. Therefore, a reasonable potential analysis was not conducted for total residual chlorine.

3.6.2 Copper, Lead and Zinc

DMRs from August 2020 – July 2025 showed that copper was always below the minimum level of the analytical test. However, the minimum levels achieved by the analytical test method were not sufficiently sensitive, ranging from 25 µg/L or 50 µg/L. There was one instance where the minimum level for copper was 3 µg/L and the result of the analysis was below the 3 µg/L. Lead and zinc were also mostly below the minimum levels, except for one instance where lead was quantified at 1.0 µg/L, and two instances where zinc was quantified at 146 µg/L and 27 µg/L.

A reasonable potential analysis was conducted for copper, lead and zinc using half of the lab minimum levels for copper and lead and 146 µg/L for zinc as the maximum reported concentrations.

The Permittee was cited for not using an approved test method in an inspection report of May 23, 2023. The test methods used for analytical tests conducted in 2025 meet the minimum level criteria.

3.6.3 Total Ammonia Nitrogen

In order to conduct an RPA for ammonia, the acute (35 µg/L) and chronic (233 µg/L) criteria that are applicable to Class SA surface waters need to be converted from un-ionized ammonia to total ammonia. As specified in Regs. Conn. State Agencies 22a-426-9, this is done according to EPA's *Ambient Water Quality Criteria for Ammonia (Saltwater)-1989* (EPA 440/5-88-004). This document specifies this conversion is highly influenced by pH and temperature, with higher pH and higher temperature

corresponding to more restrictive criteria, and slightly correlated with salinity, with lower salinity associated with more restrictive criteria. The criteria were calculated using the observed pH, temperature, and salinity values in Section 3.5, which would result in the most protective criteria. The reasonable potential analysis indicates that limits are not required.

The guidance specifies that the percentage of un-ionized ammonia (UIA) is based on pK_a and pH. Theoretical models for pK_a were developed by Whitfield and described in the 1974 paper *The hydrolysis of ammonia ions in sea water - a theoretical study*. Hampson then developed a program to in his 1977 paper *Relationship between total ammonia and free ammonia in terrestrial and ocean waters*, which uses the following equations:

$$\% \, UIA = \frac{100}{1 + 10^{\left(pK_a + 0.0324(298 - T) + 0.0415\frac{P}{T} - pH\right)}}$$

Where P = 1 ATM, T is temperature (°K).

$$pK_a = 9.245 + 0.116I$$

Which is the Model B regression equation developed by Whitfield, 1974.

$$I = \frac{19.9273S}{1000 - 1.005109S}$$

Where I is the molar ionic strength and S is salinity.
Next, the water quality criteria (expressed as un-ionized ammonia) are converted to total ammonia:

$$\left[NH_3 + {NH_4}^+\right] = \frac{Unionized \; WQC}{\% \; UIA}$$

Finally, total ammonia is converted to a concentration of total ammonia as nitrogen using a conversion factor of 0.822, which is equivalent to the percent molecular mass of N in NH_3:

$$0.822 = \frac{14.00674}{14.00674 + 3(1.00794)} = \frac{molecular \; mass \; of \; N}{molecular \; mass \; of \; NH_3}$$

$$Total \; Ammonia \; as \; N = 0.822\left[NH_3 + {NH_4}^+\right]$$

Saltwater Ammonia Calculator

Temp	pH	Salinity	Pressure	Molal Ionic Strength	pKa*	% Unionized:	Unionized WQC		Total NH3		Total NH3 as N	
(deg C)	(su)	(ppt)	(ATM)	(not valid if >0.85):	@ 25 deg C		Acute	Chronic	Acute	Chronic	Acute	Chronic
											mg/L	mg/L
25.0	8.0	23.0	1.0	0.469	9.299	4.777%	0.233	0.035	4.88	0.73	4.01	0.60

The acute and chronic criteria for total ammonia (as N) are 4.01 mg/L and 0.6 mg/L, respectively using a temperature of 25°C, pH of 8.0 S.U. and salinity of 23 parts per thousand ("ppt").

Table 3.6.1: Reasonable Potential Evaluation
(This analysis compares the projected maximum concentration in effluent ("PMC") in the receiving stream with the applicable water quality criteria ("WQC"). When the PMC is lower than the WQC, there is no potential for the discharge to exceed the WQC. When the PMC is higher than the WQC, there is a potential for the discharge to exceed the WQC and permit limits are therefore needed.)

