

STANDARD OPERATING PROCEDURE FOR SECCHI DISK DEPTH MEASUREMENTS



WATER QUALITY

State of Utah
Department of Environmental Quality
Division of Water Quality

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Foreword

Utah Division of Water Quality (DWQ) Standard Operating Procedures (SOPs) are adapted from published methods or developed by in-house technical experts. This document is intended primarily for internal DWQ use. This SOP should not replace any official published methods.

Any reference within this document to specific equipment, manufacturers, or supplies is only for descriptive purposes and does not constitute an endorsement of a product or service by DWQ. Additionally, any distribution of this SOP does not constitute an endorsement of a procedure or method.

Although DWQ will follow this SOP in most instances, there may be instances in which DWQ will use an alternative methodology, procedure, or process.

The methodology detailed below is the protocol followed by DWQ's monitoring staff and verified by DWQ's Quality Assurance officer.

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REVISION PAGE

Date	Revision #	Summary of Changes	Sections	Other Comments
6/1/12	1	not applicable	not applicable	Previous version was put into new standardized format, began document control/revision tracking
5/1/14	0	Changed revision number, minor formatting	not applicable	First version should have been revision 0
12/4/2020	2.0	Changed name to SOP_SecchiDisk_2021_v0	all	Previous name: SOP_SecchiDisk_5.1.14_Rev0
3/29/21	2.1	Updated language, grammar, and structure	All	Clarified and revised sentence structure and grammar throughout the entire document.

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1.0 SCOPE AND APPLICABILITY

This document presents the Utah Division of Water Quality's (DWQ) Standard Operating Procedure (SOP) for performing Secchi disk measurements (also referred to as Secchi readings or Secchi depths) in lakes, reservoirs, and wetlands. This SOP applies to all DWQ field staff, DWQ cooperators, and volunteer monitors trained on this SOP.

Secchi disk readings are a measure of transparency and give an indication of water clarity. DWQ uses this data in several ways. Secchi readings can be indicative of elevated algae and/or suspended sediment concentrations. Secchi depth values are one component used to calculate the Carlson Trophic State Index, a measure of the degree of eutrophication in a lake/reservoir. The Secchi depth reading can also be used to identify the predominant photic zone; DWQ uses this to determine the depth to which depth-integrated surface water samples are to be collected (See DWQ's SOP for Lake Water Sampling and Data Collection).

For comparable data, Secchi readings should be taken in the shade with the naked eye.

2.0 SUMMARY OF METHOD

The Secchi disk is lowered into the water until it disappears from view. As the sampler raises the Secchi, the depth at which the Secchi disk reappears is the recorded Secchi reading. The sampler takes the reading on the shady side of the boat without wearing sunglasses.

3.0 DEFINITIONS

Secchi disk: 20-cm disk painted in black and white alternating quarters and lowered into the water to measure transparency.

Secchi depth: The depth at which the Secchi disk is no longer visible in the water.

4.0 HEALTH AND SAFETY WARNINGS

Hazardous conditions potentially exist at every waterbody. If unfavorable conditions are present at the time of sampling, it is recommended that the sampling be rescheduled. If hazardous conditions arise during sampling, such as lightning, high winds, rising water, or flash flood warning, personnel should cease sampling and move to a safe location.

When working in Utah and other warm climates, precautionary steps should be taken to avoid heat induced illnesses such as heat stroke or heat exhaustion.

Use caution when working in waders as drowning hazards exist.

Take appropriate precautions when operating equipment and working on, in, or around water, as well as possibly steep and unconsolidated banks, bridges, or edges of ponds/lagoons. All field crews should follow DWQ health and safety procedures and be equipped with safety equipment such as proper wading gear, personal flotation devices (PFDs), gloves, first aid kits, cellular phone, etc.

Use caution when sampling from a bridge or boat and take appropriate actions to make the situation as safe as possible; suspend the sampling if conditions are unsafe.

