Washington Township

Wastewater Treatment Facility

Washington Township, Berks County
NPDES Permit No. PA0086142

Wastewater Treatment Evaluation

Bureau of Clean Water
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Harrisburg, PA 17105-8774

pennsylvania
DEPARTMENT OF ENVIRONMENTAL PROTECTION
WASTEWATER TECHNICAL ASSISTANCE PROGRAM

2025

Disclaimers:

Pennsylvania Regulations at 25 Pa. Code § 91.12 state, inter alia, that "Employees of the Department [Department of Environmental Protection] may not act as consulting engineers for a party or recommend the employment of a particular consultant, gather the data for the design of [a] his treatment plant, prepare plans or act as an inspector on the construction of the project…". This report and any recommendations represent an interpretation of data collected during the project and the best professional judgement of Department staff. Permittees, in conjunction with certified wastewater operators and consulting engineers, should continue an independent investigation to determine the guidance and procedures necessary to optimize operations of the publicly owned treatment works (wastewater treatment facility and sanitary sewer collection and conveyance system).

The mention of a brand of equipment is in no way an endorsement for any specific company. The Pennsylvania Department of Environmental Protection (PADEP) Wastewater Technical Assistance Program (WWTAP) urges the facility owner / permittee to research available products and select those which are the most applicable for its situation and compatible with existing equipment.

The goal of the PADEP WWTAP is to improve receiving water quality through troubleshooting, training, and monitoring. Permittees are encouraged to achieve effluent quality above and beyond current permit requirements.

Additional data and results from the PADEP WWTAP for this project may be available upon request. Please contact the WWTAP staff listed in Appendix A of this report or the Pennsylvania Department of Environmental Protection Bureau of Clean Water at RA-EPWWTAPROVIDER@pa.gov / (717) 787-6744

Executive Summary:

From March through May of 2025, staff from the Pennsylvania Department of Environmental Protection (PADEP) Wastewater Technical Assistance Program (WWTAP) and Washington Township coordinated to complete an evaluation of the Washington Township wastewater treatment facility (WWTF/facility) with the goal of optimizing treatment and improving the quality of the final effluent discharge to West Branch of the Perkiomen Creek, a water of the Commonwealth.

PADEP WWTAP staff were invited by the Washington Township WWTF Superintendent to perform an instrument-based evaluation of the facility and provide recommendations to optimize the WWTF activated sludge treatment system. Additionally, WWTAP supported efforts by wastewater operators to investigate slug discharges of industrial/non-domestic wastewater to the sewer service area that may be interfering with the capacity of the WWTF to comply with the requirements set forth in Washington Township's National Pollutant Discharge Elimination System (NPDES) Permit.

This wastewater treatment evaluation (WTE) included staff from PADEP's WWTAP and Wastewater Operations Outreach & Assistance - Public Service Institute Instructor (PSII) Program. During the evaluation, WWTAP staff visited the facility weekly to maintain a continuous-monitoring probe network and perform routine process monitoring & testing for a selection of water quality parameters in the treatment system. WWTAP staff discussed continuous monitoring probe system data, weekly testing results, and observations with PADEP PSII staff and the WWTF Superintendent.

Through analysis of data collected during this project, WWTAP staff developed recommendations and guidance to help Washington Township and WWTF operator(s) to optimize Biological Nutrient Removal (BNR) in the activated sludge treatment system and enhance WWTF effluent discharge water quality, resulting in improvements to the West Branch of the Perkiomen Creek and the Delaware River Watershed.

Over the period of study, data collected by WWTAP continuous monitoring equipment and weekly site visits and testing identified that:

1. The WWTF receives wastewater generated by a food processing and production facility. Food processing facilities discharge wastewater that contains significant amounts Biochemical Oxygen Demand (BOD) , a measure of the organic loading, and Fats, Oils, and Grease (FOG). High concentrations of BOD and FOG in WWTF influent flow can significantly reduce the efficiency of wastewater treatment. Data provided by WWTAP continuous monitoring probes indicate that the WWTF influent flows frequently contain elevated BOD that exceeds the expected range of organic loading used to design facilities that primarily treat domestic wastewater.
2. Washington Township can optimize BNR in the activated sludge biomass by upgrading WWTF SBR aeration blower electrical control and programming systems.
3. WWTF operator(s) can optimize treatment and pollutant removal efficiencies in the facility by implementing a more robust process control testing program.

While there were problems identified, there are many positive aspects to the Washington Township wastewater treatment facility. If Washington Township chooses to implement some/all of the recommendations included in this report, these are wins for the host communities served by the WWTF, for the facility owners and operators, for the regulatory community, and especially for the downstream users of the waters of the Commonwealth. The PADEP wastewater technical assistance program stands ready to assist Washington Township with any of the recommendations or concerns mentioned in this report.

Operational Strengths

The following items are Operational Strengths that were identified during this WTE. These include strengths of both the wastewater operator(s) and the facility itself:

- Wastewater operations are responsive to sampling results,
- The WWTF has a laboratory capable of testing the WWTF and activated sludge treatment biomass for process control monitoring purposes,
- Records indicate that treatment units and equipment at the facility is relatively well maintained and operated in balance when considering equipment age and condition.
- Facility has generally maintained compliance with NPDES permit requirements,
- Automatic samplers are located at the influent trough and at the final effluent discharge. This equipment appears to be in serviceable working order to collect representative samples and correct holding temperatures,
- Staff maintain ongoing efforts for source determination and monitoring of non-domestic and industrial waste discharges to the sewer service area.
- Staff regularly perform flow monitoring activities in the sanitary sewer collection and conveyance system (SSCS) for detection and elimination of excess flows from Inflow and Infiltration (I&I).

