Writing Standard Operating Procedures

A Guide for Small Waste Water Treatment Plant Operators

By

Daniel Baker

For the

Laboratory Accreditation Program

Washington State Department of Ecology
Manchester, Washington

January 2023, Publication 23-03-203

Publication Information

This document is available on the Department of Ecology's website at:
https://apps.ecology.wa.gov/publications/summarypages/2303203.html

Contact Information

Laboratory Accreditation Program

P.O. Box 488
Manchester, WA 98353-0488
Phone: 360-871-8840
Website[1]: Washington State Laboratory Accreditation Program

ADA Accessibility

The Department of Ecology is committed to providing people with disabilities access to information and services by meeting or exceeding the requirements of the Americans with Disabilities Act (ADA), Section 504 and 508 of the Rehabilitation Act, and Washington State Policy #188.

To request an ADA accommodation, contact Ecology by phone at 360-871-8878 or email at Daniel.Baker@ecy.wa.gov. For Washington Relay Service or TTY call 711 or 877-833-6341. Visit Ecology's website for more information.

[1] https://ecology.wa.gov/Regulations-Permits/Permits-certifications/Laboratory-Accreditation

Writing Standard Operating Procedures

A Guide for Small Waste Water Treatment Plant Operators

Laboratory Accreditation Program
Washington State Department of Ecology
Manchester, WA

January 2023 | Publication 23-03-203

Table of Contents

Standard Operating Procedures **5**

Important Sections of an SOP **6**

Title 6

Author 6

Purpose 6

Sample Handling 6

Equipment 6

Reagents 6

Quality Control (QC) 7

Procedure 8

Calculations 8

References 8

Standard Operating Procedures

A standard operating procedure (SOP) is an important part of a laboratory's quality assurance program. A laboratory SOP is not like other operating procedures you may use at a treatment plant. It is not just the steps in a procedure, but a record that completely documents an analysis. An SOP should clearly describe how an analysis is performed so that anyone with laboratory experience can follow it and helps ensure that an analysis is done the same way every time. An SOP cannot be replaced by a method or borrowed from another lab, it must be specific to one facility and to the equipment available there.

The laboratory will need to write a dedicated SOP for each method. An SOP is a stand alone document with a complete description of all the steps taken for the analysis.

This guide will describe the most important parts of an SOP that the Labortory Accreditation Unit looks for when evaluating the procedures of a small wastewater treatment plant. Operators using this guide will be able to create an accurate set of SOPs that will document how all analyses should be run in your facility.

Important Sections of an SOP

An SOP should be available in the laboratory for reference by the analyst. It is also a useful tool for analyst training. It should be organized so that all important information can be easily found.

The following sections are all parts of a quality SOP:

Title

Your SOP needs a title that includes three important details: the name of your facility, the analyte, and the method. The SOP is specially made for your laboratory, so it must have the name of your facility to be valid. The method and analyte should match what is performed in the laboratory and appears on your Scope of Accreditation. Even if your SOPs are usually kept in single file or folder, each analysis needs its own title.

Author

The SOP should have an author and effective date. Each time an SOP is changed it should have a new effective date. Older versions of an SOP should be removed from the laboratory and archived.

Purpose

Explain why the test is needed including the regulatory purpose such as permit requirements. Describe the sample type, number of samples, and how often they are collected.

Sample Handling

The SOP should describe how a sample is treated when it arrives in the laboratory. What type of bottle is the sample stored in? Does the sample require a preservative or refrigeration? How long can a sample be stored before analysis begins (the holding time)?

Equipment

The SOP should list all the instruments, glassware, and other supplies used in this analysis. This section can help an analyst gather all the materials needed for the analysis. This list is also helpful for ordering consumable or replacement parts.

Reagents

In this section, describe all the reagents and standards used for this analysis. Like the equipment section it is useful for both preparing for an analysis and for purchasing new reagents. We recommend including the vender and part number for reagents you purchase. Include instructions for any reagents or standards that you prepare in the laboratory.

Quality Control (QC)

Quality control samples are used to verify that your procedure is operating effectively. Failed quality controls indicate that something is wrong with the analysis and that troubleshooting is required.

This section should identify all the QC required for the analysis, how often they are analyzed, and what criteria are used to determine if they are acceptable. All quality controls should be treated the same as samples.

Common quality controls include:

Method Blanks

Method Blanks are analyzed by the same procedure as other samples but are expected to contain no analyte. A failing blank can indicate contamination in the equipment or reagents.

Check Standards

Check standards (sometimes called a blank spike, laboratory-fortified blank, or laboratory control sample) is a solution with a known concentration. It is used to demonstrate that the laboratory is capable of measuring results accurately and precisely. Trouble with the check standard can indicate a bad calibration or a problem with the reagents.

Duplicates

A duplicate is a sample split into two aliquots and analyzed separately to verify that the laboratory is capable of measuring values precisely and with repeatability.

Matrix Spikes

Matrix Spikes

A sample spiked with a known amount of analyte. This is similar to a check standard, but prepared with a sample instead of blank water.

Proficiency Testing (PT)

Proficiency testing samples are samples prepared by an outside vender with a value unknown to the laboratory. They are used as an independent verification of the ability of a laboratory to accurately measure the analyte being tested. Laboratories are required to successfully test PT samples every year for all accredited parameters.

Initial Demonstration of Capability (IDC)

An IDC is analyzed whenever a significant change is made to a method. It is required when applying for the addition of a new parameter and we recommend them for training new employees. Usually the analyst will analyze four check standards and generate a report showing that the results are all accurate and reproducible.

Method Detection Limit (MDL)

The method detection limit is the level at which you can positively identify an analyte in a sample. The MDL should be below your reporting limit. Contact your laboratory auditor for help conducting an MDL study.

Reporting Limit

The reporting limit is the level you can accurately measure the concentration of an analyte.

Procedure

The procedure is a step by step set of instructions for running the analysis. This will be evaluated for clarity and to verify it satisfies the accredited method.

Calculations

Any calculations necessary for the analysis should be described in this section. Include units of measure used for this analysis; for example mg/L. Show equations for evaluating quality controls such as relative percent difference and percent recovery.

References

Laboratories must use the method version with the correct publication date for compliance reporting. The reference section should cite the exact method you are accredited for. When using Standard Methods, include the edition of the book and the version of the method.

Some Hach methods can't be accredited directly, but follow the allowed method closely enough that they can be used by laboratories. These methods should be included in the reference section.

Instruction manuals, equipment manuals, and other materials that help you understand the analysis should also be included as a reference.