U.S. ENVIRONMENTAL PROTECTION AGENCY

NATIONAL STUDY OF NUTRIENT REMOVAL AND SECONDARY TECHNOLOGIES: POTW SCREENER QUESTIONNAIRE

Form Approved
OMB Control No. XXXX-XXXX
Approval Expires XX/XX/XXXX

The public reporting and recordkeeping burden for this collection of information is estimated to average 3.3 hours per response. Burden means the total time, effort, or financial resources expended by persons to generate, maintain, retain, or disclose or provide information to or for a Federal agency. This estimate includes the time needed to review instructions, develop, acquire, install, and utilize technology and systems for the purposes of collecting, validating, and verifying information, processing and maintaining information, and disclosing and providing information; adjust the existing ways to comply with any previously applicable instructions and requirements; train personnel to be able to respond to a collection of information; search data sources; complete and review the collection of information; and transmit or otherwise disclose information. An agency may not conduct or sponsor, and a person is not required to respond to, a collection of information unless it displays a currently valid OMB control number.

DRAFT
Thank you for participating in the National Study of Nutrient Removal and Secondary Technologies: POTW Screener Questionnaire!

NOTE: ***The survey is designed as an electronic questionnaire, therefore this paper copy does not accurately reflect formatting, spacing, and Section 508 coding. Text in boldfaced red is provided where the electronic questionnaire has a skip pattern.***

INTRODUCTION

EPA requests information for calendar year 2017. The questionnaire is voluntary and should be completed by personnel knowledgeable about the operation of the facility. Please read each question carefully and provide the appropriate response(s).

Key terms are defined throughout the questionnaire in footnotes. Key terms and acronyms are also defined in **GLOSSARY** and **ACRONYMS** on page 3.

You may provide any clarifying notes in the **FINAL COMMENTS** section at the end of the questionnaire. For example, you may indicate if information provided for the calendar year 2017 is not representative of normal operations.

EPA is not requesting you perform non-routine tests or measurements solely for the purpose of responding to this questionnaire. In the event exact data or information are not available, provide responses using your best professional judgement.

QUESTIONNAIRE ASSISTANCE

If you have any questions about completing this questionnaire, you can request assistance using the e-mail and telephone Helplines provided below.

EPA POTW Screener Questionnaire Helplines Eastern Research Group, Inc……1696 877-353-7560

WHEN TO RETURN THE QUESTIONNAIRE

All facilities that request a paper copy of this questionnaire are requested to submit their response no later than ***XXX XX, 2018***. EPA recommends making a copy of your completed questionnaire and keeping it for two years.

WHERE TO RETURN THE QUESTIONNAIRE

If you complete a hardcopy screener questionnaire, use the enclosed mailing label to mail the completed questionnaire to:

U.S. Environmental Protection Agency
POTW Screener Questionnaire
c/o Eastern Research Group, Inc.
14555 Avion Parkway, Suite 200
Chantilly, VA 20151-1102

ACRONYMS

BOD_5	5-Day Biochemical Oxygen Demand
COD	Chemical Oxygen Demand
$cBOD_5$	Carbonaceous Biochemical Oxygen Demand (5-day)
CWA	Clean Water Act
MGD	Million Gallons per Day
NPDES	National Pollutant Discharge Elimination System
POTW	Publicly Owned Treatment Works
TKN	Total Kjeldahl Nitrogen
TOC	Total Organic Carbon
TSS	Total Suspended Solids
WWTP	Wastewater Treatment Plant

GLOSSARY

5-Day Biochemical Oxygen Demand (BOD_5): A measure of the oxygen demand over five days to biologically degrade organic matter in wastewater.

Biological Nutrient Removal (BNR): A wastewater treatment system that is engineered to remove the nutrients nitrogen and phosphorus in amounts greater than the basic metabolic needs of the biological treatment system. BNR processes are often a variation of conventional activated sludge processes and incorporate additional biological processes into wastewater treatment systems to further reduce nutrients from the wastewater.

Carbonaceous Biochemical Oxygen Demand ($cBOD_5$): A measure of the oxygen demand to biologically degrade organic material in wastewater (carbonaceous demand), excluding biodegradation of forms of nitrogen (nitrogenous demand).

Chemical Oxygen Demand (COD): A measure of the oxygen demand to oxidize inorganic and organic matter in wastewater.

Combined Sewer Collection System: Wastewater systems that are designed to collect rainwater runoff, domestic sewage, and industrial wastewater in the same pipe. Most of the time, combined sewer systems transport all of their wastewater to a sewage treatment plant, where it is treated.

Complex Treatment Pond System: A multi-cell pond or lagoon system, with multiple cells aligned in series, designed to receive, hold, and treat wastewater.

Continuous Discharge: Discharge occurs throughout the year.

Controlled or Intermittent Discharge: Discharge only occurs at certain times or during certain times of the year.

Daily Flow: The average daily flow for any calendar month in the year.