Recommendations

While on-site, PADEP WWTAP and PSII staff discussed ways to improve performance of the wastewater treatment process with the WWTF Superintendent and certified operators, some of which follow in the body of the report. Based on the outcome of the WTE and additional discussions with the WWTF operators, the following recommendations are made for ongoing and future improvement of the WWTF:

Optimizing Pollutant/Nutrient Removal in WWTF Treatment Units

- Washington Township should investigate the upgrade of SBR aeration blower controllers to optimize activated sludge biomass treatment efficiencies in the WWTF. An upgrade of SBR controllers will allow WWTF operators to adjust react phase aeration blower operations with the goal of achieving efficient operation of the SBR treatment units, energy savings, and reductions in final effluent discharge pollutant/nutrient loadings to the West Branch of the Perkiomen Creek and waters of the Commonwealth.
- Washington Township should investigate purchase & installation of Dissolved Oxygen (DO) and oxidation/reduction potential (ORP) probes in the SBR treatment tanks to guide adjustments of the activated sludge treatment system and support efficient pollutant/nutrient removal in the WWTF. At times of the year when it is favorable to control the SBR aeration blower operations using instrument-based control the Authority could see reduced energy costs due to refined SBR blower operations.
- WWTF operators should investigate implementing additional process control testing to optimize solids mass balance in the WWTF activated sludge biomass. The frequency of this type of testing can be determined by the facility operators with input from the facility engineers. The Authority could expand its process control testing program to monitor Mean Cell Residence Time (MCRT), food to microorganism ratio (F/M), and Sludge Age. Monitoring these parameters may prove to be a useful part of the WWTF operations strategy and a successful solids inventory program would account for treatment of sludge solids from cradle-to-grave, generating efficiencies that enhance both biosolids quality and energy reduction.

Data Accessibility & Electronic Recordkeeping

- Automation of data management is useful, and trending of process monitoring data should be readily available for WWTF operators. Observing real-time data and trends can help operators

see what is happening when WWTF conditions are favorable or not. If installing additional continuous monitoring probes in the WWTF, consider having readily accessible graphics included in a Supervisory Control and Data Acquisition (SCADA) system programming, giving the operator ability to review trends in water quality data.

Training and Support for Operators & Staff

- WWTF operators should continue cross-training personnel in all aspects of operation and maintenance of the POTW Publicly Owned Treatment Works (POTW). Since the Authority plans to add new technology to the treatment system, requiring increased specialization for power controls, process instrumentation, and SCADA, plant staff should all pursue training to upgrade and maintain their skills.
- Washington Township should consider hiring seasonal help to assist with routine maintenance in the POTW (grass cutting, plowing, clearing/maintaining easements, painting, building maintenance, etc.). This will allow certified operators to focus solely on the operation & maintenance of the WWTF and SSCS.

Influent Slug Loads from Facilities that Discharge Industrial & Non-Domestic Wastewater

- Washington Township should continue to investigate discharges of industrial, non-domestic, and high organic strength wastewater (FOG & BOD) within the sewer service area.
- Washington Township should develop a program for regular monitoring of industrial and non-domestic wastewater discharges in the sewer service area.

Wet Weather Operations and Inflow & Infiltration

- Development of a wet weather operations strategy to improve WWTF performance during periods of wet weather flow.
- Institute a rolling conditional analysis of the SSCS to identify and prioritize areas within the collection system to eliminate excessive I&I flows through repair and replacement of sewer infrastructure. This would include (but not be limited to) the use of camera/video monitoring systems, flow monitoring, and dye and smoke testing. Detailed mapping of the system should occur simultaneously.
- Develop a long-term control plan for rehabilitation of the SSCS based upon the information gained during the characterization of the system. Resources must be set aside on a yearly basis for collection system rehabilitation and repair.

Computerization & Automation of Records

- Consider automating all in-house recordkeeping for all maintenance tasks (preventive, routine, and reactive), and process control testing results in the laboratory. Though this evaluation did not examine the computer equipment used for administration, automation of the laboratory and recordkeeping functions at the sub-management level may reduce the keyboarding workload of the WWTF Superintendent while automating many routine tasks.

Washington Twp. WWTF - WTE Results

The PADEP WWTAP offers a WTE that comprises round-the-clock monitoring of key treatment parameters with laboratory and practical experiences to optimize effluent quality by making process changes that do not typically involve significant capital projects. The WTE may be thought of as a custom-tailored trouble-shooting and comprehensive site inspection that aims to solve common wastewater treatment problems through interaction with licensed wastewater treatment operators. PADEP operates this program as part of a federal grant to reduce nutrient pollution in waters of the United States.

WWTAP projects require cooperation between PADEP staff and WWTF owners, operators, & consultants. To focus efforts, WWTAP staff submitted a Project Outline to Washington Township in February 2025. A copy of the Project Outline is included as Appendix D of this report.

The objectives listed in the project outline include:

1. WWTAP staff will complete an instrument-based evaluation of the WWTF using continuous monitoring probes to collect data for a selection of water quality parameters.
2. WWTAP staff will visit the WWTF weekly to conduct various process control and water quality testing of the WWTF treatment systems with laboratory testing equipment and resources provided by the program. The data provided by the continuous monitoring instrumentation, and process control and bench testing will guide cooperative efforts between WWTAP and PSII staff and the WWTP operator to optimize BNR and pollutant removal in the activated sludge biomass.
3. To assist the WWTP certified operator with determining sources of industrial and non-domestic wastewater to the Washington Township sewer service area. Slug discharges of industrial and non-domestic wastewater may be causing interference with the activated sludge treatment biota and limit the ability of the WWTF, primarily designed to treat domestic wastewater, to comply with the conditions and requirements included in the NPDES Permit.

On August 21, 2024, WWTAP staff deployed continuous monitoring submersible probes and data collection equipment at the WWTF in the SBR influent distribution box, SBR treatment units, and final effluent post aeration tank prior to discharge to the West Branch of the Perkiomen Creek. Schematics of the WWTF and installation of the WWTAP continuous monitoring probe system are included in Attachment D of this report

The water quality and process control testing included colorimetric analysis for nutrients and wastewater strength and routine wastewater lab tests such as suspended solids by volume, sludge settleability, clarifier core sampling, oxygen uptake and respiration rate tests, and microscopic evaluation of the activated sludge. Weekly project updates were provided by WWTAP to Washington Township, WWTP operator(s), and the wastewater engineering consultants.

Discharges of Industrial & Non-Domestic Wastewater to the WWTF

Discharges of pollutants (including BOD_5) by facilities that discharge industrial and non-domestic wastewater can cause interference or pass through at the WWTF and limit the ability of the POTW to adequately treat wastewater and comply with NPDES Permit requirements, PADEP Rules & Regulations, and state and federal laws. A review of data collected by the UVAS probe installed in the WWTF influent distribution box indicates that the facility receives discharges of elevated organic loading (as BOD_5) in the WWTF influent flow. Table 1, below, includes wastewater facility design standards for expected COD and BOD_5 concentrations in low, medium, and high strength domestic wastewater.

