



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

ORIGINAL EFFECTIVE DATE: December 9, 2017
RECERTIFICATION DATE:
SOP TITLE: MoST-VWQM-SOP: pH 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 and maintenance of the Hach PocketPro pH meter and how to conduct field analysis of pH in streams. Water (H<sub>2</sub>O) contains both H<sup>+</sup>, hydrogen ions and OH<sup>-</sup>, hydroxide ions. “pH” is an abbreviation for the French expression, “Pouvoir Hydrogene,” meaning “the power of Hydrogen.” It measures the H<sup>+</sup> ion concentration of substances and gives results on a scale from 0 to 14. Water that contains equal numbers of H<sup>+</sup> and OH<sup>-</sup> ions is considered neutral (pH 7). If a solution has a pH less than 7 there are more H<sup>+</sup> than OH<sup>-</sup> ions and it is considered acidic. If a solution has a pH greater than 7 there are more OH<sup>-</sup> ions than H<sup>+</sup> ions and it is considered alkaline. The pH criteria in the Missouri Water Quality Standards (MoDNR 2014) specify that contaminants shall not cause pH to be outside the range of 6.5 to 9.0 standard pH units.

## **2.0 DEFINITIONS AND ABBREVIATIONS**

CSI – Cooperative Stream Investigation

DI – de-ionized

MDC – Missouri Department of Conservation

MoDNR – Missouri Department of Natural Resources

MoST – Missouri Stream Team

pH – Hydrogen ion concentration

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 pH 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 pH:

- Program provided Hach PocketPro pH meter
- 7.00 pH calibration solution
- 10.01 pH calibration solution
- DI water

## 7.0 PROCEDURE

### 7.1 CALIBRATION

1. Set the power to on and remove the cap from the sensor.
2. Push  to go to calibration mode. The calibration standard (7.00 or 10.01 pH) to measure shows on the bottom line.
3. Pour the 7.00 calibration standard into the cap to the fill line.
4. Put the sensor fully into the cap.
5. When the measurement is stable, push  to save the measurement. The measured value will flash three times and lock into the 7.00 value.
6. Rinse the probe and cap; blot dry and then perform steps 3–5 again using the 10.01 calibration standard.
7. Push  and hold to go to continuous measurement mode. "END" shows on the display. Note: "ECAL" shows on the display if the calibration was not successful.
8. Rinse the sensor and cap, then blot dry.

### 7.2 MEASUREMENT

1. Set the power to on.
2. Remove the cap from the sensor.
3. If the lock icon shows on the display, push  to unlock and go to continuous measurement mode.
4. If possible, **it is preferable to place the meter's electrode directly into the water.** Immerse the electrode end of the meter approximately 1 inch deep in slightly moving water.

5. If the meter cannot be held in the water; fill the cap with stream water to the fill line and put the sensor fully into the cap. Gently swirl the sample in the cap.
6. The measured value shows on the top line.
7. Allow the measured value to stabilize.
8. Record the result as pH units

## **8.0 SPECIAL CONSIDERATIONS**

Rinse the sensor and cap with DI water and blot dry between calibration solutions and before storage.

Do NOT containerize samples and measure pH at a later time; pH is temperature dependent and will change as temperature changes!

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

As part of attending a Level 2 QA/QC workshop, pH meters will be checked against a reference standard. Meters that cannot measure  $\pm 0.2$  pH units of the reference standard will be replaced.

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. 2014. Code of State Regulations, Rules of Department of Natural Resources, Division 20 – Clean Water Commission, Chapter 7 – Water Quality. Pg. 18.

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)