Design Capacity Flow: A wastewater flow rate, typically expressed in volume (gallons) per day, that the treatment works was designed to process. Design capacity may be identified in the treatment works' NPDES permit or in the treatment works' design documentation**.**

Headworks: The point at which wastewater enters a wastewater treatment plant. The headworks may consist of bar screens, a comminutor, wet wells, or pumps.

Maximum Capacity Flow or Peak Flow: The treatment works' designed maximum capacity, including capacity for diurnal variations, wet weather, safety factors, and/or other higher than average sustained flowrates that may occur during any given 24-hour period. These are fixed values based on facility design and do not vary based on facility operation.

Municipality: A city, town, borough, county, parish, district, association, or other public body created by or pursuant to State law and having jurisdiction over disposal of sewage, or an Indian tribe or an authorized Indian tribal organization, or a designated and approved management agency under section 208 of the CWA.

National Pollutant Discharge Elimination System (NPDES): The national program for issuing, modifying, revoking and reissuing, terminating, monitoring and enforcing permits, and imposing and enforcing pretreatment requirements under the CWA. The NPDES permit number is assigned by the respective state or EPA Region and generally includes the state abbreviation in the number.

Nutrient Recovery: The practice of recovering nutrients, such as nitrogen and phosphorus, from wastewater streams that would otherwise be discharged to the environment and converting them into useful products.

Package Plant: A pre-manufactured treatment works used to treat wastewater in small communities or on individual properties.

Publicly Owned Treatment Works (POTW): A treatment works that is owned by a State, municipality, or tribal organization, including facilities owned by counties, sanitary sewer districts, or other approved management agencies. A POTW is usually designed to treat domestic sewage and not industrial wastewater.

Recommended Standards for Wastewater Facilities: A document of *Policies for the Design*, *Review*, *and Approval of Plans and Specifications for Wastewater Collection and Treatment Facilities*, written as a report of the Wastewater Committee of the Great Lakes – Upper Mississippi River Board of State and Provincial Public Health and Environmental Managers.

Often referred to as "*The Ten State Standards*."

Separate Sewer Collection System: wastewater systems that are designed to collect and convey sanitary wastewater (domestic sewage from homes as well as industrial and commercial wastewater), but not stormwater or runoff. In municipalities served by separate sanitary sewers, separate storm drains may convey stormwater and runoff. Separate sewer systems are distinguished from *combined sewers*, which combine sewage and stormwater in one pipe.

Septage: Also known as septic tank sludge, septage is the liquid or solid material removed from a septic tank cesspool, portable toilet, type III marine sanitation device, or a similar system. Septage may be transported to and discharged directly into an NPDES permitted POTW.

Simple Pond: A single-cell, earthen basin designed to receive, hold, and naturally treat wastewater.

Total Nitrogen: The sum of total Kjeldahl nitrogen and nitrate and nitrite.

Total Kjeldahl Nitrogen (TKN): The sum of ammonia and organic nitrogen.

Total Suspended Solids (TSS): The portion of organic and inorganic solids retained on a filter.

Treatment System: The portion of the treatment works which is designed to provide physical, chemical, and/or biological treatment (including recycling and reclamation) of municipal sewage and industrial waste.

Treatment Works: Devices and systems used in the storage, treatment, recycling, and/or reclamation of municipal sewage. It also includes sewers, pipes, and other conveyances only if they convey wastewater to a treatment plant.

Typical High Flow: The average of the daily flow measurements taken during a one-month period of high flows, typically one month of significant rainfall, snowmelt, and/or significant volumes of inflow and infiltration. Flow averages should exclude days without flow readings.

Wet Weather System: The system through which flow is diverted past portions of the treatment works during wet weather events.

DRAFT

POTW

SCREENER QUESTIONNAIRE

OMB Control No. XXXX-XXXX
Approval Expires XX/XX/XXXX

Responses must be received no later than *XXX XX, 2018*.

EPA requests information for calendar year 2017.

Section A ELIGIBILITY CONFIRMATION

1. Is this facility a treatment works[1] used for the storage, treatment, recycling, and/or reclamation of municipal sewage? For purposes of this questionnaire, the term *treatment works* is used interchangeably with the terms publicly-owned treatment works (POTW), sewage treatment plant (STP), domestic wastewater treatment plant, wastewater treatment facility (WWTF), wastewater treatment plant (WWTP), and water resource recovery facility (WRRF).

☐ Yes

☐ No

IF YOU ANSWERED "NO" TO QUESTION 1, DO NOT COMPLETE THE REMAINDER OF THIS QUESTIONNAIRE.

[1] Treatment works means devices and systems used in the storage, treatment, recycling, and/or reclamation of municipal sewage. It also includes sewers, pipes, and other conveyances only if they convey wastewater to a treatment plant.

2. Which of the following describes the ownership of your treatment works? Select all that apply.

- ☐ Publicly owned[2] (owned by a State, municipality,[3] or tribal organization, includes facilities owned by counties, sanitary sewer districts, or other approved management agencies)
- ☐ Privately owned (owned by a private individual or private organization)
- ☐ Federally owned (owned by the U.S. federal government)

IF YOU DID NOT ANSWER "PUBLICLY OWNED" TO QUESTION 2, DO NOT COMPLETE THE REMAINDER OF THIS QUESTIONNAIRE.