Table 1) Table of expected BOD_5 and COD concentrations in untreated domestic wastewater. (Wastewater Engineering: Treatment and Reuse, Metcalf and Eddy - 2003)

Contaminant	Unit	Low strength	Medium strength	High strength
BOD_5	mg/l	110	190	350
COD	mg/l	250	430	800

While the maximum concentrations recorded by the WWTAP UVAS probe did not occur at a predictable frequency, the data indicate that the WWTF is receiving discharges of wastewater with elevated organic loading (as BOD_5) and FOG consistent with wastewater generated at food production facilities. It is the opinion of WWTAP staff that this condition can most likely be attributed to wastewater discharges from non-domestic and industrial users in the sewer service area.

Figures 1 and 2, below, include graphs of influent UVAS probe data for February and March 2025. Both graphs include events where the continuous monitoring probe recorded data indicating elevated BOD_5 concentrations in WWTF influent flows. It may be advantageous for the facility to install UVAS, pH, or Conductivity continuous monitoring probes in the WWTF influent to detect slug loads of elevated organic loading entering the facility. If slug loads are detected, WWTF operators can adjust the operations strategy in response to potential interference of treatment capacity caused by influent wastewater with elevated organic loading.

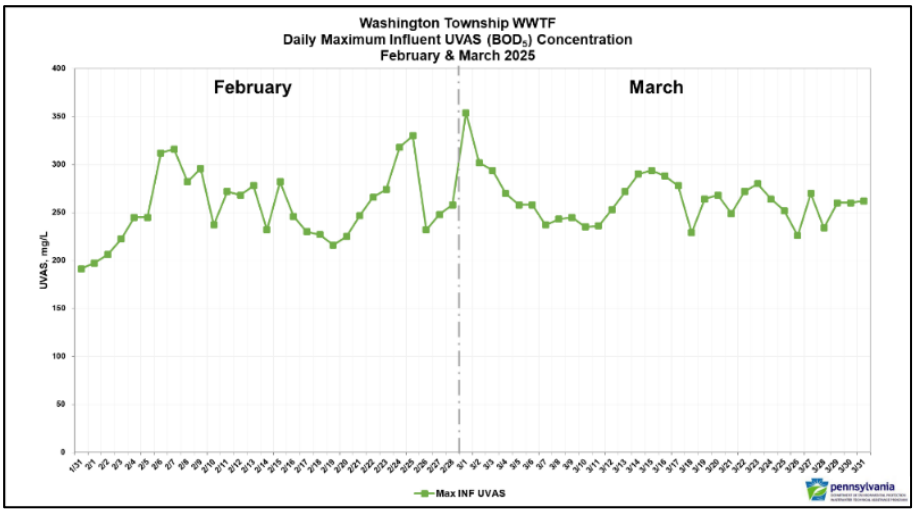


Figure 1) Graph of WWTF influent BOD_5 daily maximum data collected by the WWTAP Hach UVAS probe.

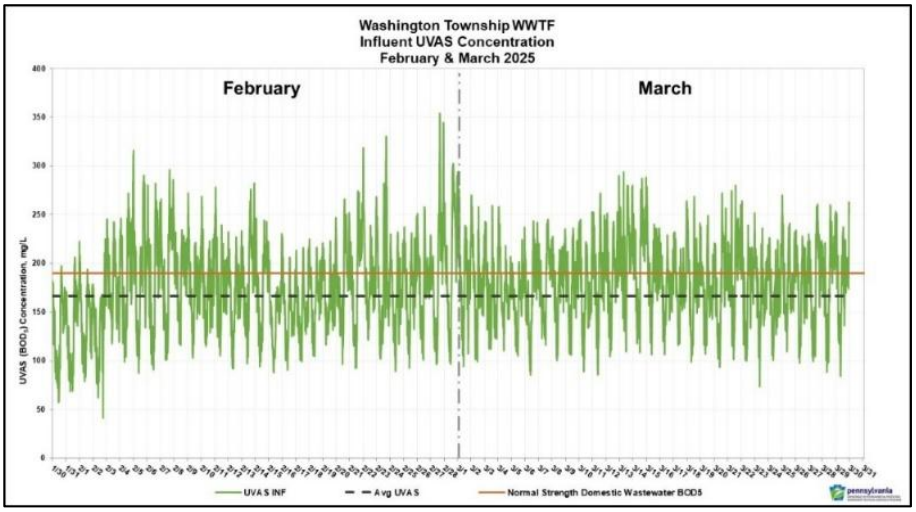


Figure 2) Graph of WWTF influent BOD_5 data collected by the WWTAP Hach UVAS (15-min. interval).

Longacres Dairy (Longacres) is a dairy food product manufacturing facility that has been issued an "Industrial User Permit" by Washington Township for the discharge of industrial/non-domestic wastewater (Industrial User Permit No. 2023-01) in the WWTF sewer service area.

On March 5th, 2025, WWTAP staff attended a site visit with the WWTF operator, sewerage engineer, and representatives for Longacres Dairy at the Longacres Dairy facility and restaurant located at Niantic Road and State Route 100 in Washington Township. During the meeting, WWTAP staff observed the collection of a single grab sample from Longacre's Dairy wastewater discharge to the Washington Township SSCS. Additionally, representatives for Longacres stated that the facility only discharges wastewater from its dairy production and processing area pretreatment system (aerated holding tank) once per week.

On March 17, 2025, Longacres reported the BOD and Total Suspended Solids (TSS) analytical results from the March 5th sampling event to Washington Township as a composite sample. A review of Industrial User Permit No. 2023-01, issued to Longacres by Washington Township indicates that Longacres is required to collect composite samples.

In September 2025, PADEP WWTAP staff coordinated with Washington Township WWTF operator(s) to collect composite samples in a specific area of the SSCS that collects the wastewater discharge(s) from Longacres Dairy. The composite sampler was programmed to collect 24 discrete samples (one 150 mL aliquot every 15-minutes and four aliquots per sample bottle) from 11:20 on Wednesday, September 10th to 11:00 on Thursday, September 11th, 2025.

At the time the WWTAP composite sampler was deployed, the wastewater flowing into the sampling manhole appeared mostly clear, but at the time the sampler was pulled from the manhole, wastewater flowing into the manhole appeared cloudy/turbid with white color and visible fat/grease accumulation in the trough.

