



**MISSOURI STREAM TEAM  
VOLUNTEER WATER QUALITY MONITORING PROGRAM  
Standard Operating Procedure**

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| ORIGINAL EFFECTIVE DATE: January 29, 2018                           |
| RECERTIFICATION DATE:   |
| SOP TITLE: MoST-VWQM-SOP: Water Transparency Measurement of Streams |
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| APPLICABILITY: | Applies to all Level 1, Level 2, Level 3 and CSI trained Missouri Stream Team, Volunteer Water Quality Monitoring Program Participants |
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## **1.0 SCOPE AND APPLICABILITY**

This Standard Operating Procedure (SOP) provides MoST, VWQM Program participants with guidance on the operation of water transparency tubes and how to conduct field analysis of water transparency in streams. Transparency is a measure of how much light passes through water. Reduced transparency of water has effects that include: increased water temperature; decreased dissolved oxygen; influencing the behavior of visual aquatic predators, notably fish and birds; affecting light penetration for aquatic plants; impacting safe recreation; and altering the aesthetic quality of a waterbody. The particles blocking light may be microscopic plankton, suspended clay, silt, sand, organic matter, dissolved substances, or a variety of other runoff materials. Therefore, water transparency is a key indicator of water quality, and can be measured using a device called a transparency tube.

A transparency tube is a simple device made from a 65 centimeter length piece of clear polycarbonate tubing with an inside diameter of 45 millimeters. On the inside bottom of the tube is a black and white disk (commonly referred to as a Secchi disc), with alternating black and white quadrants. On the outside, the tube is marked with black numbers on a white tape that correspond to a 0 – 60 centimeter scale, with the 0 cm mark at the bottom of the tube.

## **2.0 DEFINITIONS AND ABBREVIATIONS**

CSI – Cooperative Stream Investigation

MDC – Missouri Department of Conservation

MoDNR – Missouri Department of Natural Resources

MoST – Missouri Stream Team

SOP – Standard Operating Procedure

VWQM – Volunteer Water Quality Monitoring

QAPP – Quality Assurance Project Plan

QA/QC – Quality Assurance/Quality Control

## **3.0 SUMMARY OF METHOD**

The water transparency method described in this SOP is used by the MoST, VWQM Program participants that have received Level 1, Level 2, Level 3 or CSI Program training. Further background information can be found in the MoST, VWQM Level 1 Notebook and PowerPoint Presentation on water chemistry (see Section 10.0).

## **4.0 HEALTH AND SAFETY REQUIREMENTS**

Appropriate protective gear, such as gloves and water proof boots, should be worn to protect against encountering potential water-borne illnesses during sampling. It is also advisable to frequently wash hands with soap and water, especially before eating or drinking.

Those participants that monitor near wastewater outfalls should be vaccinated for Hepatitis A. Please contact your county health department or your personal physician for this vaccination.

## **5.0 PERSONNEL QUALIFICATIONS**

Participants will be knowledgeable of this SOP and will have, at a minimum, attended an Introductory and Level 1 VWQM workshop.

## **6.0 SUPPLIES AND EQUIPMENT**

The following equipment is needed to measure transparency:

- Program-provided transparency tube (purchased at [www.watermonitoringequip.com](http://www.watermonitoringequip.com))

## **7.0 PROCEDURE**

In general, collect the sample away from the stream bank in the main flow area. Be careful not to collect water that has sediment from bottom disturbances (toss out the sample and try again if you get bottom sediment in your sample).

1. Walk into the water downstream from the sampling location. Be careful not to stir up the bottom sediment upstream of your sampling location.
2. Face upstream (into the current) in the middle of the stream.
3. Rinse the tube with stream water and shake dry.
4. Collect your water sample by submerging your transparency tube 6-12 inches beneath the surface with the mouth tilted slightly upward.
5. While grabbing the tube towards the bottom, place a finger over the discharge hole.
6. After the tube is full and your finger is blocking the discharge hole, lift the tube from the water and hold in a vertical position with the opening at the top and the discharge hole facing away.
7. Block the sun from shining on the tube with your body.
8. Immediately look into the tube opening.
9. By releasing your finger from the discharge hole, allow water to drain to the 60 centimeter mark.
10. Close the discharge hole with your finger.
11. If the black and white disk is visible, record the value as  $> 60$  centimeters.
12. If the black and white disk is not visible, continue releasing water from the discharge hole until the disk is just visible.
13. Close the discharge hole with your finger.

14. Read the black number from the centimeter scale that corresponds to nearest number above the water level.

15. Record the value on your datasheet as centimeters of transparency.

## **8.0 SPECIAL CONSIDERATIONS**

Minimize disturbance of substrate covering the bottom of the stream because this may re-suspend already settled particles, which can artificially decrease the transparency of the water column and provide lower transparency readings than the actual values. If there is a discernable flow in the waterbody, personnel should always work from downstream to upstream and wait for any disturbed substrate/sediment to settle or otherwise dissipate before taking a water column sample for the transparency measurement.

## **9.0 QUALITY ASSURANCE/QUALITY CONTROL**

Duplicate samples should be analyzed and be within  $\pm 10\%$  of each other.

Level 2 and Level 3 workshop QA/QC is covered under a MoDNR QAPP (see Section 10.0).

## **10.0 REFERENCES**

Missouri Department of Natural Resources, Quality Assurance Project Plan for Level 2 and Level 3 Volunteer Water Quality Monitoring.

Missouri Stream Team – Volunteer Water Quality Monitoring Program; Level 1 Volunteer Water Quality Monitoring Training Notebook, Chapter 2, Water Chemistry  
[http://www.mostreamteam.org/Documents/VWQM/Level1\\_Notebook/04\\_Chapter2\\_Chemistry.pdf](http://www.mostreamteam.org/Documents/VWQM/Level1_Notebook/04_Chapter2_Chemistry.pdf)

Missouri Stream Team – Volunteer Water Quality Monitoring Program; Level 1 Volunteer Water Quality Monitoring Workshop PowerPoint Presentation, Water Chemistry  
[http://www.mostreamteam.org/Documents/VWQM/Level1\\_PPT/Chapter%20%20-%20Water%20Chemistry.pdf](http://www.mostreamteam.org/Documents/VWQM/Level1_PPT/Chapter%20%20-%20Water%20Chemistry.pdf)