Q = Flow, C = Concentration, $(QC)_u$ = Upstream data, $(QC)_d$ = Downstream data, $(QC)_e$ = Effluent data and $Q_d = Q_u + Q_e$, Q_e = 720,000 gpd ÷ 24 = 30,000 gph, Q_u = 2,970,000 gph, and Q_d = 3,000,000 gph

Pollutants	PMC = Max. measured concentration X multiplier in Attachment A	PMC in the waterbody $C_d = \frac{(QC)_u + (QC)_e}{Q_d}$	**Connecticut Water Quality Criteria (WQC) (Freshwater)**			**Is there potential to exceed WQC?**
			Aquatic Life (Acute) (µg/l)	Aquatic Life (Chronic) (µg/l)	Human Health (µg/l)	
Ammonia	130 X 3.5 = 455	4.55	600 [1]	4,010 [1]	--	No

[1] The numbers above were converted from un-ionized ammonia (acute criteria = 35 µg/l, chronic criteria = 233 µg/l).

3.7 Whole Effluent Toxicity

The Permittee shall comply with effluent standards or prohibitions established by CWA Section 307(a) and Regs. Conn. State Agencies Section 22a-430-4(l), and may not discharge toxic pollutants in concentrations or combinations that are harmful to humans, animals, or aquatic life.

If toxicity is suspected in the effluent, DEEP may require the Permittee to perform acute or chronic whole effluent toxicity testing. Based on Sections 22a-430-3(j)(7)(A)(i) and 22a-430-4(l)(5) of the Regs. Conn. State Agencies, a discharge that results in an IWC of 1% will have a permit limit of lethal concentration ("LC_{50}") limit of 20%. However, the Permittee's previous permit required annual acute toxicity testing using *Mysodopsis bahia* and *Menidia beryllina* and a "LC_{50}" limit of 100% for both DSN 001 and 002.

During the last permit cycle, the Permittee had no exceedances of its LC_{50} limit (LC_{50} = 100%). In addition, a review of aquatic toxicity monitoring report data (August 2020 – July 2025) for DSN 001 also showed a no observable acute effect level ("NOAEL") of 100%, which means 100% survival of test organisms in an undiluted effluent which shows the discharge is not toxic.

A reasonable potential analysis was performed consistent with EPA's TSD as shown below.

$$Acute\ toxic\ unit\ (TU_a) = \frac{100}{LC_{50}}, Chronic\ toxic\ unit\ (TU_a) = \frac{100}{IC_{25}}, TU_a = \frac{100}{100} = 1TU_a$$

A default coefficient of variation of 0.6 is assumed because of the limited number of data (annual sampling for 5 years), which corresponds to a statistical multiplier of 4.2 for n = 5 (Appendix A).
The projected maximum toxicity unit when the dilution is 1:100 is:

$$Projected\ Maximum\ TU_a$$
$$= 1TU_a\ (highest\ observed\ TU_a\ )\ X\ 4.2\ (multiplier\ in\ Appendix\ A)\ X\ 0.01\ (dilution\ factor)$$
$$= 0.042TU_a$$

The previous permit had no chronic toxicity testing requirement. Therefore, an acute to chronic ratio of 10 is assumed consistent with EPA's TSD.

$$TU_c = 0.042\ TU_a\ X\ 10 = 0.42\ TU_c$$

The EPA's TSD recommends using aquatic toxicity criteria of $TU_a = 0.3$ and $TU_c = 1.0$. $0.042TU_a$ is lower than EPA's TSD recommended $0.3TU_a$ WET criteria for protection against acute effects, and $0.42TU_c$ is lower than EPA's TSD recommended 1.0 TU_c. for protection against chronic effects. Therefore, there is no reasonable potential of causing toxicity at the existing WET limits, and a more stringent WET limit is not needed.

The existing toxicity monitoring requirements and the previous limit of LC50 = 100% are maintained in the permit. The salinity range for conducting aquatic toxicity was changed from 25 ± 2 ppt to 28 ± 2 ppt because the proposed salinity is closer to the range in the receiving waterbody.

3.8 Water Quality Based Effluent Limitations ("WQBELS")

The CWA and federal regulations require that effluent limitations based on water quality considerations be established for point source discharges when such limitations are necessary to meet state or federal water quality standards that are applicable to the designated receiving water. This is necessary when less stringent TBELs would interfere with the attainment or maintenance of water quality criteria in the receiving water. See CWA Section 301(b)(1)(C) and 40 CFR Section 122.44(d)(1),122.44(d)(5), 125.84(e) and 125.94(i).