On September 11th, WWTAP staff collected the composite sampler and completed qualitative analysis (abnormal malodors, color, turbidity, sheen, foam, etc.) and bench testing of each sample for COD. For comparison, BOD_5 concentrations were calculated based on an assumption that approximately 50% of COD in domestic wastewater is BOD_5. After completing testing for each sample, WWTAP staff found that 5 of 24 samples may exceed the limits set in Industrial User Permit No. 2023-01 for BOD daily max (300 mg/L) and 15 of 24 samples exceeded the BOD_5 and COD concentrations expected in medium strength domestic wastewater. A copy of the bench testing results for the September 2025 WWTAP composite sampling event are included in Appendix F of this report.

Without additional sampling in the collection system and monitoring of facilities with industrial and non-domestic wastewater discharges, it is difficult to accurately predict of the timing of the slug discharges that impact the WWTF. As stated previously, the most likely cause of elevated organic loading conditions at the WWTF could be discharges of industrial and nondomestic wastewater from facilities in the Washington Township sewer service area. These discharges can contain elevated levels of pollutants (FOG and BOD) that impact the WWTF treatment system and the ability the activated sludge biota in the SBR treatment units to efficiently treat wastewater and comply with requirements set forth in the WWTF NPDES Permit

WWTAP staff strongly recommend that Washington Township continue to work towards completion of a comprehensive survey of any non-domestic, commercial, and industrial facilities in the sewer service area. and investigate any facilities with the potential to discharge high organic strength wastewater (schools, recreational & food establishments, etc.) in its sewer service area.

Optimizing Biological Nutrient Removal and Effluent Quality

Nitrification is a purely aerobic process that requires a large amount of oxygen. In fact, it requires 4.6 pounds of oxygen to oxidize one pound of ammonia into nitrate. Comparatively, it takes approximately 1.1 pounds of oxygen to oxidize a pound of BOD. The requirement to nitrify can almost double your oxygen requirements and aeration costs. As you can see from the chart included in Figure 3, below, the specific growth rate of nitrifying organisms drops off dramatically at dissolved oxygen levels below 2 mg/l and growth rates do not increase significantly above 4.0 mg/L. It is good if the dissolved oxygen level can be maintained between 2.0 and 4.0 mg/L. If SBR dissolved oxygen concentration exceeds 4.0 mg/l, the WWTF is wasting electricity.

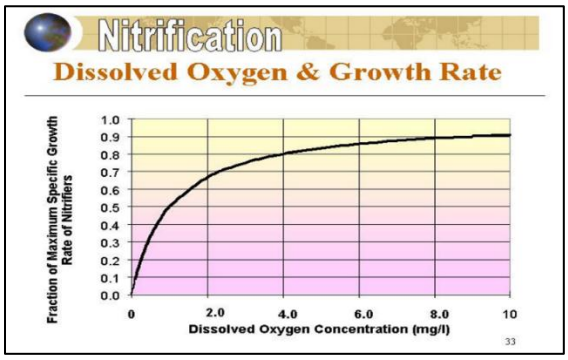
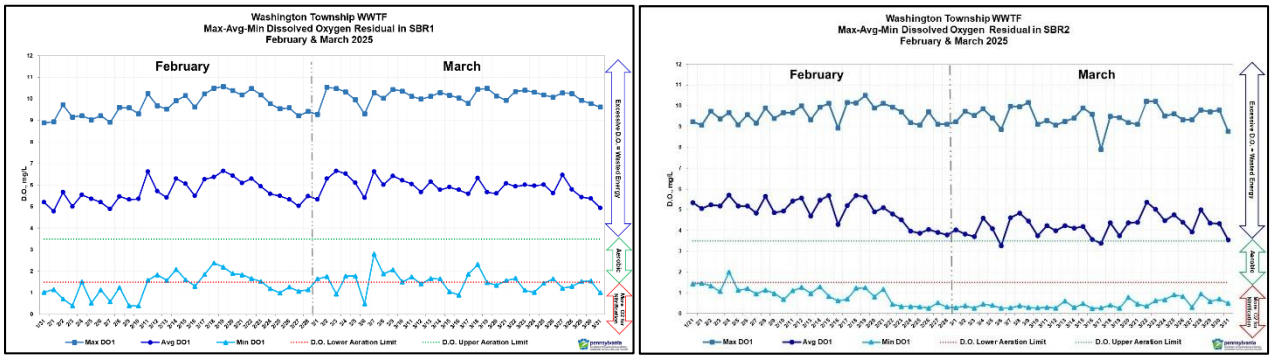


Figure 3) Nitrifier bacteria growth rate and SBR activated sludge dissolved oxygen concentrations.

Continuous immersion probes installed at the WWTF were used for data collection only. Weekly WTE project updates were provided to WWTF operators and consultants. The weekly project updates included graphs of continuous monitoring probe data presenting daily, weekly, and all data collected to date during the study period. Weekly updates also provided project notes, and a summary of the process control and bench testing data collected during WWTAP site visits. Copies of the WWTAP weekly project updates and graph packs may be available upon request.

Graphing data provided by the continuous monitoring probe system will help to monitor and control the efficiency of wastewater treatment. Additionally, it provides some level of assurance against problems that occur when operators are not physically present on site. Figures 4 and 5, below, include graphs of DO and ORP readings from the #1 and #2 oxidation ditch treatment units. The data included in both graphs indicate room for improving BNR and nutrient/pollutant removal by the activated sludge treatment system.



Figures 4 & 5) WWTAP Hach LDO probe data for SBR activated sludge mixed liquor concentrations at WWTF in Feb. & Mar. 2025. D.O. concentrations in SBR mixed liquor over 4 mg/L indicate wasted energy.

Implementation of a Robust Process Control Program

There are various factors that impact the proper operation of the WWTF that can be addressed through development and implementation of a robust process control testing program. During wet weather events, washout of solids can impact nitrification in the oxidation ditch treatment units often relies on a long MCRT, this is tough to achieve with constant washouts. Another concern is settling characteristics of the biomass. It particular, filamentous organisms are a concern for poor settling of the biomass. Regular microscopic examinations are essential and can identify these organisms allowing action to be taken to keep them under control.

The principal benefits of optimizing the activated sludge solids treatment system and instituting a robust process control monitoring program at the WWTF include:

- Increased potential for compliance with NPDES Permit requirements and final effluent limits.
- Increased removal of nutrients (phosphorous, total nitrogen [ammonia-nitrogen, nitrite-nitrogen, and nitrate-nitrogen]) in the final effluent, reducing pollutants in downstream waters that are used for drinking water sources, wildlife & aquatic life, and various recreational uses.
- Potential reduction of electricity consumption due more efficient operation of treatment systems.

