

National Study of Nutrient Removal and Secondary Treatment

Operator Training Committee of Ohio
Columbus, Ohio
October 17-18, 2017

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Environmental Protection Agency



This presentation will discuss:

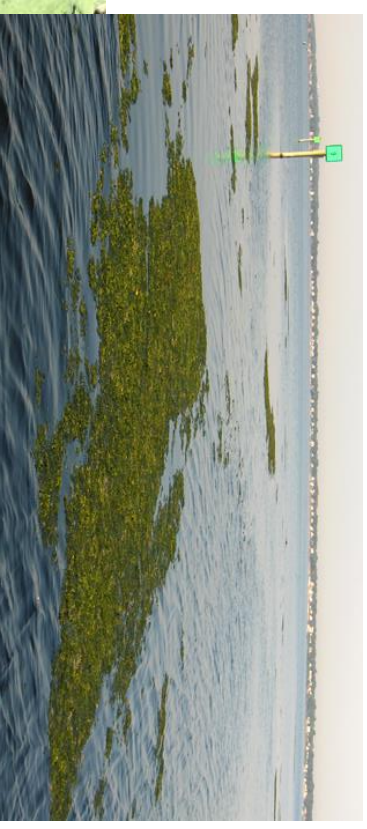
- History of EPA's Secondary Treatment Requirements
- Background on Nutrient Pollution
- Overview of the National Study of Nutrient Removal and Secondary Treatment
 - Goals
 - Outcomes
 - Design of the Study
- Present Examples (POTW Case Studies) of the Type of Information the Study will Generate
- Demonstrate the Census Questionnaire

History of Secondary Treatment

- Technology based limits that reflect the performance of secondary treatment (Federal Water Pollution Control Act of 1972)
- Limits for BOD and TSS established in the mid-1970's
- Remove the majority of the oxygen demanding constituents (BOD and COD) from municipal wastewater
- Nutrients (nitrogen and phosphorus) beyond metabolic needs of the treatment system can be removed under certain circumstances -- more on this later

Why should we be concerned about nutrients?

- Previous focus was environmental but now includes public health due to HABs and nitrate
- Elevated nutrient concentration is one of our biggest, most widespread, pervasive water quality problems
- Likely to get worse unless there is a concerted long-term effort to reduce those concentrations



Narragansett Bay;
credit Save the Bay



Credit St. Johns Riverkeeper

Why should we be concerned about nutrients?

- **Well Documented Problem and**

- **Impacts, e.g.:**

- EPA: Science Advisory Board (2007), Wadeable Streams and Lakes Assessments (2004, 2007)
- National Research Council: Mississippi River Water Quality (2008), Urban Stormwater (2008)
- USGS: Impact of Nutrients on Groundwater (2010), SPARROW Loadings (multiple years)
- Many published articles, State and university reports
- State EPA Nutrient Innovations Task Group (NITG) *Call to Action Report*



Photo credit: Bill Yates

Why should we be concerned about nutrients?

- **14,000+ Nutrient-related Impairment Listings in 49 States**
- 2.5 Million Acres of Lakes and Reservoirs & 80,000 Miles of Rivers and Streams
- >47% of Streams have Med to High Phosphorus; >53% have Med to High Nitrogen



Lake Erie, 2011, algae bloom (NASA)

Why should we be concerned about nutrients?

- **65% of Assessed Continental U.S. Coastal Area Impacted by Eutrophication**
- **168 Hypoxic Zones in U.S. Waters, including immense zone in Northwestern Gulf of Mexico**
- **Public Health Risks – Contaminated Drinking Water is Significant & Costly**
 - Rate of nitrate violations in drinking water systems **doubled** over 7 years
 - *Harmful Algal Blooms an emerging concern,*
 - 2014 Toledo, OH
 - 2016 Utah Lake, UT



Lake Erie, photo by Tom Archer



Mississippi River plume entering the Gulf of Mexico, credit Nancy Rabalais

What does this National Study do to address nutrients?