The reasonable potential analysis did not indicate that WQBELS are warranted at this time.

3.9 Comparison of Limits

After preparing and evaluating applicable TBELs and WQBELs, the most stringent limits are applied in the permit. Pollutants of concern that only require monitoring without limits are not included in the table below.

Table 3.9.1: Comparison of Limits Based on Different Criteria

Parameters	WQBELs based on EPA/505/2-90-001	Regs. Conn. State Agencies 22a-430-4(l)(5)(A)	Previous Permit Limits	Case by Case Determination
Acute Aquatic toxicity, *Americamysis bahia*	---	$LC_{50} \geq 20\%$	$LC_{50} = 100\%$	---
Acute Aquatic toxicity, *Menidia beryllina*	---	$LC_{50} \geq 20\%$	$LC_{50} = 100\%$	---
pH, minimum	6.8 S.U.	---	6.8 S.U.	---
pH, maximum	8.5 S.U.	---	8.5 S.U.	---

3.10 Sampling Frequency, Type, And Reporting

The permit has monthly monitoring of pH and flow, while other pollutants are monitored semi-annually. This frequency was established to adequately ensure the Permittee is in compliance with permit terms and conditions, in accordance with Regs. Conn. State Agencies Section 22a-430-3(j)(5).

Acute toxicity monitoring requirements were incorporated in the last permit cycle because of minimal city water that may be added to the discharge. Annual acute toxicity monitoring requirements in the previous permit is proposed to be carried forward. DEEP does not propose more frequent monitoring because the Permittee has demonstrated that the toxicity of the discharge is relatively constant and the potential for the discharge to cause acute toxicity in the receiving waters is minimal, consistent with Regs. Conn. State Agencies Section 22a-430-3(j)(4)(A).

The previous sample type was changed from grab to composite sample because Regs. Conn. State Agencies Section 22a-430-4(c)(20) prescribes daily composite sampling for continuous discharges to account for variability in the wastewater discharge over the course of the daily discharge period. While the discharge occurs for 24 hours, variability in wastewater quality is expected to occur when operations staff are present at the lab during the first shift operating hours. This timeframe correlates to when the majority of lab operations occur, including tank cleanouts, experiment work, and maintenance. Minimal variation is expected in wastewater quality outside of these operating hours; therefore, the composite sample shall be comprised of equal aliquots, collected at the beginning, middle and end of first shift operating hours.

3.11 Effluents Limitations and Monitoring Requirements

Pollutants	Limit	Basis for Limits	Monitoring /Reporting Frequency	Sample Type
DSNs 001-1 and 002-1:				
Acute Aquatic Toxicity, *Americamysis bahia,* LC_{50}	100%	Anti-backsliding regulation	Annually	Daily Composite
Acute Aquatic Toxicity *Menidia beryllina,* LC_{50}	100%	Anti-backsliding regulation	Annually	
Ammonia (as N)	Monitoring only requirement for pollutant of concern, No RP		Semi-annually	
Copper, Total	Monitoring only requirement for pollutant of concern, No RP		Semi-annually	
Flow, Maximum during 24-hr period	DSN 001-1: 720,000 gpd DSN 002-1: 54,600 gpd	Permitted discharge flow per application	Continuous/ Monthly	Total daily flow
Kjeldahl Nitrogen, Total (as N)	Monitoring only requirement due to TMDL		Semi-annually	Daily Composite
Lead, Total	Monitoring only requirement for pollutant of concern, No RP		Semi-annually	
Nitrate (as N)	Monitoring only requirement due to TMDL		Semi-annually	
Nitrite (as N)	Monitoring only requirement due to TMDL		Semi-annually	
Nitrogen, Total	Monitoring only requirement due to TMDL		Semi-annually	
pH, Minimum	6.8	WQC	Continuous/ Monthly	Continuous
pH, Maximum	8.5	WQC		
Phosphorus, Total	Monitoring only requirement for pollutant of concern		Semi-annually	Daily Composite
Total Residual Chlorine	Monitoring only requirement for pollutant of concern, No RP		Semi-annually	Grab Sample Average
Total Suspended Solids	Monitoring only requirement for pollutant of concern		Semi-annually	Daily Composite
Zinc, Total	Monitoring only requirement for pollutant of concern, No RP		Semi-annually	
RP: Reasonable Potential; TMDL: Total Maximum Daily Load; WQC: Water Quality Criteria				