WWTF operators conduct daily process control testing and analysis at the onsite laboratory. WWTF wastewater operators monitor the activated sludge solids inventory with 30-minute settleability testing on weekdays and analysis of mixed liquor settleable solids (MLSS). Based upon 30-minute settleability and MLSS results, the WWTF operators adjust the activated sludge solids inventory by wasting sludge from final clarifiers.

Some of these tests are recommended by wastewater operations and design manuals as standard, routine tests to be performed at the WWTF regularly. At times when the plant is upset or if the biological treatment is failing, both the facility NPDES permit, and the industry guidelines recommend increasing the frequency of these monitoring tests until the problem is resolved. A list of recommended process control testing is included in Appendix E of this report.

Washington Township Municipal Sewer Ordinance and Industrial User Permitting

As part of this study, WWTAP staff reviewed Washington Township's local ordinance named "Washington Code", PA Municipal Ordinance § 95-9 Article II Subsection D to determine whether Washington maintains adequate guidance for effective oversight and control of industrial and non-domestic wastewater discharges in the sewer service area. WWTAP staff have determined that Washington's Industrial/commercial user permit ordinance includes adequate guidance regarding industrial and non-domestic wastewater discharges to the sewer service area. However, additional revisions to the ordinance should be identified to ensure that customers collect representative samples of industrial/non-domestic discharges to the sewer service area.

While Washington is not required to develop and implement an industrial pretreatment program, the EPA's Model Pretreatment Ordinance may be used as a guide for adopting new or revised provisions of local law to implement and enforce sewer use ordinance and industrial/nondomestic wastewater discharge pretreatment requirements. Specifically, Washington should revise the Sewer Ordinance to include but not be limited to; maximum pollutant discharge concentrations, prohibited discharge standards, accidental and slug discharge control plans, discharge self-monitoring and reporting, and the development of local limits.

EPA Industrial Pretreatment Program resources are available at the following link: https://www.epa.gov/npdes/national-pretreatment-program .

Additionally, WWTAP staff recommend that Washington Township review the existing sewer rate structure. While the issue of billing can be a politically charged issue, some consideration may want to be given to billing based on usage. While flat rate is convenient and easy, it may not be equitable. Flat rate customers have no reason to consider conservation. The winners in a usage (per gallon) based system would most likely be people with small households (one or two people) as they would most likely see a decrease in the bill while people with larger households would most likely see increases in bills. While industrial customers are not a current concern, consideration should be given to updating billing for industrial customers who may discharge wastewater with onto your system. This can be especially true for food processing plants. There is a direct correlation in the pounds of BOD removed and the amount of biosolids produced and the costs of operating the treatment system.

Acknowledgements:

WWTAP would like to thank Washington Township, the WWTF Superintendent & staff, and the consulting operators & engineers, for the opportunity to perform this WTE project The PADEP wastewater technical assistance program stands ready to assist Washington Township with any of the recommendations or observations mentioned in this report

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LIST OF ATTACHMENTS

Attachment A	Washington Twp. WWTF – WWTAP WTE Study Team
Attachment B	WWTAP Continuous Monitoring Equipment Deployed for WTE
Attachment C	WWTAP Project Outline for Washington Twp. WWTF WTE
Attachment D	Washington Twp. WWTF Reference Schematics
Attachment E	Recommended Process Control Testing for WWTF
Attachment F	Washington Twp. POTW - WWTAP Composite Sampling Results

- ***Upon request, WWTAP* will *provide Washington Township with complete copies of all data & documentation generated during this project.***

- ***Additional WWTAP data & results for this project may be available upon request. Please contact the project manager listed in Appendix A of this report or the PADEP Bureau of Clean Water WWTAP at RA-EPWWTAPROVIDER@pa.gov / (717) 787-6744.***

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Attachment A: Washington Twp. WWTF – WTE Project Team

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Washington Township Wastewater Treatment Facility

Washington Twp. WWTP

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Attachment B: Washington Twp. WWTF WTE – Project Outline

Project Outline

PADEP WWTAP Wastewater Treatment Evaluation Project
Washington Township (Berks Co.) Wastewater Treatment Plant
PA National Pollutant Discharge and Elimination System (NPDES) Permit No. PA0086142

Background:

On September 12th, 2024, a wastewater operator outreach advisor from the Pennsylvania Department of Environmental Protection (PADEP), Bureau of Clean Water, Wastewater Technical Assistance Program (WWTAP) conducted a site visit at the Washington Township Municipal Authority wastewater treatment plant (WWTP) in Washington Township, Berks County, Pennsylvania. Following the September 2024 site visit, the WWTP operator and PADEP WWTAP & Public Service Institute Instructor (PSII) operator outreach staff coordinated to design a wastewater treatment evaluation (WTE) project to monitor and optimize the WWTP activated sludge treatment system and investigate slug discharges of non-domestic wastewater in WWTP influent flows that may be interfering with the treatment capacity of the WWTP.

WWTAP Project Proposal:

WWTAP staff will install a selection of continuous monitoring equipment at the WWTP to optimize biological nutrient removal of the activated sludge treatment system and complete at least one (1) weekly site visit to clean & maintain probes and complete process control & bench testing.

The WWTP is currently completing a pilot study to add a Poly-Aluminum Chloride solution (Process Masters) for phosphorous removal. WWTAP and PSII staff will coordinate with the WWTP operator to optimize Biological Nutrient Removal in the activated sludge treatment system and reduce the WWTP final effluent discharge loading of pollutants/nutrients (phosphorous and nitrogen) to waters of the Commonwealth.

PADEP WWTAP staff have offered to assist the WWTP certified operator with determining sources of non-domestic wastewater to the sewer service area that may be causing interference with the activated sludge treatment biota.

PADEP PSII staff may review data and results collected by WWTAP continuous monitoring equipment and process control/bench testing. Based on those data, WWTAP and PSII staff will consult with the WWTP operator(s) to determine whether there are any recommended treatment system adjustments to optimize biological nutrient removal and reduce WWTP effluent discharge nutrient loading.

WWTAP will deliver a project report that will include, at minimum; a summary of data & relevant findings, recommendations for WWTP optimization, and a discussion and resources for the investigation and elimination of slug discharges of non-domestic & high organic strength wastewater in the sewer service area.

WWTAP Project Timeline:

Project duration is six (6) to ten (10) weeks from deployment to striking of WWTAP equipment.
WWTAP equipment deployment and setup is scheduled for Wednesday, January 29th, and Thursday, January 30th, 2025.