3. Is your treatment works physically capable of <u>directly</u> discharging treatment system effluent to a surface water? This discharge may be continuous[4] or intermittent (controlled)[5].

- ☐ Yes
- ☐ No

IF YOU ANSWERED "NO" TO QUESTION 3, DO NOT COMPLETE THE REMAINDER OF THIS QUESTIONNAIRE.

[2] Publicly owned means owned by a State, municipality, or tribal organization.
[3] Municipality means a city, town, borough, county, parish, district, association, or other public body created by or pursuant to State law and having jurisdiction over disposal of sewage, or an Indian tribe or an authorized Indian tribal organization, or a designated and approved management agency under section 1288 of the CWA.
[4] Continuous discharge occurs throughout the year.
[5] Controlled or intermittent discharge occurs only at certain times or during certain times of the year.

Section B POTW IDENTIFICATION

4. Print your facility name: _____

5. Print your treatment works' U.S. Postal Service (USPS) mailing address:

Street: _____

PO/Apt/Suite: _____

City: _____

State: _____

Zip Code: _____

5-1. Print the physical location of the treatment works, if different from the mailing address:

Street: _____

Address Line 2_____

City: _____

State: _____

Zip Code: _____

6. If we have any questions about your response, whom may we contact?

Name: _____

Street: _____

PO/Apt/Suite: _____

City: _____

State: _____

Zip Code: _____

Daytime Phone: _____ Extension_____

e-Mail: _____ @ _____ . _____

7. Print the National Pollutant Discharge Elimination System (NPDES)[6] permit number associated with this treatment works. Also print the state-issued wastewater discharge permit number associated with this treatment works if it is known and applicable. If you do not have an NPDES or state-issued wastewater discharge permit, then please select 'Do not have an NPDES permit (nor state equivalent).'

☐ Individual NPDES permit

NPDES Permit Number*:* _____

☐ General NPDES permit

NPDES Permit Number*:* _____

☐ State-issued wastewater discharge permit number

State Permit Number*:* _____

OR

☐ Do not have an NPDES permit (nor state equivalent)

[6] The NPDES program is the national program for issuing, modifying, revoking and reissuing, terminating, monitoring and enforcing permits, and imposing and enforcing pretreatment requirements under the CWA. The NPDES permit number is assigned by the respective state or EPA Region and generally includes the state abbreviation in the number.

Section C POTW OPERATIONS AND TREATMENT CHARACTERISTICS

8. Which of the following best describes the maximum population served by your treatment works at any time in 2017? Select the most applicable.

- ☐ < 750 individuals
- ☐ 750 – < 5,000 individuals
- ☐ 5,000 – < 10,000 individuals
- ☐ 10,000 – < 50,000 individuals
- ☐ 50,000 – < 100,000 individuals
- ☐ 100,000 – < 300,000 individuals
- ☐ 300,000 – < 1,000,000 individuals
- ☐ > 1,000,000 individuals

9. Did the population served vary seasonally by more than 50 percent (e.g., college town, vacation resort, snowbird destination) in 2017?

- ☐ Yes
- ☐ No

10. Is this POTW a package plant[7]?

- ☐ Yes
- ☐ No

11.

Which of the following discharge or disposal methods does your treatment works use to manage treatment system effluent? Select all that apply.

- ☐ Direct discharge to a surface water) ⇨ **Respond to Question 11-1 and 11-2**
- ☐ Discharge to another POTW ⇨ **Respond to Question 11-3**
- ☐ Discharge to a non-publicly owned treatment works (e.g., privately or federally owned)
- ☐ 100% reuse
- ☐ Evaporation
- ☐ Other disposal method (e.g., underground injection, groundwater recharge, land application)

[7] A package plant is a pre-manufactured treatment works used to treat wastewater in small communities or on individual properties.

Describe 'Other disposal method:'_____

_____

_____

_____

11-1. If you indicated that your treatment works directly discharges to a surface water in Question 11-1, did your treatment works operate continuous or intermittent (controlled) discharge in 2017?

☐ Continuous Discharge

☐ Controlled or Intermittent Discharge

11-2. If you indicated that your treatment works directly discharges to a surface water in Question 11, provide the name of the receiving surface water(s) and provide the latitude and longitude of the outfall location(s) if known and readily available:

Receiving Surface Water Name	Latitude	Longitude	Lat/Long Unknown
			☐
			☐
			☐

11-3. If you indicated that your treatment works discharges to another POTW in Question 11-1, enter the name of that facility and any other information you have available.

Facility Name:_____(required)

Street: _____

_____

City: _____

_____

State: _____

_____

Zip Code:_____

_____

12. Do you estimate the treatment works' daily flow[8] increased by 30 percent or more after a typical rainfall event in 2017?

