

This document provides industry best practices and resources for operators and system managers to avoid common mistakes that trigger non-compliance.

System Information

Facility Name _____ Receiving Water _____

Important Dates

Permit Start ____/____/____ Permit End ____/____/____ Date To Reapply ____/____/____

Operational Best Practices

Frequent Inspections

Items to check often (usually daily) as the operational condition of these items can quickly impact the performance of the treatment plant.



- ☐ **Critical Equipment Status:** Evaluate status of critical equipment including influent pumps, UV lights, chemical inventories, clarifier rake arms, aerators, etc.
- ☐ **Flows and Pumping rates:** Confirm that influent, effluent and internal flows throughout the plant are within expectations for current conditions. Are flows fluctuating as expected for rainfall or seasonal conditions? Are flow meters intact and functioning?
- ☐ **Solids Inventory:** Are any parts of the plant overloaded? Verify mixed liquor suspended solids are within range for activated sludge (2500-3500 mg/L), settling tanks sludge blankets are < 2 ft, 30 min settling is < 150 ml/L.
- ☐ **Auto Samplers:** Clear intake lines of blockages. Check sample cycle matches the volume in the bottle and confirm all samples have been drawn.
- ☐ **Outfall Water Condition:** Observe if there is an unusual odor, excessive foam, sheen to the water, or discoloration of the surrounding vegetation.
- ☐ **Treatment Issues:** Observe if there is bulking sludge, pin floc, vectors (snails, bloodworms, midge flies, waterfowl), excessive algae or vegetation growth.
- ☐ **Safety:** Be aware of trip hazards, personal protective equipment availability and conditions, railings, and walkways.

Occasional Inspections

Items to check less frequently (usually weekly or monthly) to confirm that performance is within expectations

- ☐ **Equipment Calibrations:** Items like autosamplers, dissolved oxygen and chemical probes (including pH) drift out of range over time and will need to be recalibrated to a standard to ensure that the equipment is reading accurately.
- ☐ **Collection System:** Lift stations and manholes throughout the service area will need to be inspected periodically for condition assessment and potential fats, oils, and grease and wipes build-up that can lead to blockages and malfunctions causing sanitary sewer overflows.
- ☐ **Pump and Motor Maintenance:** Most pumps and motors require lubrication, belt replacement, or oil changes. Identify assets that need additional maintenance above the manufacturers estimates due to the demanding conditions experienced at wastewater systems.
- ☐ **Alarms:** Confirm alarms and other active monitoring systems are operational.
- ☐ **Safety:** Keep spill control supplies stocked and emergency response equipment in operational condition.



Use the QR code to access resources, including formulas for the calculations listed above, and techniques for nutrient reduction.

<https://www.epa.gov/compliance/resources-wastewater-operators>

Common Process Monitoring Parameters

Dissolved Oxygen (DO)	Treatment microorganisms consume a large quantity of oxygen to grow and reproduce. A minimum DO of (0.5 - 2 mg/L) should be provided to these organisms or the treatment capacity of the system can be suppressed leading to septicity and undesired filamentous bacteria growth.
Solids Inventory SRT F:M SVI Sludge Blanket	- Treatment microorganisms require a minimum residence time to become established within a system, too long of a time causes a system to be devoid of food and promotes the growth of larger organisms reducing efficiency and leading to overloading and bulking issues. Consistently removing a percentage of "activated sludge" from a system can help regulate the total microbial population and promote the dominance of the most efficient treatment organisms. - Sludge blanket monitoring can be accomplished using a sludge judge or ultrasonic interface monitor. - Solids Retention Time (SRT), Food to Microorganism Ratio (F:M), and Sludge Volume Index (SVI) are all common calculations that can be used to regulate the solids inventory of a system to find the best-performing steady state for operation.
Nutrients Ammonia Nitrate/Nitrite Phosphorus	- Excessive nutrients within a system can create internal treatment challenges as well as cause effluent exceedances by contributing to eutrophication and exerting additional biochemical oxygen demand on receiving waters. - Identifying and mitigating the sources of the nutrients through a pretreatment program can reduce the removal demand required by the treatment plant.
Sludge Settling Filamentous Bacteria Sludge Age 30-min settling test	- Bulking sludge is a major challenge within many systems. Excessive filamentous bacteria and old sludge age are two of the most common factors causing sludge to float. - A 30-min settling test of the mixed liquor suspended solids can inform an operator of the current biomass condition and the quality of the floc formed that contributes to settling characteristics.