First, this study will:

Define the baseline of nutrient discharges from POTWs

- Provide accurate estimates of nutrient discharges from POTWs
- provide necessary information to set realistic, achievable nutrient reduction targets



Mississippi River Tributary flows to the Gulf of Mexico; credit NASA

What does this National Study do to address nutrients?

Second, this study will:

Characterize low-cost options that result in improved nutrient control

- Document, on a national scale
- Implement on individual scale



Credits:
Arlington,
ORACWA, YSI,
Exowater

How do we plan to achieve the Study Goals?

- Collect data that is national in scope and represents the variation in technologies, climate, and raw waste
- Focus on technology performance, process control, and system operation and maintenance
- Collect data in 3 phases

Phase 1 – Census of the POTW Population

- Implement early next year
- Short, on-line questionnaire
- Gather basic facility information
 - Location
 - General indication of contributions other than domestic, e.g., industrial, I/I
 - Size—based on population served and net average flow
 - Treatment technologies in place

Phase 1 – Census Results

- From census we can develop representative samples that will be surveyed for the follow-up phases
- Representativeness will be defined on the basis of climate, raw waste characteristics, technology in place, and indication of upgrades to achieve resource recovery

Phase 2 – Detailed Data Collection

Purpose: To gather detailed operational data, especially from facilities that have made efforts to achieve nutrient reduction by optimization

- Focus will be on secondary treatment facilities
- Phase 2 questionnaire design will require consultation with experts who have worked with POTWs to improve nutrient reduction by optimization
- Survey will be sent to representative facilities to capture differing technologies, regions (climates) and raw waste characteristics

Phase 3 – Sampling

Purpose: To develop a national baseline loading of nutrients from POTWs and to document the performance of optimized facilities at various points within their treatment system

- **Select a representative population of all types of POTWs for sampling**
- **Sample influent and effluent seasonally for a week each time over the course of 1 year**
- **Sample for BOD, TSS, ammonia and nutrients, and other relevant data**

Potential Products of the Study

- **Possibility 1:** Interactive data base with information on optimization practices that have been successfully implemented by POTWs across the country
- **Possibility 2:** Training courses tailored to POTWs with different technologies in different regions of the country
- **Possibility 3:** Technical support document designed to advise POTWs
- **Possibility 4:** A nutrient loading baseline for evaluating the potential for load reduction at the facility, watershed, state or national level

Phase I – last year's draft Census Questionnaire has been revised

- Reduced number of questions
- Extensive use of check boxes and pull down menus
- Some questions have skip patterns to reduce respondent burden
- Will be completely on-line interactive process
- Facilities will receive letter directing them to web-site to start the questionnaire
- Working with states to try and get CEU credits for taking survey

Link to Example Screener Questionnaire

- https://erg.az1.qualtrics.com/jfe/preview/SV_bjSKztEuxYTapq5?Q_CH_L=preview



United States Environmental Protection Agency

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

OMB Control No. **2000-0062** Approval Expires **06/30/2009**

EPIC-102

Welcome to the National Study of Nutrient Removal and Secondary Technologies: 2016 POTW Screener Questionnaire! Please submit your response no later than December 31, 2017. If you would like more information or have questions about this study, please consult EPA's Website at:

<https://www.epa.gov/epanational-study-nutrient-control-and-water-treatment-technologies>.

Registration Instructions for the 2016 POTW Screener Questionnaire:

Registration for the questionnaire at the end of these instructions requires your facility's National Pollutant Discharge Elimination System (NPDES) wastewater discharge permit number. If you do not know your facility's NPDES permit number, use the Facility Search feature on the EPA's Envirofacts website: <https://www3.epa.gov/enviro/facts/nutrlsystem.html> or contact the EPA POTW Screener Questionnaire Help Line:

EPA POTW Screener Questionnaire Help Line

Eastern Research Group, Inc.

Phone: 703-633-1234 (local) or 1-800-555-1234 (Toll-free)

E-mail: EPOTWhelp@epa.com

If, after entering your NPDES permit number, you receive an error message stating, "This survey has already been completed," but do not know this to be true, please contact the EPA POTW Screener Questionnaire Help Line to complete your registration.

