# Standard Operating Procedure #008
# Secchi Depth

*Version 1.0*
*October 2018*

**Prepared by:**
**Water Resources Division**
**Natural Resources Department**
**Lummi Indian Business Council**

**Prepared for:**
**EPA Region 10**

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# REVISION RECORD

| Approval | Date | Responsible Person | Description of Change | Location of Change |
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| 1 | October 2018 | Kara Kuhlman | Initial Approval and Release of Version 1.0 | N/A |
| 2 | | | | |
| 3 | | | | |

# SIGNATURE PAGE

**Document: Secchi Depth SOP #008**

**Version 1.0**

The following technical staff have read this manual. A copy of this page will be distributed to the employee training record file.

| | |
|---|---|
| **Signature** | **Date** |
| **Name (printed)** | **Title** |

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# 1. INTRODUCTION

The Secchi disk is used to measure *in situ* water clarity ("Secchi depth") at marine surface water sites. This document, the Standard Operating Procedures (SOP) for the Secchi disk, should be used any time Secchi depth is measured. This document describes the standard operating procedures and best practices for measuring Secchi depth, including measurement technique, equipment needed, and quality assurance/quality control (QA/QC) procedures. This document is to be used in conjunction with the relevant project Quality Assurance Project Plan (QAPP).

## 1.1 Method Summary

The Secchi disk is used to measure *in situ* water clarity at all marine sites accessed by boat. Quality assurance and quality control procedures include duplicate measurements at 10% of sites sampled on a given day.

## 1.2 Health and Safety Warnings

No water quality measurement is worth risking injury or death. Field personnel must be aware of the environment, use common sense and training, and not exceed their abilities or limits. Field work is never conducted alone. All Lummi Natural Resources (LNR) Water Resources Division (LWRD) Health and Safety Plan (LWRD 2015a) requirements and guidelines are followed at all times while conducting fieldwork.

# 2. INSTRUMENT SPECIFICATIONS

The Secchi disk is an eight-inch diameter disk marked alternately in black and white quadrants. A weight is attached to the bottom center of the disk and the disk is attached to a 10-meter nylon cord. The cord is marked in 0.5-meter intervals. LWRD maintains one Secchi disk (Figure 2.1).

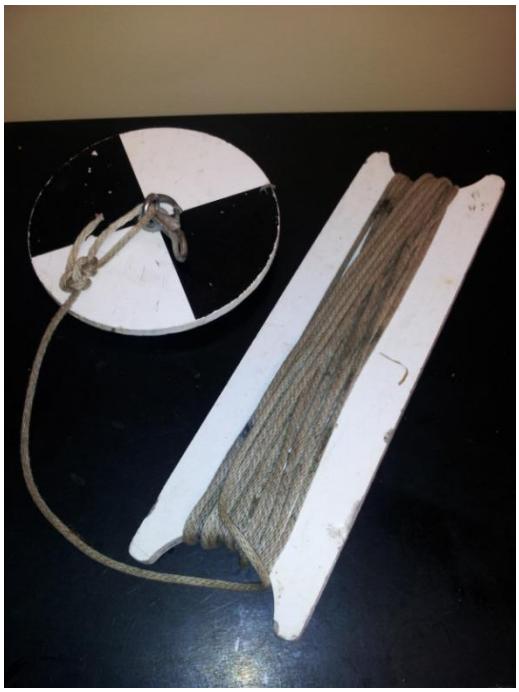

**Figure 2.1** Secchi Disk and Cord

The range, accuracy, and precision vary with sea-state, sunlight intensity, water clarity, and the sampler. Use of the Secchi disk for water clarity is imprecise and only approximate due to the subjective nature of the measurement and variable field conditions. Readability is approximately 0.1-0.25 meters based on visual assessment.

Secchi depth and water depth are not critical measurements but are collected to provide additional information about site conditions on the day sampling occurred.

# 3. SECCHI DEPTH MEASUREMENT

Secchi depth is a measure of water clarity and is collected at marine sites sampled from a boat. The measurement is made at a representative location by lowering the Secchi disk into the water until it is no longer visible. Detailed instructions follow:

1. Select representative location based on previous experience and visual assessment
    - Measure on the shady side of the boat
    - Keep sun to back to minimize glare
    - Do not use sunglasses
    - Same person should perform measurement throughout sample run
    - Ideally, measurement performed between 10:00 am and 2:00 pm
2. Ensure that all components of Secchi disk are firmly attached and that the disk is clean
    - If Secchi disk is broken, discontinue measurements and fix or replace the Secchi disk as soon as possible
    - If the Secchi disk is dirty, clean with a mild detergent (*e.g.,* Alconox)
3. Perform measurement
    - Lower the Secchi disk from the shady side of the boat until it is no longer visible
    - When disk is no longer visible, take visual reading of cord at water surface
    - Lower the Secchi disk a few inches and then raise the Secchi disk until it reappears
    - When disk reappears, take visual reading of the cord at water surface
    - Repeat and average both depths to the nearest 0.1-0.25 meter (10-25 cm) using visual assessment
    - Record the average of the two depth measurements in Water Database or on field datasheet (LWRD 2018d)

If current or wind causes Secchi disk to drift and requires collecting a reading at an angle, note conditions in Water Database or on field datasheet. Discontinue collection of Secchi depth if reasonably accurate reading cannot be collected because of drift due to current or wind.

# 4. QUALITY ASSURANCE/QUALITY CONTROL (QA/QC)

The Secchi disk cannot be calibrated. Quality assurance/quality control procedures include the following:

- Using appropriate measurement techniques (Section 3)
- Having the same person collect all Secchi disk measurements during the sample run
- Keeping the Secchi disk clean and well-maintained
- Duplicate measurements as required by the relevant project QAPP. Duplicate Secchi disk measurements inform the sampler of site variability and measurement precision.

All QA/QC information is documented in the Water Database or on field datasheets.

# 5. ACRONYMS AND ABBREVIATIONS

| | |
|---|---|
| LIBC | Lummi Indian Business Council |
| LNR | Lummi Natural Resources |
| LWRD | Lummi Water Resources Division |
| QAPP | Quality Assurance Project Plan |
| QA/QC | Quality Assurance/Quality Control |
| SOP | Standard Operating Procedure |

# 6. REFERENCES

Lummi Water Resources Division (LWRD). 2015a. Health and Safety Plan. Prepared for the Lummi Indian Business Council. April.

LWRD. 2018a. Quality Assurance Project Plan: Ambient Surface Water Quality Monitoring Project. Version 1.0. Prepared for the Lummi Indian Business Council. Lummi Reservation, Washington. October.

LWRD. 2018b. Quality Assurance Project Plan: Department of Health Support National Shellfish Sanitation Program (NSSP) Project. Version 1.0. Prepared for the Lummi Indian Business Council. Lummi Reservation, Washington. October.

LWRD. 2018c. Quality Management Plan for the Lummi Nation Water Quality Monitoring Program. Version 1.0. Prepared for the Lummi Indian Business Council. Lummi Reservation, Washington. October.

LWRD. 2018d. Water Database User Guide. Prepared for the Lummi Indian Business Council. Lummi Reservation, Washington. October.