Please note rigorous calculations are not required to answer this question; this question seeks to address whether typical rainfall events pose a significant source of flow to your treatment plant.

☐ Yes

☐ No

☐ Unknown

13. What was your 2017 design capacity flow?Do not include additional flow capacity reserved for primary treatment units only.

☐ Less than 1 MGD ⇨ **Skip to Question 14**

☐ Greater than or equal to 1 MGD ⇨ **Continue**

13-1. Enter the design capacity flow of your treatment works in 2017.

Design Capacity Flow: ☐ MGD

13-2. This design capacity flow is also my NPDES permitted flow.

☐ Yes

☐ No

☐ Unknown

13-3. The design flow of my treatment works is based on the *Recommended Standards for Wastewater Facilities*[9] (i.e., the "*Ten State Standards*")?

☐ Yes

☐ No

☐ Unknown

[8] Daily Flow is the average daily flow for any calendar month in 2016.

[9] Recommended Standards for Wastewater Facilities is a document of *Policies for the Design, Review, and Approval of Plans and Specifications for Wastewater Collection and Treatment Facilities*, written as a report of the Wastewater Committee of the Great Lakes – Upper Mississippi River Board of State and Provincial Public Health and Environmental Managers. Often referred to as "*The Ten State Standards*."

13-4. Enter the Maximum Capacity Flow[10] or Peak Capacity Flow[13] (fixed values based on facility design).

Maximum Capacity Flow or Peak Capacity Flow:

☐ MGD ☐ Unknown

14. What were the actual operational flows to your treatment works in the calendar year 2017? Only use 2017 flow data for your averaging period.

Daily Flow (e.g., average daily flow or total daily flow):

☐ MGD ☐ Unknown

Typical High Flow[11]:

☐ MGD ☐ Unknown

⇨ If your treatment works served < 750 individuals" (Question 8) AND has a design capacity flow less than 1 MGD (Question 13): ⇨ Skip to Question 18a

⇨ All others: ⇨ Continue

[10] Maximum Capacity Flow or Peak Capacity Flow are the treatment works' designed maximum capacity, including capacity for diurnal variations, wet weather, safety factors, and/or other higher than average sustained flowrates that may occur during any given 24-hour period. These are fixed values based on facility design and do not vary based on facility operation.

[11] Typical High Flow is the average of the daily flow measurements taken during a one-month period of high flows, typically one of the months of significant rainfall, snowmelt, and/or significant volumes of inflow and infiltration. Flow averages should exclude days without flow readings.

15. In 2017, which type(s) of collection system fed into the treatment works? Estimate percentages of contribution based on sewered population using best professional judgement. Round up to the nearest whole percentage/integer. The sum of all responses must equal 100 percent. Please enter zero (0) if no contribution was received from a particular source.

Separate Sewer Collection System[12]		%
Combined Sewer Collection System[13]		%
Hauled from off-site:		%
Other:		%
Total:	100%	%

16. Indicate what percentage(s) by volume of the wastewater treated at your treatment works was from each of the following sources in 2017. Estimate using best professional judgement. Round up to the nearest whole percentage/integer. The sum of all responses should equal 100 percent. Please enter zero (0) if no contribution was received from a particular source.

Please note that the category of 'septage' is intended to cover septic tank sludge and is the liquid or solid material removed from a septic tank cesspool, portable toilet, type III marine sanitation device, or a similar system. Septage may be transported to and discharged directly into an NPDES permitted POTW. It should be accounted for separately from collected residential, commercial, and industrial wastewater. Boiler blowdown should be accounted for in the category of Commercial/Institutional. Examples of the category of 'Other' include onsite stormwater, onsite landfill leachate, and other POTW effluent.

Residential		%
Commercial/Institutional (e.g., schools, hotels, restaurants)		%
Septage:		%

[12] Separate Sewer Collection Systems are wastewater systems designed to collect and convey sanitary wastewater (domestic sewage from homes as well as industrial and commercial wastewater), but not stormwater or runoff. In municipalities served by separate sanitary sewers, separate storm drains may convey stormwater and runoff. Separate sewer systems are distinguished from *combined sewers*, which combine sewage and stormwater in one pipe.

[13] Combined sewer collection systems are wastewater systems that are designed to collect rainwater runoff, domestic sewage, and industrial wastewater in the same pipe. Most of the time, combined sewer systems transport all of their wastewater to a sewage treatment plant, where it is treated.

Industrial:		%
Stormwater and other:		%
Total:	100%	%

Describe 'Other:'_____

_____

16-1. If you indicated industrial contributions in Question 16, did flows from industrial contributions vary by more than 25 percent (excluding diurnal fluctuations) at any point in 2017?

☐ Yes

☐ No

17. Did your treatment works receive process wastewater from one or more of the following industrial sources in 2017? Select all that apply.