EPA's goal is to receive a completed questionnaire for each treatment works in the U.S. If your facility has multiple treatment works that fall under the same NPDES permit, please contact the EPA POTW Screener Questionnaire Help Line for further instruction.

If you require assistance in registering for or completing your questionnaire, or would like to request a paper copy of the questionnaire be mailed to you, please contact the EPA POTW Screener Questionnaire Help Line.

To Register:

Enter the NPDES wastewater discharge permit number for your treatment works, typically found on the front/cover page of your NPDES permit (e.g., PA1234567):

NPDES ID :

[Next](#)

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EPA POTW Screener Questionnaire Help Line

Eastern Research Group, Inc.

Local: 703-633-XXXX or Toll-free: 1-800-555-XXXX

E-mail: POTWhelp@epa.com

Helpful Links

[Acronyms and Glossary \(pdf\)](#)

[Print A Blank Copy of the Questionnaire](#)

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

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

NPOES ID:

Thank you for participating in the National Study of Nutrient Removal and Secondary Technologies: 2016 POTW Screener Questionnaire! Please submit your response no later than December 31, 2017.

EPA requests information for calendar year 2016. The questionnaire should be completed by personnel knowledgeable about the operation of the facility. Please read each question carefully and provide the appropriate response(s). The questionnaire requires responses to each question in sequence (that is, questions cannot be skipped or completed out of order).

EPA is not requiring you to 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.

Responses are saved each time you click "Save and Continue." To pause the questionnaire, simply close your browser window. The questionnaire will resume at the same point when you return.

You can print a blank copy of the questionnaire by clicking the link that says, "Print A Blank Copy of the Questionnaire" found at the bottom of this page and in the footer on each page of the questionnaire. You can also print your partially or fully completed questionnaire by clicking on the link that says, "Print a Copy of My Saved Responses," presented at the end of each section of questionnaire.

Save and Continue

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Local: 703-633-XXXX or Toll-free: 1-800-200-XXXX
E-mail: POTWhelp@erq.com

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

NIPDES ID:

Key terms are defined throughout the questionnaire. Key terms are also defined in the GLOSSARY, and acronyms are listed in ACRONYMS, which can be accessed via links provided in the footer on each page of the questionnaire.

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 2016 is not representative of normal operations.

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

EPA POTW Screener Questionnaire Help Line

Eastern Research Group, Inc.

Phone: 703-633-1234 (local) or 1-800-555-1234 (Toll-free)

E-mail: POTWhelp@erag.com

Use the "Go Back" button at the bottom of each page of the questionnaire to review or revise responses to earlier questions. NEVER use your browser's back button, which will result in the loss of any responses entered since the previous "Save and Continue."

Go Back

Save and Continue

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EPA POTW Screener Questionnaire Help Lines

Eastern Research Group, Inc.

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

NFOES ID: _____

Section A ELIGIBILITY CONFIRMATION

Key Terms

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

1. Is this facility a treatment works used in the storage, treatment, recycling, and reclamation of municipal sewage (e.g., POTW, domestic WWTP)?

- Yes
- No

Go Back

Save and Continue

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NPDES ID:

Key Terms

Publicly owned means owned by a State, municipality, or tribal organization.

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 1298 of the CWA.

2. Which of the following describes the ownership of your treatment works?

Select all that apply.

- Publicly owned (owned by a State, municipality 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)

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POTW SCREENER QUESTIONNAIRE

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NPDES ID:

Key Terms

The **National Pollutant Discharge Elimination System (NPDES)** is the national program for issuing, modifying, revoking and reissuing, terminating, monitoring and enforcing permits, and imposing and enforcing pretreatment requirements under Sections 307, 318, 402, and 405 of the Clean Water Act. The Clean Water Act prohibits anybody from discharging pollutants through a point source into a water of the United States unless they have a NPDES permit. The NPDES permit ID number is assigned by the respective state and generally includes the state abbreviation in the number.

3. Enter the National Pollutant Discharge Elimination System (NPDES) permit number associated with this treatment works. Also enter the state-issued wastewater discharge permit number associated with this treatment works if it is known and applicable.