WWTAP Resource Requests for Washington Twp. and the WWTP Certified Operator:

- WWTAP requests access to the facility at reasonable times (M-F 0700-1600).
- Reliable power source(s) for WWTAP equipment. (120 VAC)
- Access to 24-months of operating records, including Chapter 94 and industrial/non-domestic customer information, and laboratory & bench testing results.
- Availability to regularly discuss project status and WWTAP continuous monitoring & process control data
- Discrete influent grab samples for BOD_5 concurrent with WWTAP monitoring equipment installation & startup.
  ** WWTAP requests that the wastewater operator complete weekly influent BOD_5 grabs for project duration and/or with observed qualitative impacts of WWTP influent flow.*

Figure 10) Washington Township WWTF – WWTAP Project Outline

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Attachment C: WASHINGTON TOWNSHIP WTE - WWTAP EQUIPMENT

WWTAP Deployment Pictures for Washington WTE

Figure B-1: Photo of PADEP WWTAP process control and bench testing equipment at Washington Twp. WWTF

Figure B-2: Photo of UVAS continuous monitoring probe installation location in the. WWTF influent distribution box.

Figure B-3: Photo of UVAS continuous monitoring probe installation location in the WWTF influent distribution box.

ATTACHMENT C: WASHINGTON TOWNSHIP WTE - WWTAP EQUIPMENT (cont'd)

WWTAP Deployment Pictures for Washington WTE

Figure B-4: Photo of continuous monitoring probe installation location in the WWTF SBR treatment units.

Figure B-5: Photo of continuous monitoring probe installation in the WWTF SBR#1 treatment unit (settle).

Figure B-6: Photo of continuous monitoring probe installation location in the. WWTF SBR#2 treatment unit (react).

ATTACHMENT B: WASHINGTON TOWNSHIP WTE - WWTAP EQUIPMENT (cont'd)

WWTAP Deployment Pictures for Washington WTE

Figure B-7: Photo of HACH SC4500+ controller, airblast unit compressor (for AISE probe), and Nitratax & AISE probe installation location in the WWTP effluent trough.

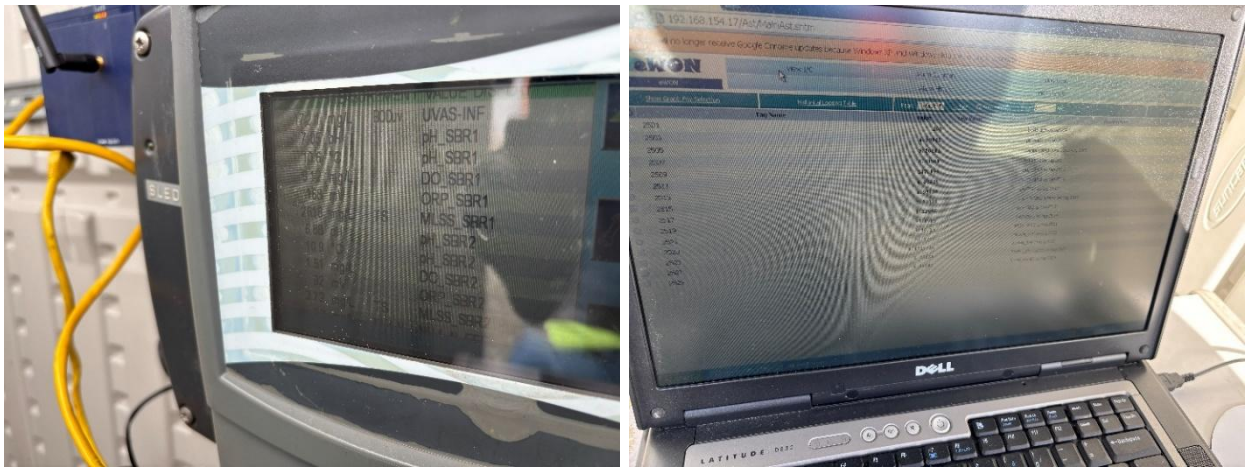

Figure B-9: Photo of Hach SC1000 controller universal display module and eWon eBuddy data logging program with live display of continuous monitoring probe data.