Take appropriate precautions when operating watercraft and working on, in, or around water. All boats should be equipped with safety equipment according to Utah's "Boating Laws and Rules." (<https://stateparks.utah.gov/activities/boating/boating-laws-rules/>)

5.0 CAUTIONS

When operating a boat, hidden hazards exist underwater. Boat operators should take caution when sampling to avoid equipment damage.

Adverse sampling conditions could increase the likelihood of equipment damage. Boat operators should take extra caution when sampling under adverse conditions. If conditions are unsafe, reschedule sampling.

6.0 INTERFERENCES

Since the eyesight of samplers may vary, it is a good practice for the same person to take all readings on a waterbody on any given day.

Weather and site conditions such as overcast skies, choppy water, presence of plants and algae, tannic or turbid water should be recorded so that outlier readings may be explained. In instances of dense vegetation, move to a nearby clear area if possible.

Watercraft must be stationary while performing Secchi readings. A moving watercraft will produce invalid readings because the Secchi disk will not be aligned vertically in the water column. An additional anchor may be needed to further secure watercraft.

Extreme wave action may also produce invalid readings. In these cases, round the Secchi reading to the nearest 0.1 meter as best as possible, making sure to note the field conditions on a field sheet or in a field notebook.

7.0 PERSONNEL QUALIFICATIONS/RESPONSIBILITIES

Samplers are required to read this SOP annually and acknowledge they have done so via a signature page (see Appendix 1) that will be kept on-file at DWQ along with the official hard copy of this SOP.

Personnel performing water sampling must be familiar with sampling techniques, safety procedures, proper handling, and record keeping. Samplers are responsible for attending refresher meetings held each spring to review procedures and techniques. New staff will be trained in the field by experienced personnel.

8.0 EQUIPMENT AND SUPPLIES

A Secchi disk is made out of a 20-cm-diameter Plexiglass disk painted with four alternating black and white quadrants. This disk is attached to a metered tape marked off in meters and subdivided by tenths of meters. Before use, make sure the markings on the tape are still clearly visible.

- Copy of this SOP
- Secchi disk and metered tape
- Field forms, pencils or pens

9.0 PROCEDURE

Upon arrival at the site, establish which sampler is going to perform the Secchi reading(s) at the waterbody. If there is dense vegetation at the sampling location move the boat if possible to a location that will allow for an undisturbed Secchi reading.

1. Retrieve the Secchi disk.
2. Move to the shady side of the boat.

Note: Wait for the boat to be as stationary as possible before lowering the Secchi disk, and make sure the tape is aligned straight down (not at an angle).

3. With sunglasses off, lower the disk slowly; make sure the tape is straight up and down.
4. Lower the Secchi disk to the point of vanishing and slowly raise it back up until it reappears. Move the disk up and down until the exact vanishing/reappearing point is found. At this point, read the depth on the tape at the water surface; this is the Secchi reading. One can visually read the tape or use your hand to mark the tape where it meets the water's surface.
5. Pull the disk out of the water and record the tape measurement to the nearest 0.1 meter on the trip sheet.

10.0 DATA AND RECORDS MANAGEMENT

Secchi readings will be recorded on the trip sheet and datalogger (if applicable). Review the trip sheet for completeness.

The Secchi reading and field notes, such as high winds/wave action or other events that may have interfered with the reading, are recorded on the trip sheet and hydrofile. Trip sheets and hydrofile are saved in the project hydrodata and scanned data folders.

11.0 QUALITY ASSURANCE AND QUALITY CONTROL

There are limited Quality Assurance and Quality Control (QA/QC) procedures for Secchi readings. Follow all SOP and data management protocols for project-specific sampling and analysis plans.

12.0 REFERENCES

Related DWQ's SOPs:

Standard Operating Procedure for Lake Water Sampling and Collection

Standard Operating Procedure for Calibration, Maintenance, and Use of Multiparameter Water Quality Sondes