☐ Airport deicing

☐ Dairy products (e.g. milk or cheese), animal processing (e.g., meat processing, poultry processing, aquaculture)

☐ Breweries/microbreweries

☐ Chemical, fertilizer, or phosphate manufacturing

☐ Grain milling

☐ Metals manufacturing and processing (e.g., electroplating, smelting, iron and steel)

☐ Non-animal food processing

☐ Petroleum refining

☐ Pharmaceutical manufacturing

☐ Pulp and paper manufacturing

☐ Steam electric power

☐ Oil and gas

☐ None of the above

☐ Other significant industrial source of nutrients

Describe 'Other significant industrial source of nutrients:'_____

___

_____

___

DO NOT COMPLETE BOTH VERSIONS OF QUESTION 18.

⇨ If your treatment works served < 750 individuals" (Question 8) AND has a design capacity flow less than 1 MGD (Question 13): ⇨ Continue to Question 18a

⇨ All others: ⇨ Skip to Question 18b **18a.** Which of the following treatment technologies were included in the treatment works in 2017? Select all that apply.

☐ Preliminary (e.g., grit removal, flow equalization, screening)

☐ Primary treatment (e.g., primary clarification)

☐ Biological treatment **⇨ Respond to Question 18a-2**

18a-2 If you indicated biological treatment, indicate which types of biological treatment technologies were operated in 2017. Select all that apply.

☐ Suspended growth: Tank/reactor system (e.g., sequencing batch reactor, conventional activated sludge, oxidation ditch)

☐ Attached growth (e.g., trickling filter, activated biofilter, rotating biological contactor, fixed-film reactor)

☐ Suspended growth: Natural wastewater treatment system (e.g., waste stabilization pond, wetland, facultative lagoon) **⇨ Respond to Questions 18a-2.1 and 18a-2.2**

18a-2.1 If you indicated Suspended growth: Natural wastewater treatment system, please indicate which types of natural wastewater treatment systems were operated in 2017. Select all that apply.

☐ Simple (single cell) pond[14]

[14] A simple pond is a single-cell, earthen basin designed to receive, hold, and naturally treat wastewater.

☐ Complex (multi-cell) treatment pond system[15]

☐ Wetland or vegetative pond (e.g., constructed wetland, hyacinth pond, duckweed pond)

☐ Terrestrial treatment (e.g., soil aquifer treatment/rapid infiltration, overland flow system)

18a-2.2. Was any portion of your Suspended growth: natural wastewater treatment system mechanically aerated at any time in 2017?

☐ Yes

☐ No

⇨ Skip to Question 23

18b. Which of the following treatment technologies were included in the treatment works in 2017? Select all that apply.

☐ Preliminary (e.g., grit removal, flow equalization, screening)

☐ Primary treatment (e.g., primary clarification, chemically-enhanced primary treatment [CEPT]) **⇨ Respond to Question 18b-1**

☐ Biological treatment **⇨ Respond to Questions 18b-2 and 18b-3**

☐ Physical and/or chemical treatment **⇨ Respond to Question 18b-3**

18b-1. If you indicated primary treatment, is any chemical addition or chemical treatment in primary treatment specifically for the purposes of nutrient removal?

☐ Yes

☐ No

18b-2. If you indicated biological treatment, indicate which types of biological treatment technologies were operated in 2017. Select all that apply.

In the following section, BNR stands for Biological Nutrient Removal. BNR means the wastewater treatment system is engineered to remove the nutrients nitrogen and phosphorus in amounts greater than the basic metabolic needs of the biological treatment system. BNR processes are often a variation of conventional activated sludge processes and incorporate additional biological processes into wastewater treatment systems to further reduce nutrients from the wastewater.

☐ Suspended growth: Natural wastewater treatment system (e.g., waste stabilization pond, wetland, facultative lagoon). **⇨ Respond to Questions 18b-2.1 and 18b-2.2**

[15] A complex treatment pond system is a multi-cell pond or lagoon system, with multiple cells aligned in series, designed to receive, hold, and treat wastewater.

☐ Suspended growth: Tank/reactor system (e.g., sequencing batch reactor, conventional activated sludge, A2O, Modified Ludzack-Ettinger [MLE], Bardenpho, oxidation ditch)

☐ Attached growth ⇨ **Respond to Question 18b-2.3**

☐ Combined suspended/attached growth systems (e.g., integrated fixed film activated sludge, moving-bed biofilm reactor)

☐ Biological sidestream treatment (e.g., SHARON, ANAMMOX©, PhoStrip)

18b-2.1 If you indicated Suspended growth: Natural wastewater treatment system, indicate which types of natural wastewater treatment systems were operated in 2017. Select all that apply.

☐ Simple (single cell) pond[15]

☐ Complex (multi-cell) treatment pond system[16]

☐ Wetland or vegetative pond (e.g., constructed wetland, hyacinth pond, duckweed pond)

☐ Terrestrial treatment (e.g., soil aquifer treatment/rapid infiltration, overland flow system)

18b-2.2. If you indicated Suspended growth: Natural wastewater treatment system, was any portion of your natural wastewater treatment system mechanically aerated at any time in 2017?