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ATTACHMENT D: WASHINGTON WWTF REFERENCE SCHEMATICS

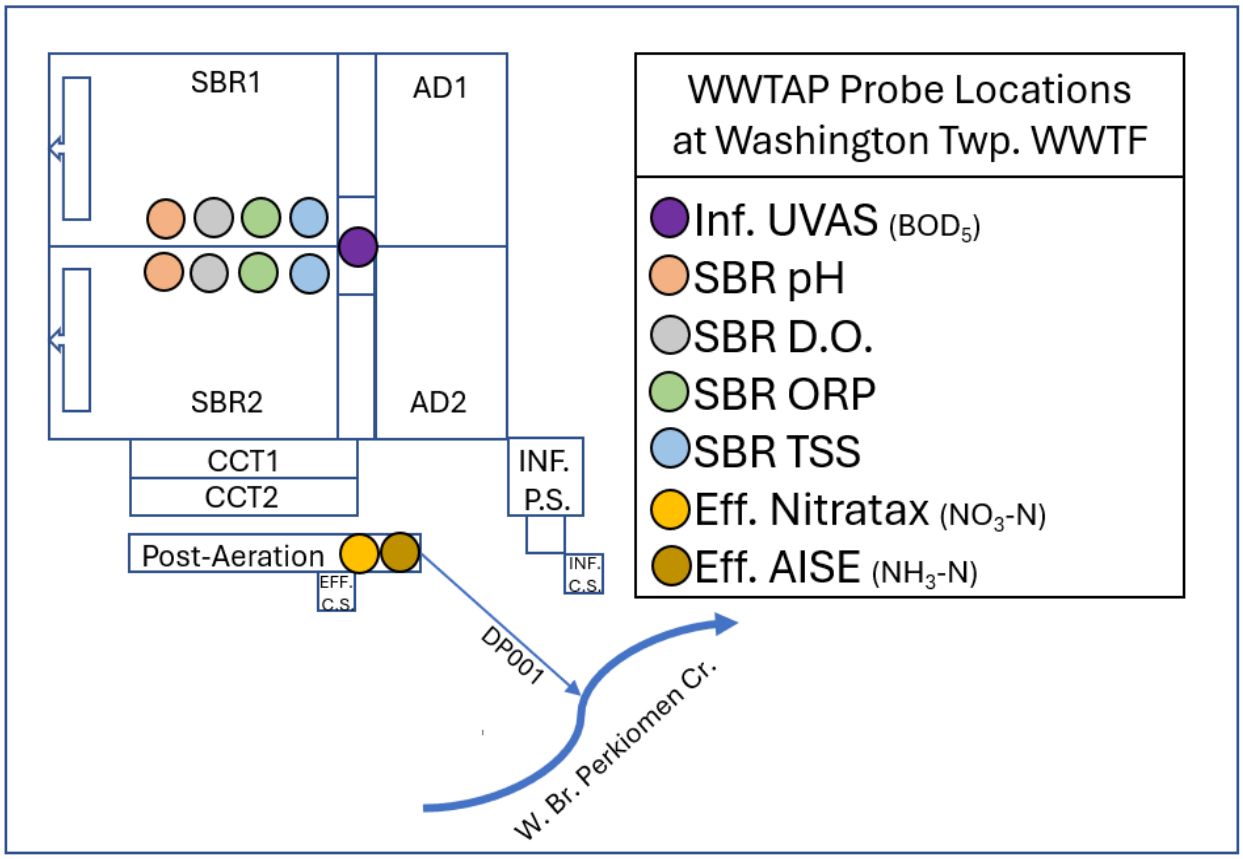

Figure D-1: WWTAP monitoring probe locations at Washington Twp. WWTF (PADEP)

ATTACHMENT D: WASHINGTON WWTF REFERENCE SCHEMATICS (cont'd

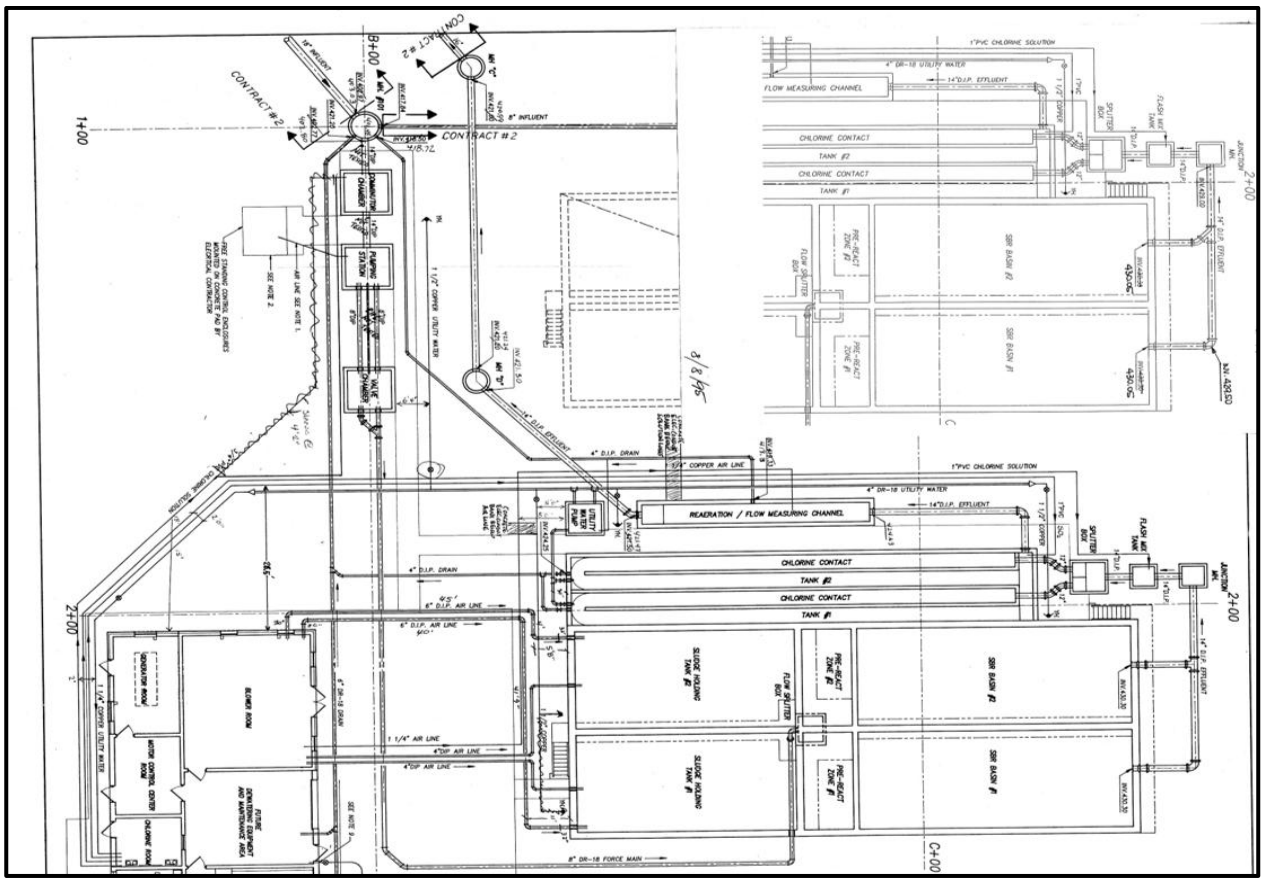

Figure D-2: WWTF Process Schematic from 2022 NPDES Renewal Application (1994).

Attachment E: RECOMMENDED PROCESS CONTROL TESTING

The following is a list of recommended process tests/calculations for this system (many already being performed).

- Continuous monitoring/recording of pH, conductivity, and ORP can alert operator of drastic changes in influent waste characteristics
- Influent Temperature (daily grab)
- Monitor Nutrient Balance (1# P: 5# N :100# BOD)
- Influent/Effluent alkalinity (as needed). Alkalinity is necessary to support nitrification, and it will be consumed in the process. If testing reveals little fluctuation in these values, testing can be occasional. We would recommend this test any time there is a problem with nitrification.
- SBR DO, ORP, & pH (daily grab during react phase in SBR cycle)
- MLSS & MLVSS on each SBR (3 times per week)
- Daily microscopic examination of mixed liquor.
- 30 Min. Settleability
- Adjustments to WAS Rates (per SBR cycle)
- Calculate the Food to Microorganism Ratio (F/M Ratio) for the WWTF
- Calculate MCRT (sludge age)
- Calculate Lbs. of solids under aeration.
- For the digestion process, monitor the lbs of solids added (WAS) to the system each day and the lbs. of solids removed. Monitor the volatile content of solids (WAS & Hauled Sludge). Calculate reduction of volatile solids. Monitor the temperature & pH of the digesters daily. Thicken digesters daily (as much as possible). Calculate Hydraulic Detention Time (HDT) of digesters.
- The decant from the aerobic digesters should be monitored as well. Internal recycle flows (like digester decant) can impact BNR by the activated sludge biomass in the SBR treatment units. The quantity and quality of the filtrate should be monitored. Specifically, WWTAP recommends monitoring for BOD, Total Phosphorous, TSS, NH_3-N and pH.