If you previously called the Help Line and they assigned you a survey ID, please do not enter that number here; please select 'I do not have a NPDES permit or state equivalent.'

Individual NPDES permit:

General NPDES permit:

State issued wastewater discharge permit:

OR

Do not have a NPDES permit (nor state equivalent)

Go Back

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NIPDES ID: _____

4. Was your treatment works physically capable of directly discharging treatment system effluent to a surface water in 2016? This discharge may be continuous or intermittent.

- Yes
- No

Go Back

Save and Continue

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POTW SCREENER QUESTIONNAIRE

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NPDES ID:

4-2. 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
- Discharge to another POTW
- 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)
- Please describe below:

Go Back

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NPDES ID: XXXX-XXXX

4-3. You indicated that your treatment works discharges to a surface water. Please provide the name of the receiving surface water(s) and provide the latitude and longitude of the outfall location if known and readily available.

	Receiving Surface Water Name	Coordinates		Check here if coordinates are unknown
		Latitude	Longitude	
1	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="checkbox"/>
2	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="checkbox"/>
3	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="checkbox"/>
4	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="checkbox"/>
5	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="checkbox"/>

Go Back

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Local: 703-633-XXXX or Toll-free: 1-800-XXX-XXXX

E-mail: POTWhelp@ergr.com

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NPOES ID:

4.4. You indicated that your treatment works discharges to another POTW. Please enter the name of that facility and any other information you have available.

Facility Name: (Required)

Street:

City:

State: (2 letter abbreviation only - uppercase)

ZIP Code: (5-digit ZIP code OR ZIP-4)

NPDES Permit Number:

Go Back

Save and Continue

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Local: 703-633-XXXX or Toll-Free: 1-800-368-XXXX
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OMB Control No. **XXXX-XXXX** Approval Expires **XXXX/XXXX**

NPDES ID: _____

Note: This page will be updated pending any final revisions to the screener questionnaire.

Below is a summary of your responses to Section A. Please note that this is your last opportunity to use the Go Back button to revise answers in Section A. Review your responses carefully. If any of the information shown below is NOT correct or NOT complete, please click 'Go Back' to return to previous questions; otherwise, please click the button to submit your responses to proceed.

NPDES ID:

Section A ELIGIBILITY CONFIRMATION

#	Question	Response
1	Is this facility a treatment works used in the storage, treatment, recycling, and reclamation of municipal sewage (e.g., POTW, domestic WWTP)?	
2	(If yes to 1) Which of the following describes the ownership of your treatment works? Enter the National Pollutant Discharge Elimination System (NPDES) permit number associated with this treatment works. Also enter the state-issued wastewater discharge permit number associated with this treatment works if it is known and applicable.	
3	Was your treatment works physically capable of directly discharging treatment system effluent to a surface water in 2016? This discharge may be continuous or intermittent.	
4-2	Which of the following discharge or disposal methods does your treatment works use to manage treatment system effluent?	
4-3	You indicated that your treatment works discharges to a surface water. Please provide the name of the receiving surface water(s) and provide the latitude and longitude of the outfall location if known and readily available.	Receiving Surface Water Name: Latitude: Longitude: Unknown
4-4	You indicated that your treatment works discharges to another POTW. Please enter the name of that facility and any other information you have available.	Facility Name: Street: PO/Apt/Suite: City: State: ZIP Code: NPDES Permit Number:

[CLICK HERE TO PRINT YOUR RESPONSES](#)

[Go Back](#)

[Save and Continue](#)

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POTW SCREENER QUESTIONNAIRE**

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NPDES ID:

Section B POTW IDENTIFICATION

5. Enter your facility name as it appears on your NPDES or state-issued wastewater discharge permit:

Save and Continue

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NPDES ID:

6. Enter mailing address as it appears on your NPDES or state-issued wastewater discharge permit:

Street:

PO/Apt/Suite: (Optional)

City:

State: (2 letter abbreviation only - uppercase)

ZIP Code: (5-digit ZIP code OR ZIP-4 digits)

Please CHECK HERE if the physical location is the same as the mailing address

6-2. Enter physical location of the treatment works.