☐ Yes

☐ No

18b-2.3. If you indicated Attached growth, which of the following describes your attached growth biological treatment technology used in 2017. Select all that apply.

☐ Trickling filter system (e.g., trickling filter with any media, activated biofilter)

☐ Other than trickling filter system (e.g., rotating biological contactor, fixed-film reactor, denitrification filtration)

18b-3. If you indicated biological treatment, indicate the average seasonal wastewater temperatures (winter and summer) of the biological treatment system for your treatment works in 2017. Please note this question is not asking for the temperature at the outfall.

Season	Temperature Units
lest	☐ ^{o}C ☐ ^{o}F
rmest	☐ ^{o}C ☐ ^{o}F

18b-4. If you indicated physical and/or chemical treatment, indicate which types of physical and/or chemical treatment technologies were present in the treatment works in 2017. Also indicate if any of these physical and/or chemical treatment technologies were specifically operated for nutrient removal and/or recovery in 2017. Select all that apply.

Treatment Technology	Present in Treatment Works	Operated for Nutrient Removal and/or Recovery
Ammonia oxidation with chlorine (e.g., breakpoint chlorination)	☐	☐
Chemically-assisted clarification for reasons other than nutrient removals (e.g., chemical oxidants, coagulants, flocculants, metals precipitants, proprietary additives)	☐	Not Applicable
Chemical phosphorus precipitation	☐	☐
Disinfection	☐	☐
Gas stripping (e.g., ammonia stripping, air stripping)	☐	☐
Ion separation/exchange	☐	☐
Media/Granular filtration (e.g., sand, mixed media, granular activated carbon [GAC], fuzzy)	☐	☐
Membrane filtration (e.g., ultrafiltration, reverse osmosis, microfiltration)	☐	☐
Solids separation (e.g., clarification, sedimentation, settling, dissolved air flotation [DAF])	☐	☐
Surface filtration (e.g., cloth, cartridge and bag filter)	☐	☐

Treatment Technology	Present in Treatment Works	Operated for Nutrient Removal and/or Recovery
Other physical and/or chemical technology	☐	☐

Describe 'Other physical and/or chemical technology:' _____

_____

_____

_____

19. What type(s) of process control did your treatment works use in 2017? Select all that apply.

☐ Manual (Operator Controlled)

☐ Automatic (Computerized Control)

☐ None ⇨ **Skip to Question 20**

19-1. Please indicate which parameters were used for process control and how each parameter was measured in 2017. Select all that apply.

Parameter		
	Manual	**Automatic**
Dissolved Oxygen (DO)	☐	☐
Influent Flow	☐	☐
Internal Recycle Flow	☐	☐
Mixed Liquor Suspended Solids (MLSS)	☐	☐
Nitrate and/or Nitrite	☐	☐
Organics (including BOD, COD, TOC)	☐	☐
Oxidation-Reduction Potential (ORP)	☐	☐
pH	☐	☐
Phosphate-orthophosphate	☐	☐
Solids Retention Time (SRT)	☐	☐
Sludge Blanket Depth	☐	☐
Temperature	☐	☐
Ammonia	☐	☐
Total Suspended Solids (TSS)	☐	☐
Other	☐	☐

Describe 'Other:'_____
_____

_____

.

20. Please indicate if your treatment works has implemented any capital upgrades or operational changes that resulted in nutrient removal or improved energy efficiency (e.g., energy audit, energy optimization) in the past 10 years. Select all that apply.

Action	Objective
Capital Upgrades (e.g., baffles, added tank capacity, new treatment unit, pumps and piping for additional return and recycle lines)	☐ Nutrient removal ☐ Energy efficiency ☐ Not applicable
Operational Changes (e.g., adjusting residence time or mechanical aeration, additional monitoring probes in biological treatment, upgraded process control)	☐ Nutrient removal ☐ Energy efficiency ☐ Not applicable

20-1. Please indicate if your treatment works is planning to implement any capital upgrades or operational changes specifically for nutrient removal or to improve energy efficiency (e.g., energy audit, energy optimization) in the next 3 years. Select all that apply.

Action	Objective
Capital Upgrades (e.g., baffles, added tank capacity, new treatment unit, pumps and piping for additional return and recycle lines)	☐ Nutrient removal ☐ Energy efficiency ☐ Not applicable
Operational Changes (e.g., adjusting residence time or mechanical aeration, additional monitoring probes in biological treatment, upgraded process control)	☐ Nutrient removal ☐ Energy efficiency ☐ Not applicable

22. Respond to the following three questions (Questions 22-1 through 22-3) to indicate if your treatment works may have been designed to achieve objectives for BNR or achieves these objectives for BNR through process optimization and/or other operational changes.

22-1. Which nutrients, if any, were removed by your treatment works in 2017? This does not include incidental nutrient removals due to the basic metabolic requirements of your biological treatment system. Select all that apply.

- ☐ Ammonia
- ☐ Nitrogen
- ☐ Phosphorus
- ☐ Unknown

22-2. Were the average annual treatment system effluent concentrations for your treatment works below the following values in 2017? Select all that apply.