3.11.1 Sufficiently Sensitive Methods:

EPA at 40 CFR Section 122.21(e)(3) and 122.44(i) requires sufficiently sensitive test methods to be utilized for all parameters in a NPDES permit. A method approved under 40 CFR 136 or required through other regulations is sufficiently sensitive when:

- The method minimum level ("ML") is at or below the level of the applicable water quality criterion or effluent limitation (if below the water quality criterion), whichever is more stringent, for the measured pollutant or pollutant parameter; or
- The method ML is above the applicable water quality criterion, but the amount of the pollutant or pollutant parameter in a facility's discharge is high enough that the method detects and quantifies the level of the pollutant or pollutant parameter in the discharge; or
- The method has the lowest ML of the analytical methods approved under 40 CFR part 136 or required under 40 CFR chapter I, subchapter N (effluent limit guidelines) or O (sewage sludge) for the measured pollutant or pollutant parameter. Note some effluent limit guidelines ("ELGs") will specify a required ML for certain analyses.

DEEP has specified ML requirements in the permit to ensure compliance with the sufficiently sensitive test method regulations. The MLs listed in the NPDES permit are the minimum concentration at which quantification must be achieved and verified during the laboratory analysis of the parameter. These values are not necessarily equivalent to the MLs that would be formally established by a lab under the ML definition at 40 CFR Section 136. In other words, at a minimum, the permittee's analytical method must achieve the ML listed in the permit. This may vary from the actual ML established by the lab for the analysis, using the MDL, lowest calibration point, or other acceptable method under 40 CFR Section 136.

3.12 Other Permit Conditions

The permit prohibits cleaners or detergents from entering the discharge of DSN 001-1 and 002-1 when used by the Permittee for washing floors. If cleaners or detergents are used, the wastewater should be contained, mopped, vacuumed and then discharged to the sanitary sewer.

3.13 Compliance Schedule

There is no compliance schedule.

3.14 Antidegradation

Implementation of the Antidegradation Policy follows a tiered approach pursuant to the federal regulations (40 CFR Section 131.12) and consistent with the Connecticut Antidegradation Policy included in the Connecticut Water Quality Standards (Section 22a-426-8(b-f) of the Regulations of Connecticut State Agencies). Tier 1 Antidegradation review applies to all existing permitted discharge activities to all waters of the state. Tiers 1 and 2 Antidegradation reviews apply to new or increased discharges to high quality waters and wetlands, while Tiers 1 and 3 Antidegradation reviews apply to new or increased discharges to outstanding national resource waters.

This discharge is an existing discharge, and the Permittee does not propose an increase in volume or concentration of constituents. Therefore, only the Tier 1 Antidegradation Evaluation and Implementation Review was conducted to insure that existing and designated uses of surface waters and the water quality necessary for their protection are maintained and preserved, consistent with Connecticut Water Quality Standards, Regs. Conn. State Agencies Sec.22a-426-8(a)(1). This review involved:

- An evaluation of narrative and numeric water quality standards, criteria and associated policies;
- Consideration of the discharge activity both independently and in the context of other dischargers in the affected waterbodies; and

- Consideration of any impairment listed pursuant to Section 303d of the federal Clean Water Act or any TMDL established for the waterbody.

DEEP has determined that the discharges or activities are consistent with the maintenance, restoration, and protection of existing and designated uses assigned to the receiving water body by considering all relevant data. Compliance with all the terms and conditions in the new permit would ensure that existing and designated uses of surface waters and the water quality necessary for their protection are maintained and preserved.

3.15 Anti-Backsliding

This permit has effluent limitations, standards or conditions that are at least as stringent as the final effluent limitations, standards, or conditions in the previous permit as required in 40 CFR Section 122.44(l) and Regs. Conn. State Agencies Section 22a-430-4(l)(4)(A)(xxiii).

3.16 Categorical Discharge Conditions

There are no categorical discharge conditions.

3.17 Intake Structure

Section 316(b) of the Federal Water Pollution Control Act, U.S.C. Section 1326(b) states that "any standard established pursuant to Section 301 or 306 of this Act and applicable to a point source shall require that the location, design, construction, and capacity of cooling water intake structures ("CWIS") reflect the best technology available ("BTA") for minimizing adverse environmental impact".