Street:

PO/Apt/Suite: (Optional)

City:

State: (2 letter abbreviation only - uppercase)

ZIP Code: (5-digit ZIP code OR ZIP-4 digits)

Go Back

Save and Continue

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

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

NPDES ID: _____

6. Enter mailing address as it appears on your NPDES or state-issued wastewater discharge permit:

Street:

PO/Apt/Suite: (Optional)

City:

State: (2 letter abbreviation only - uppercase)

ZIP Code: (5-digit ZIP code OR ZIP-4 digits)

Please CHECK HERE if the physical location is the same as the mailing address

Go Back

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NPOES ID: [redacted]

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

Name:

Street:

PO/Apt/Suite: (Optional)

City:

State: (2 letter abbreviation only - uppercase)

ZIP Code: (5-digit ZIP code OR ZIP-4)

Daytime Phone: (include area code)

Extension: (Optional)

e-Mail: (Format: example@domain.com)

Go Back

Save and Continue

Save and Continue

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NPROES ID: XXXX

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 2016?

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

Go Back

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NPOES ID:

Key Terms

A package plant is a pre-manufactured treatment works used to treat wastewater in small communities or on individual properties. See https://www3.epa.gov/npdes/pubs/package_plant.pdf for more information.

9. Did the population served vary seasonally by more than 50 percent (e.g., college town, vacation resort, snowbird destination) in 2016?

- Yes
- No

10. Is this POTW a package plant?

- Yes
- No

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For the following questions, you may find these terms useful...

Key Terms

Continuous discharge occurs throughout the year.

Controlled discharge occurs during only certain times of the year.

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

11. Did your treatment works operate continuous or controlled discharge in 2016?

Select one.

- Continuous Discharge
- Controlled or Intermittent Discharge

12. Did the treatment works' daily flow increase by 30 percent or more after a typical rainfall event in 2016?

- Yes
- No
- Unknown

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Key Terms

Design Capacity Flow is a wastewater flow rate, typically expressed in volume (gallon) 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.

13. Was your treatment works' design capacity reserved for primary treatment units only.

- Yes
- No

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Key Terms

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.

14. What were the actual operational flows to your treatment works in the calendar year 2016?

Daily Flow (e.g., average daily flow or total daily flow)	<input type="text"/>	MGD	<input type="checkbox"/>	Unknown
Typical High Flow	<input type="text"/>	MGD	<input type="checkbox"/>	

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Key Terms

Separate Sewer Collection System is a wastewater collection system, owned by a state or municipality, that is specifically designed to collect and convey only sanitary wastewater (domestic sewage from homes as well as industrial and commercial wastewater). In such systems, stormwater is conveyed through an additional set of pipes.

Combined Sewer Collection System is a wastewater collection system, owned by a state or municipality, which conveys sanitary wastewaters (domestic, commercial, and industrial wastewaters) and stormwater through a single-pipe system to a POTW.

15. In 2016, which type of collection system(s) fed into the treatment works? Estimate percentages of contribution based on sewered population using best professional judgement. 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:	<input type="text" value="0"/>	%
Combined Sewer Collection System:	<input type="text" value="0"/>	%
Hauled from off-site:	<input type="text" value="0"/>	%
Other:	<input type="text" value="0"/>	%
Total	<input type="text" value="0"/>	%

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16. Indicate what percentage by volume of the wastewater treated at your treatment works was from each of the following sources in 2016. Estimate using best professional judgement. 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 which is pumped out, hauled, and discharged directly into the treatment works. 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:

Industrial:

Septage:

Other - please describe below:

%

%

%

%

%

Total %

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17. Did your treatment works receive process wastewater from one or more of the following industrial sources in 2016?

Select all that apply.

- Airport de-icing
 - 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
 - Other significant industrial source of nutrients
- please describe below
-
- None of the above

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Key Terms

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.

18b. Which of the following treatment technologies were included in the treatment works in 2016?

Select all that apply.