	Yes	No	Unknown
Total Nitrogen ≤ 8 mg N/L	☐	☐	☐
Total Phosphorus ≤ 1 mg P/L	☐	☐	☐

22-3. Did your treatment works utilize resource recovery practices in 2017? Select all that apply.

☐ Nutrient recovery[16] (e.g., struvite, nitrogen, phosphorus)

☐ Beneficial use of biosolids (e.g., land application)

☐ Energy recovery (e.g., digestion, biogas, primary effluent filtration [PEF] for carbon diversion)

☐ Other resource recovery practice

☐ No

23. Indicate where your treatment works monitored for ammonia in 2017. Select all that apply. If your treatment works did not monitor for ammonia in any of the following locations in 2017, check the box under Did Not Monitor. Please note, if you have more than one outfall, use your primary outfall to answer this question.

Nutrient monitored	Headworks or System Influent	Treatment System Effluent[17]	Wet Weather System Effluent[18]	Final Outfall(s)	Biosolids	Other locations within the treatment works	Did Not Monitor
Ammonia	☐	☐	☐	☐	☐	☐	☐

⇨ If your treatment works served < 750 individuals" (Question 8) AND has a design capacity flow less than 1 MGD (Question 13): ⇨ Skip to Question 25a

[16] Nutrient Recovery is the practice of recovering nutrients, such as nitrogen and phosphorus, from wastewater streams that would otherwise be discharged to the environment and converting them into useful products.

[17] Treatment System is the portion of the treatment works which is designed to provide physical, chemical, and/or biological treatment (including recycling and reclamation) of municipal sewage and industrial waste.

[18] Wet Weather System is the system through which flow is diverted past portions of the treatment works during wet weather events.

⇨All others: **⇨Continue to Question 24**

24. For each monitoring location you indicated in Question 23, what were the average annual concentrations of ammonia in the treatment works in 2017? Circle the range that best approximates the concentration of ammonia and check the appropriate unit. Please note, if you have more than one outfall, use your primary outfall to answer this question.

⇨Once you have completed Question 24, skip to Question 25b

Nutrient Parameter	Average Concentration (mg/L)				Units Select the most applicable
	Headworks or System Influent (untreated)	Treatment System Effluent (treated)	Wet Weather System Effluent	Outfall	
Ammonia	< 10 mg/L 10 – < 25 mg/L 25 – < 50 mg/L ≥ 50 mg/L	< 1 mg/L 1 – < 3 mg/L 3 – < 10 mg/L ≥ 10 mg/L	< 5 mg/L 5 – < 15 mg/L ≥ 15 mg/L	< 1 mg/L 1 – < 3 mg/L 3 – < 10 mg/L ≥ 10 mg/L	☐ NH_3 as N ☐ Other

25a. Indicate where your treatment works monitored for nutrients other than ammonia in 2017. Select all that apply. If your treatment works did not monitor for nitrogen species other than ammonia or phosphorus in any of the following locations in 2017, check the box under Did Not Monitor. Please note, if you have more than one outfall, use your primary outfall to answer this question.

⇨Once you have completed Question 25a, skip to Question 28

Nutrient monitored	Headworks or System Influent	Treatment System Effluent	Wet Weather System Effluent	Final Outfall(s)	Biosolids	Other locations within the treatment works	Did Not Monitor
Nitrogen (other than Ammonia)	☐	☐	☐	☐	☐	☐	☐
Phosphorus	☐	☐	☐	☐	☐	☐	☐

25b. Indicate where your treatment works monitored for nutrients other than ammonia in 2017. Select all that apply. If your treatment works did not monitor for a nutrient parameter in any of the following locations in 2017, check the box under Did Not Monitor. Please note, if you have more than one outfall, use your primary outfall to answer this question.

⇨Once you have completed Question 25b, continue to Question 26

Nutrient monitored	Headworks or System Influent	Treatment System Effluent	Wet Weather System Effluent	Final Outfall(s)	Biosolids	Other locations within the treatment works	Did Not Monitor
Total Nitrogen[19]	☐	☐	☐	☐	☐	☐	☐
Total Kjeldahl Nitrogen (TKN)[20]	☐	☐	☐	☐	☐	☐	☐
Nitrate or Nitrate-Nitrite (if measured together)	☐	☐	☐	☐	☐	☐	☐
Organic Nitrogen[21]	☐	☐	☐	☐	☐	☐	☐
Total Phosphorus	☐	☐	☐	☐	☐	☐	☐
Orthophosphate	☐	☐	☐	☐	☐	☐	☐

[19] Total Nitrogen is the sum of total Kjeldahl nitrogen and nitrate-nitrite.
[20] Total Kjeldahl Nitrogen (TKN) is the sum of ammonia and organic nitrogen.
[21] Organic Nitrogen is typically a calculated, not measured, value. You do not need to calculate this value for purposes of this questionnaire.