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ATTACHMENT F: WWTAP – WTBA MH#408 COMPOSITE SAMPLING RESULTS

WWTAP staff coordinated with wastewater operator for Washington Township – Berks County wastewater treatment facility (WWTF), to deploy a composite sampler at the Washington Twp. sanitary sewage collection and conveyance system Manhole #408 (Laura Drive cul-de-sac). The gravity sewer system at Manhole #408 collects domestic sewage from approximately four residences and wastewater discharge(s) from the Longacres Dairy food production facility. The composite sampler was programmed to collect discrete samples from 11:20 on September 10th to 11:00 on September 11th, 2025. At the time of deployment, the wastewater to the manhole appeared mostly clear but at the time the sampler was pulled from the manhole, wastewater in the trough that included the Longacres Dairy wastewater was cloudy/turbid with white color and visible fat/grease accumulation in the manhole trough. WWTAP staff observed that most samples appeared hazy with fine, white-colored colloidal and settled solids.

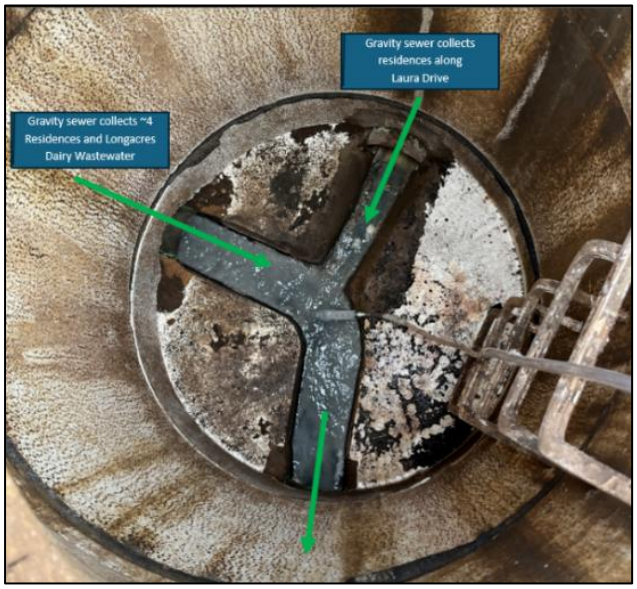

Figure F-1) Photo of trough system in Washington Twp. – Berks sanitary sewer collection & conveyance system manhole #408. Note the white-colored deposition in the trough that collects Longacre's Modern Dairy wastewater discharge.

Figure F-2) Photographs of MH408 samples collected from Sept. 10th, through Sept. 11th, 2025.

WWTAP staff picked up the composite sampler at the Washington Twp – Berks Co. sanitary sewer collection and conveyance system Manhole #408 and returned to the Washington Twp. WWTP for bench testing and analysis. Those results are included in the tables below.

ATTACHMENT F: WWTAP COMPOSITE SAMPLING RESULTS (cont'd)

Table F-1) Results of Ammonia-Nitrogen bench testing using HACH TNT 837 tests and HACH DR1900 portable spectrophotometer. (WWTAP analyzed Ammonia-Nitrogen in six randomly selected samples.)

Bottle No.	Sample Start	NH_3-N (mg/L)
4	9/10/2025 14:20	UR <10.0
6	9/10/2025 16:20	UR <10.0
12	9/10/2025 16:20	13.0
15	9/10/2025 16:20	10.7
20	9/11/2025 6:20	UR <10.0
24	9/11/2025 10:20	UR <10.0

Table F-2, below, includes wastewater facility design standards for expected COD and BOD_5 concentrations in low, medium, and high strength domestic wastewater.

Table F-2) Composition of untreated domestic wastewater (Metcalf and Eddy, 2003)

Contaminant	Unit	Low strength	Medium strength	High strength
BOD_5	mg/l	110	190	350
COD	mg/l	250	430	800

Table F-3) Results of Chemical Oxygen Demand (COD) bench testing. For comparison, Biochemical Oxygen Demand, 5-day (BOD_5) concentrations were calculated based on an assumption that approximately 50% of COD in domestic wastewater is BOD_5. Highlighted results for COD >430 mg/L and/or calculated BOD_5 >190 mg/L

Bottle #	Sample Start	COD (mg/L)	BOD (mg/L) *Calculated	Comments
1	9/10/2025 11:20	0	0	0 mL sample volume. Low Q?
2	9/10/2025 12:20	459	230	3/4 aliquots collected.
3	9/10/2025 13:20	440	220	Four aliquots collected.
4	9/10/2025 14:20	516	258	Four aliquots collected.
5	9/10/2025 15:20	364	182	Four aliquots collected.
6	9/10/2025 16:20	444	222	Four aliquots collected.
7	9/10/2025 17:20	234	117	Four aliquots collected.
8	9/10/2025 18:20	684	342	Four aliquots collected.
9	9/10/2025 19:20	608	304	Four aliquots collected.
10	9/10/2025 20:20	810	405	Four aliquots collected.
11	9/10/2025 21:20	447	224	Four aliquots collected.
12	9/10/2025 16:20	472	236	Four aliquots collected.
13	9/10/2025 23:20	390	195	Four aliquots collected.
14	9/11/2025 00:20	388	194	Four aliquots collected.
15	9/10/2025 01:20	781	391	Four aliquots collected.
16	9/11/2025 02:20	325	163	Four aliquots collected.
17	9/11/2025 03:20	459	230	Four aliquots collected.
18	9/11/2025 04:20	603	302	Four aliquots collected.
19	9/11/2025 05:20	164	82	Four aliquots collected.
20	9/11/2025 06:20	123	62	Four aliquots collected.
21	9/11/2025 07:20	157	79	Four aliquots collected.
22	9/11/2025 08:20	226	113	Four aliquots collected.
23	9/11/2025 09:20	565	283	Four aliquots collected.
24	9/11/2025 10:20	348	174	3/4 aliquots collected.