Note: You will be prompted to select specific treatment types in the next question.

- Preliminary (e.g., grit removal, flow equalization, screening)
- Primary treatment (e.g. primary clarification, chemically-enhanced primary treatment [CEPT])
- Biological treatment
- Physical and/or chemical treatment

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18b-1. Is any chemical addition or chemical treatment in primary treatment specifically for the purposes of nutrient removal?

- Yes
 No

18b-2. Indicate which types of biological treatment technologies were operated in 2016.

Select all that apply.

- Suspended growth: Natural wastewater treatment system (e.g., waste stabilization pond, wetland, facultative lagoon)
- Suspended growth: Tank/reactor system (e.g., sequencing batch reactor, conventional activated sludge, A2O, MLE, Bardenpho, oxidation ditch)
- Attached growth
- Combined suspended/attached growth systems (e.g., integrated fixed film activated sludge, moving-bed biofilm reactor)
- Biological sidestream treatment (e.g., SHARON, ANAMMOX, PhoStrip)

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Key Terms

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

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.

18b-2.1. Please indicate which types of natural wastewater treatment systems were operated in 2016.

Select all that apply.

- Simple (single cell) pond
- Complex (multi-cell) treatment pond system
- 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. Was any portion of your natural wastewater treatment system mechanically aerated at any time in 2016?

- Yes
- No

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18b-3. Indicate which types of attached growth systems were operated in 2016.

Select all that apply.

- Tricking 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)

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18b-4. Indicate which types of physical and/or chemical treatment technologies were present in the treatment works in 2016. Also indicate if any of these physical and/or chemical treatment technologies were specifically operated for nutrient removal and/or recovery in 2016.

Select all that apply.

	Present in Treatment Works	Operated for Nutrient Removal and/or Recovery
Ammonia oxidation with chlorine (e.g., breakpoint chlorination)	<input type="checkbox"/>	<input type="checkbox"/>
Chemically-assisted clarification for reasons other than nutrient removals (e.g., chemical oxidants, coagulants, flocculants, metals precipitants, proprietary additives)	<input type="checkbox"/>	<input type="checkbox"/>
Chemical phosphorus precipitation	<input type="checkbox"/>	<input type="checkbox"/>
Disinfection	<input type="checkbox"/>	<input type="checkbox"/>
Gas stripping (e.g., ammonia stripping, air stripping)	<input type="checkbox"/>	<input type="checkbox"/>
Ion separation/exchange	<input type="checkbox"/>	<input type="checkbox"/>
Media/Granular filtration (e.g., sand, mixed media, GAC, fuzzy)	<input type="checkbox"/>	<input type="checkbox"/>
Membrane filtration (e.g., ultrafiltration, reverse osmosis, microfiltration)	<input type="checkbox"/>	<input type="checkbox"/>
Solids separation (e.g., clarification, sedimentation, setting, DAF)	<input type="checkbox"/>	<input type="checkbox"/>
Surface filtration (e.g., cloth, cartridge and bag filter)	<input type="checkbox"/>	<input type="checkbox"/>
Other physical and/or chemical technology - please describe below	<input type="checkbox"/>	<input type="checkbox"/>

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19. What type of process control operations did your treatment works use in 2016?

Select all that apply.

- Manual (Operator Controlled)
- Automatic (Computerized Control)
- None

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19-2. Please indicate what process control parameters fed into the control operations and how each parameter was measured in 2016.

Select all that apply.