26a. Of the nutrients that you monitor, what were the average annual concentrations in the treatment works measured at any of the following locations in 2017? Circle the range that best approximates the concentration of each of the following parameters and check the appropriate unit. Please note, if you have more than one outfall, use your primary outfall to answer this question.

⇨Once you have completed Question 26, continue to Question 26b.

Nutrient Parameter	Average Concentration (mg/L)				Units Select the most applicable
	Headworks or System Influent (untreated)	**Treatment System Effluent (treated)**	**Wet Weather System Effluent**	**Outfall**	
Total Nitrogen	< 10 mg/L 10 – < 35 mg/L 35 – < 70 mg/L ≥ 70 mg/L	< 5 mg/L 5 – < 10 mg/L 10 – < 25 mg/L 25 – < 35 mg/L ≥ 35 mg/L	< 5 mg/L 5 – < 15 mg/L 15 – < 35 mg/L ≥ 35 mg/L	< 5 mg/L 5 – < 10 mg/L 10 – < 25 mg/L 25 – < 35 mg/L ≥ 35 mg/L	☐ N ☐ Other
Total Kjeldahl Nitrogen (TKN)	< 10 mg/L 10 – < 35 mg/L 35 – < 70 mg/L ≥ 70 mg/L	< 5 mg/L 5 – < 10 mg/L 10 – < 25 mg/L 25 - < 35 mg/L ≥ 35 mg/L	< 5 mg/L 5 – < 15 mg/L 15 – < 35 mg/L ≥ 35 mg/L	< 5 mg/L 5 – < 10 mg/L 10 – < 25 mg/L 25 – < 35 mg/L ≥ 35 mg/L	☐ TKN as N ☐ Other
Nitrate or Nitrate-Nitrite (if measured together)	Non-detect > 0 mg/L	< 5 mg/L 5 – < 10 mg/L 10 – < 25 mg/L 25 – < 35 mg/L ≥ 35 mg/L	< 5 mg/L 5 – < 15 mg/L 15 – < 35 mg/L ≥ 35 mg/L	< 5 mg/L 5 – < 10 mg/L 10 – < 25 mg/L 25 – < 35 mg/L ≥ 35 mg/L	☐ NO_3^-/NO_2^- as N ☐ Other
Organic Nitrogen	< 10 mg/L 10 – < 15 mg/L 15 – < 25 mg/L ≥ 25 mg/L	< 5 mg/L 5 – < 10 mg/L 10 – < 20 mg/L ≥ 20 mg/L	< 10 mg/L 10 – < 25 mg/L ≥ 25 mg/L	< 5 mg/L 5 – < 10 mg/L 10 – < 20 mg/L ≥ 20 mg/L	☐ N ☐ Other
Total Phosphorus	< 4 mg/L 4 – < 7 mg/L 7 – < 12 mg/L ≥ 12 mg/L	< 0.3 mg/L 0.3 – < 1 mg/L 1 – < 4 mg/L ≥ 4 mg/L	< 4 mg/L 4 – < 7 mg/L ≥ 7 mg/L	< 0.3 mg/L 0.3 – < 1 mg/L 1 – < 4 mg/L ≥ 4 mg/L	☐ P ☐ Other
Orthophosphate	< 3 mg/L 3 – < 6 mg/L 6 – < 10 mg/L ≥ 10 mg/L	< 0.3 mg/L 0.3 – < 1 mg/L 1 – < 4 mg/L ≥ 4 mg/L	< 3 mg/L 3 – < 6 mg/L ≥ 6 mg/L	< 0.3 mg/L 0.3 – < 1 mg/L 1 – < 4 mg/L ≥ 4 mg/L	☐ PO_4 asP ☐ Other

26b. Do you have more than one outfall? Yes ☐ No ☐

27. What were the average concentrations of BOD_5, $cBOD_5$, COD, and TSS <u>at the headworks</u> or system influent for this treatment work in 2017?

BOD_5[22]		mg/L	☐ Unknown
$cBOD_5$[23]		mg/L	☐ Unknown
COD[24]		mg/L	☐ Unknown
TSS[25]		mg/L	☐ Unknown

28. FINAL COMMENTS: This concludes the questionnaire. Provide any relevant notes or comments in this section. Operations are expected to fluctuate, but you may explain in this section if any information from calendar year 2017 is not representative of normal operations. If you need to provide additional comments, please record on separate pages and include your submission by mail.

[22] Biochemical Oxygen Demand (BOD_5) is a measure of the oxygen demand to biologically degrade organic matter in wastewater.
[23] Carbonaceous Biochemical Oxygen Demand ($cBOD_5$) is a measure of the oxygen demand to biologically degrade organic material in wastewater (carbonaceous demand), excluding biodegradation of forms of nitrogen (nitrogenous demand).
[24] Chemical Oxygen Demand (COD) is a measure of the oxygen demand to oxidize inorganic and organic matter in wastewater.
[25] Total Suspended Solids (TSS) is the portion of organic and inorganic solids retained on a filter.