The federal regulations establish requirements under Section 316(b) of the CWA for existing power generating facilities and existing manufacturing and industrial facilities with a cooling water intake structure having a design intake flow greater than 2 million gallons per day of water from waters of the United States and use at least 25 percent of the water they withdraw exclusively for cooling purposes. Section 125.92 defines "Cooling water intake structure" as "the total physical structure and any associated constructed waterways used to withdraw cooling water from waters of the United States. The cooling water intake structure extends from the point at which water is first withdrawn from waters of the United States up to and including the intake pumps."

Section 125.90(b), states "Cooling water intake structures not subject to requirements under Section 125.94 through 125.99 or subparts I or N of this part must meet requirements under Section 316(b) of the CWA established by the Director on a case-by-case, best professional judgment (BPJ) basis."

The water withdrawn at the facility's intake structure described in Section 1.4.1 of this fact sheet is not used for cooling purposes. Therefore, Section 316(b) of the CWA is not applicable.

3.18 Variances and Waivers

The facility did not request a variance or a waiver.

3.19 E-Reporting

The Permittee is required to electronically submit documents in accordance with 40 CFR Section 127.

Section 4 Summary of New Permit Conditions and Limits from the Previous Permit

- Monitoring tables for acute toxicity testing (DSN 001 and 002) have been added to the permit. These tables do not change the testing requirements, rather they change the way the acute toxicity

monitoring data are reported by the Permittee. The Permittee is now required to electronically report toxicity results and paired chemical and receiving water data through NetDMR with the annual DMR reports.

- The sample type was changed from grab to composite because the discharge is a continuous flow.
- The salinity range for conducting aquatic toxicity was changed from 25 ± 2 ppt to 28 ± 2 ppt because the proposed salinity is closer to the range in the receiving waterbody.
- Sulfate monitoring requirements were removed because the wastewater sulfate concentrations do not vary significantly from the typical sulfate concentrations of 2,700 mg/l in saltwater.
- Biochemical Oxygen Demand ("BOD5") monitoring requirements were removed because continuous monitoring showed that BOD5 was always below the minimum level of 4 mg/L.
- To better describe the monitoring location, the monitoring location description of DSN 001-1 discharge in Tables A and B was changed from "15" P.V.C drain outside of the building" to "Inside the fiberglass drain immediately before the 15-inch P.V.C drain outside the laboratory".

Section 5 Public Participation Procedures

5.1 Information Requests

The application has been assigned the following numbers by the Department of Energy and Environmental Protection. Please use these numbers when corresponding with this office regarding this application.

Application No. 202505184 Permit ID No. CT0028631

Interested persons may obtain copies of the application from Jennifer Williams, University of Connecticut, Department of Marine Sciences, 1080 Shennecossett Road, Groton, CT 06340.

The application is available for inspection by contacting Oluwatoyin Fakilede at Oluwatoyin.fakilede@ct.gov, at the Department of Energy and Environmental Protection, Bureau of Materials Management and Compliance Assurance, 79 Elm Street, Hartford, CT 06106-5127 from 8:30 - 4:30, Monday through Friday.

Any interested person may request in writing that his or her name be put on a mailing list to receive notice of intent to issue any permit to discharge to the surface waters of the state. Such request may be for the entire state or any geographic area of the state and shall clearly state in writing the name and mailing address of the interested person and the area for which notices are requested.

5.2 Public Comment

Prior to making a final decision to approve or deny any application, the Commissioner shall consider written comments on the application from interested persons that are received within 30 days of this public notice. Written comments should be directed to Oluwatoyin Fakilede, Environmental Engineer 3, Bureau of Materials Management and Compliance Assurance, Department of Energy and Environmental Protection, 79 Elm Street, Hartford, CT 06106-5127 or DEEP.IndustrialNPDESPublicComments@ct.gov and should indicate the Permit ID No. CT0028631 in the subject line. The Commissioner may hold a public hearing prior to approving or denying an application if in the Commissioner's discretion the public interest will be best served thereby, and shall hold a hearing upon receipt of a petition signed by at least twenty five (25) persons. Notice of any public hearing shall be published at least thirty (30) days prior to the hearing.