	Type of Measurement	
	Manual Sampling	Automatic Sensor/Probe/Meter
Dissolved Oxygen (DO)	<input type="checkbox"/>	<input type="checkbox"/>
Influent Flow	<input type="checkbox"/>	<input type="checkbox"/>
Internal Recycle Flow	<input type="checkbox"/>	<input type="checkbox"/>
Mixed Liquor Suspended Solids (MLSS)	<input type="checkbox"/>	<input type="checkbox"/>
Nitrate and/or Nitrite	<input type="checkbox"/>	<input type="checkbox"/>
Organics (including BOD, COD, TOC)	<input type="checkbox"/>	<input type="checkbox"/>
Oxidation-Reduction Potential (ORP)	<input type="checkbox"/>	<input type="checkbox"/>
pH	<input type="checkbox"/>	<input type="checkbox"/>
Phosphate-orthophosphate	<input type="checkbox"/>	<input type="checkbox"/>
Solids Retention Time (SRT)	<input type="checkbox"/>	<input type="checkbox"/>
Sludge Blanket Depth	<input type="checkbox"/>	<input type="checkbox"/>
Temperature	<input type="checkbox"/>	<input type="checkbox"/>
Ammonia	<input type="checkbox"/>	<input type="checkbox"/>
Total Suspended Solids (TSS)	<input type="checkbox"/>	<input type="checkbox"/>
Other - please describe below	<input type="checkbox"/>	<input type="checkbox"/>

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20. Indicate the seasonal wastewater temperatures (winter and summer) of the biological treatment system for your treatment works in 2016.

NOTE: This question is not asking for the temperature at the outfall.

	Enter value	Temperature Units	
		°C	°F
Coldest:	<input type="text"/>	<input type="radio"/>	<input type="radio"/>
Warmest:	<input type="text"/>	<input type="radio"/>	<input type="radio"/>

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21-1. 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) within the past 10 years.

Select all that apply.

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

21-2. 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) within the next 3 years.

Select all that apply.

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

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Key Terms

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.

In the following section, respond to the following three questions (Questions 22-1 through 22-3) to indicate if your treatment works achieves any of the following objectives. Your treatment works may have been designed to achieve these objectives or now achieves these objectives through process optimization and other operational changes.

22-1. Which nutrients, if any, were removed by your treatment works in 2016? 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 2016?

Select all that apply:

	Yes	No	Unknown
Total Nitrogen \leq 8 mg N/L	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Total Phosphorus \leq 1 mg P/L	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

22-3. Did your treatment works utilize resource recovery practices in 2016?

Select all that apply:

- Nutrient recovery (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

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For the following questions, you may find these terms useful...

Key Terms

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.

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

23. Indicate your treatment works' ammonia monitoring locations in 2016.

Select all that apply.

Note: If your treatment works did not monitor for ammonia in 2016, please select 'Did not monitor.'

	Headworks or System Influent	Treatment System Effluent	Wet Weather System Effluent	Final Outfall (s)	Biosolids	Other locations within the treatment works	Did not monitor
Ammonia	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

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24. What were the average annual concentrations of ammonia in the treatment works measured at any of the following locations in 2016?

Select the range that best approximates the concentration of ammonia.

	Headworks or System Influent (untreated)	Treatment System Effluent (treated)	Wet Weather System Effluent	Outfall	Units (Select the most applicable) NH ₃ -N Other
Ammonia	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="radio"/> <input type="radio"/>

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For the following questions, you may find these terms useful...

Key Terms

Total Nitrogen is the sum of total kjeldahl nitrogen and nitrate-nitrite.

Total Kjeldahl Nitrogen (TKN) is the sum of ammonia and organic nitrogen.

Organic Nitrogen is typically a calculated, not measured, value. You do not need to calculate this value for purposes of this survey.

25. Indicate your treatment works' nutrient monitoring locations for nutrients other than ammonia in 2016.

Select all that apply.

Note: If your treatment works did not monitor for any additional nutrients in 2016, please select 'Did not monitor.'

	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	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Total Kjeldahl Nitrogen	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Nitrate or Nitrite-Nitrite (if measured together)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Organic Nitrogen	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Total Phosphorus	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Orthophosphate	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

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26. Of the nutrients that you monitor, what were the average annual concentrations in the treatment works measured at the following locations in 2016?

Select the range that best approximates the concentration of each of the following parameters.