Sampling Best Practices

Location	Required sample locations are described in the permit and are representative of influent (before any treatment and return flows) and effluent (after all treatment is performed). Effluent samples should be representative of the water discharge through the outfall prior to mixing with the receiving water body or other waste streams.
Occurrence Specified by the permit	Frequency: sampling can occur at daily, weekly, monthly, quarterly, and at annual intervals. Type: grab (single dip sample) or composite sample (a series of flow proportional grab samples in timed increments combined into a single sample for analysis).
Collection	- Only use sample bottles that are sterilized and triple rinsed. Discard the contents of the first sample as rinse then collect the actual sample. If there is a preservative in the collection bottle, do not rinse or overfill. The volume of preservative needed is specific to the volume of sample to be collected. - Document in the chain of custody: the time of collection, date, the person taking the sample, and unique sample identifier. Rinse all collection equipment with deionized water before storage.
Preservation	All samples collected should be preserved in accordance with 40CFR part 136. At a minimum, all samples should be maintained at $\leq 6^{\circ}\text{C}$ prior to analysis; however, frozen samples will be rejected by the lab. Be aware of hold times for specific parameters. Parameters such as pH and dissolved oxygen need to be analyzed almost immediately as values can change rapidly whereas others can be stored over 24 hours before analysis is required.
Shipping	Include all samples, a temperature blank (provided by the lab), and the preservative (ice). Do not use dry ice as the CO_2 released when melting can cause asphyxiation or extreme pressure buildup in enclosed containers.
Safety	There is potential for exposure to pathogens in the wastewater during sampling. Wear proper personal protective equipment like nitrile gloves and safety glasses to limit entry points into the body.



Reporting Best Practices

Logbook

Documenting operational actions and equipment status or calibration results is a great way to troubleshoot problems within a system that may happen later. Some documentation is required by the permit like a chain of custody and recording of operational actions. An official logbook should have a date, climate conditions, operators on duty and work completed during that shift. Logbooks should be accessible to inspectors upon request and be retained for at least 3-5 years.

Submitting Discharge Monitoring Reports (DMRs)

Submission: Sample and calculated results must be recorded and submitted on a DMR through NetDMR at the frequency required by the permit. DMRs are due on the 28th day of the month following the reporting period.

Significant Digits: NetDMR allows for a maximum of 8 digits after the decimal; however, the number of significant digits required is determined by the accuracy of the measurement.

- All non-zero digits and any zeros between non-zero digits count.
- Leading zeros do not count.
- Trailing zeros count if there is a decimal point.

Rounding Numbers: Stay consistent in rounding numbers through calculations and reporting.

- Identify the position of the digit you are rounding to.
- Leave the digit the same if the trailing digit is less than 5.
- Increase the digit by 1 if the trailing digit is 5 or more.
- If the digit 5 is dropped, round off the preceding digit to the nearest even number (e.g., 1.05 round to 1.0, 1.15 rounds to 1.2)

Interpreting Lab Results

Detection Limit: The minimum value that an analytical method can generate with confidence. A detection limit must be $\leq$ the minimum value specified for a parameter in the permit. If a laboratory reports a trace amount, then a "<" sign should be reported on the DMR with the detection limit specified.

Practical Quantification Limit (PQL): The minimum concentration of an analyte that can be measured with a high degree of confidence that the analyte is present at or above that concentration. Often, analytical values less than PQL are considered zero for purposes of determining averages. If analytical results are less than PQL, < PQL can be reported on the DMR.

Calculations

Average Monthly (30-day): Arithmetic mean of all samples for a parameter collected during a calendar month or consecutive 30-day period.

Average Weekly (7-day): Arithmetic mean of all samples collected Sunday through Saturday or consecutive 7-day period.

Daily Maximum: Greatest measured value for a pollutant discharged during a calendar day or 24-hour period that represents a calendar day for purposes of sampling. For pollutants with limitations expressed in other units of measurement (e.g., mg/L), the daily maximum is calculated as the average of all measurements of the pollutant over the calendar day or 24-hour period.

Noncompliance

Significant Noncompliance (SNC): SNC violations can range from significant exceedances of effluent limits and sanitary sewer overflows to reporting violations.

Reporting: In any event of effluent discharge exceeding permit limits, the operator in responsible charge must notify the **permitting authority orally within 24 hours** of becoming aware of the circumstances and provide a **written submission within 5 days**. The written submission should include: **(1)** a description of the noncompliance and its cause; **(2)** the period of noncompliance (exact dates and times); **(3)** if at the time of notification, the noncompliance has not been corrected, the anticipated time it is expected to continue; and **(4)** steps taken or planned to reduce, eliminate, and prevent the recurrence of noncompliance.

Noncompliance Hotline: Regional EPA _____ - _____ - _____ State _____ - _____ - _____

Disclaimer: This tip sheet addresses select provisions of EPA regulatory requirements using plain language. The statements in this tip sheet are intended solely as guidance. Nothing in this tip sheet is meant to replace or revise any NPDES permit, any EPA regulatory provision, or any other part of the Code of Federal Regulations, the Federal Register, or the Clean Water Act. EPA recommends that operators consult with their permitting agency prior to making major changes to their systems.



Use the QR code to access resources, including formulas for the calculations listed above, and techniques for nutrient reduction.

<https://www.epa.gov/compliance/resources-wastewater-operators>