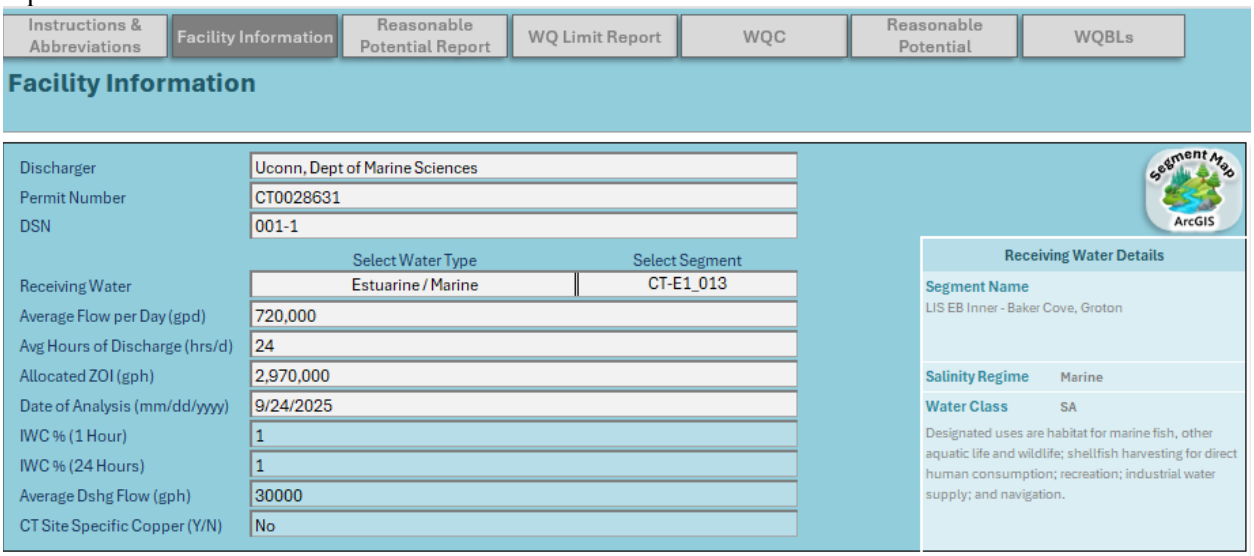
Petitions shall be submitted within thirty (30) days from the date of publication of this public notice and should include the application number noted above and also identify a contact person to receive notifications. Petitions may also identify a person who is authorized to engage in discussions regarding the

application and, if resolution is reached, withdraw the petition. Upon receipt of a petition, the Commissioner shall take action as required by relevant laws, including Public Act 25-84, which was effective upon passage in June 2025. The Office of Adjudications will accept electronically-filed petitions for hearing in addition to those submitted by mail or hand-delivered. Petitions with required signatures may be sent to deep.adjudications@ct.gov; those mailed or delivered should go to the DEEP Office of Adjudications, 79 Elm Street, Hartford, CT 06106. If the signed original petition is only in an electronic format, the petition must be submitted with a statement signed by the petitioner that the petition exists only in that form. Original petitions that were filed electronically must also be mailed or delivered to the Office of Adjudications within 30 days of electronic submittal. Additional information can be found at www.ct.gov/deep/adjudications.

The Connecticut Department of Energy and Environmental Protection is an Affirmative Action/Equal Opportunity Employer that is committed to complying with the requirements of the Americans with Disabilities Act ("ADA"). If you are seeking a communication aid or service, have limited proficiency in English, wish to file an ADA or Title VI discrimination complaint, or require some other accommodation, including equipment to facilitate virtual participation, please contact the DEEP Office of Diversity and Equity at 860-418-5910 or by email at deep.accommodations@ct.gov. Any person needing an accommodation for hearing impairment may call the State of Connecticut relay number - 711. In order to facilitate efforts to provide accommodation, please request all accommodations as soon as possible following notice of any agency hearing, meeting, program, or event.

Appendix: Reasonable Potential Analysis

Input data



Chemical Type	Chemical Name	CASRN	Maximum Value	Number of results >20=20	Coefficient of Variance	Number of Samples / Month for Permit Limit
Metals & Inorganics	Ammonia	7664417	130	10	0.7	4
Metals & Inorganics	Copper	7440508	25	10	0.5	4
Metals & Inorganics	Lead	7439921	10	10	0.7	4
Metals & Inorganics	Zinc	7440666	146	10	1.7	4

Reasonable Potential Analysis Result

Chemical Type	Chemical Name	CASRN	Estimated Maximum Concentration in Effluent	Waste Load Allocation	Limit Needed?	Governing WLA
Metals & Inorganics	Ammonia	7664417	455		WQ Group	
Metals & Inorganics	Copper	7440508	65	310	No	Chronic
Metals & Inorganics	Lead	7439921	35	810	No	Chronic
Metals & Inorganics	Zinc	7440666	1,504	8,100	No	Chronic