	Headworks or System Influent (untreated)	Treatment System Effluent (treated)	Wet Weather System Effluent	Outfall	Units (Select the most applicable)
Total Nitrogen	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="radio"/> N <input type="radio"/> Other
		Treatment System Effluent (treated)			Units (Select the most applicable)
Total Kjeldahl Nitrogen (TKN)		<input type="text"/>			<input type="radio"/> TKN-N <input type="radio"/> Other
		Wet Weather System Effluent			Units (Select the most applicable)
Nitrate or Nitrate-Nitrite (if measured together)		<input type="text"/>			<input type="radio"/> NO ₃ -/NO ₂ -N <input type="radio"/> Other
		Headworks or System Influent (untreated)			Units (Select the most applicable)
					<input type="radio"/> N <input type="radio"/> Other



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Key Terms

CBOD₅ is a measure of the oxygen demand to biologically degrade organic material in wastewater (carbonaceous demand), excluding biodegradation of forms of nitrogen (nitrogenous demand).

COD is a measure of the oxygen demand to oxidize inorganic and organic matter in wastewater.

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

27. What were the average concentrations of CBOD₅, COD, and TSS at the headworks for this treatment work in 2016?

		Unknown
CBOD ₅ :	<input type="text"/>	<input type="checkbox"/>
	mg/L	
COD :	<input type="text"/>	<input type="checkbox"/>
	mg/L	
TSS :	<input type="text"/>	<input type="checkbox"/>
	mg/L	

Go Back

Save and Continue

NOTE: Never use your browser's back button. Always use the "Go Back" button provided on the page.



United States Environmental Protection Agency

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

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

NPDES ID: _____

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 2016 is not representative of normal operations (500 character limit).

If you have additional comments, please send them to nutrient-removal-study@epa.gov.

On the next page, you will have the opportunity to review a summary of your responses before submitting your questionnaire.

Go Back

Save and Continue

NOTE: Never use your browser's back button. Always use the "Go Back" button provided on the page. Question numbers are provided for consistency with the printed questionnaire. When completing the questionnaire electronically, you may not see all questions.

EPA POTW Screener Questionnaire Help Lines

Eastern Research Group, Inc.
Local: 703-633-XXXX or Toll-free: 1-800-800-XXXX
E-mail: POTWhelp@era.com

Helpful Links

[Acronyms and Glossary \(pdf\)](#)
[Print A Blank Copy of the Questionnaire](#)



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OMB Control No. **XXXXX-XXXX** Approval Expires: **XXXX/XX/XXXX**

NPDES ID: _____

Note: This page will be updated pending any final revisions to the screener questionnaire.

Below is a summary of your responses to the questionnaire. If the information you have entered is not correct, you may use the 'Go Back' button to correct your responses in Section B and Section C. Otherwise, please click 'Save and Continue' to proceed.

NPDES ID: _____

Section A ELIGIBILITY CONFIRMATION

#	Question	Response
1
4

Section B POTW IDENTIFICATION

#	Question	Response
5
7

Section C POTW OPERATIONS AND TREATMENT CHARACTERISTICS

#	Question	Response
8
28

[CLICK HERE TO PRINT YOUR RESPONSES](#)

Check this box if you would like to receive a copy of your responses via email

Please confirm your email address below. You will receive an email confirmation that we have received your completed questionnaire.

Email address:

Confirm email address:

[Go Back](#)

[YOU MUST CLICK HERE TO SUBMIT YOUR RESPONSES](#)

Restart Survey



United States Environmental Protection Agency

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

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

NPOES ID: XXXXX

Thank you!
Your responses to the POTW Screener Questionnaire were submitted to EPA
on Wednesday, June 14th at 2:45 PM.
You may now close your browser tab or window.

NOTE: Never use your browser's back button. Always use the "Go Back" button provided on the page.
Question numbers are provided for consistency with the printed questionnaire. When completing the questionnaire electronically, you may not see all questions.

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Helpful Links

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[Print A Blank Copy of the Questionnaire](#)

What's next?

- Submit the draft questionnaire to the Office of Management & Budget for approval—early October
- Publish a notice soliciting comments—simultaneous with OMB submission
- Obtain OMB approval—late Fall
- Field questionnaire—early 2018

For more information

- Contact Tony Tripp at tripp.anthony@epa.gov
- Study website www.epa.gov/eg/national-study-nutrient-removal-and-secondary-technologies