Standard Operating Procedure 6: Water Chemistry Equipment Calibration and Cleaning, version 1.0

Shenandoah National Park maintains two different Hydrolab® multi probe units for water chemistry sampling. The units are MS5 multi probes with Surveyor 4a readouts. Hydrolabs are calibrated at the beginning of each week during the monitoring season. If in doubt, see the manuals for each unit located in the Wet Lab of the Lower NCR building.

MS5 Calibrations

1) MS5 D.O. Calibration
   a) Rinse probes with distilled water.
   b) Make air saturated water by filling a 1 liter bottle half full of distilled water. Seal the bottle and shake vigorously for 40 seconds.
   c) Invert unit, probes up, screw on open-ended cup and fill almost to the top of the cup with air-saturated distilled water (DO NOT OVERFILL).
   d) Invert the screw cap and place on top of the cup to cover but not to create an airtight seal.
   e) Turn unit ON.
   f) Wait for the D.O. to stabilize (You can do step i while waiting).
   g) Then go to the calibrate menu.
   h) Then toggle down to LDO: mg/l and press Select.
   i) From http://www.intellicast.com/Local/Weather.aspx?location=USVA0451 get the barometric pressure (BP) and plug into formula: Inches of Hg/0.039=mm of Hg (BP) to get mm of Hg. You must then correct the BP for your altitude (A) by using the following formula: BP'=BP-2.5(A/100). **For the Lower NCR wet lab, BP'=BP-31**
   j) Enter the corrected BP into the unit in mm of Hg using the arrow keys and press Done.
   k) See www.hydrolab.com for additional information.

2) MS5 Conductivity Calibration
   a) Rinse the sensors twice thoroughly with distilled water by using the calibration cup and shaking the unit to clean all of the sensors pouring it out each time.
   b) Dry the sensor with a towel and cotton swab.
   c) Calibrate to “0” while the sensor is dry by doing the following.
   d) Turn the unit on and let it stabilize. This should take a minute or more.
   e) Go to the Calibrate mode and choose "SpCond : uS/cm".
   f) Enter “0” for the first conductivity standard slope.
   g) Rinse the sensors twice thoroughly with a small amount of the specific conductance standard by using the calibration cup and shaking the unit to clean all of the sensors, pouring it out each time.
   h) Place the unit on the ring stand with the probes pointed up.
   i) Fill the calibration cup to within 1cm of the top with the specific conductance standard, making sure there are no bubbles around the sensors and cover with black cap.
   j) Turn the unit on and let it stabilize. This should take a minute or more.

k) Go to the Calibrate mode and choose "SpCond : uS/cm ".
l) Enter the value of your conductivity standard (for the current solution temperature).
m) Press Done.
n) Verify the calibration and you are done with the conductivity calibration.
o) See http://www.hydrolab.com for additional information

3) MS5 pH Calibration
   a) Rinse probes twice with distilled water.
   b) Rinse twice more with a small amount of pH solution.
   c) Invert the unit on the stand.
   d) Fill cup with pH 7 buffer.
   e) Turn unit on.
   f) Wait for stable reading, (about 1 minute).
   g) Once it is stabilized, go to Calibrate mode and press Select.
   h) Use arrows to scroll down to pH and press Select: you will then be prompted for the standard (Std:).
   i) Use the arrows to change the numbers to 7.00 (the up and down arrows change the numbers and the right/left arrows change the position of the flashing digit.
   j) Press Done.
   k) Leave the unit ON, discard pH solution, and start the process over at step a for pH 4.00 and then go to Step l (or Step l following calibration with pH 4 solution).
   l) Do not discard the pH4 buffer in the cup, screw the cup on with ph4 buffer in it and go!
   m) See http://www.hydrolab.com for additional information.

Hydrolab Multiprobe Cleaning

This information has been condensed from the Hydrolab Manuals found in the Lower NCR wet lab.

The cup should be taken off of the probes and the probes and cup rinsed every Thursday and Monday morning. This will help prevent corrosion and algae from forming on the sensors. The probes should be lightly cleaned with detergent and water every two weeks and thoroughly cleaned every four weeks.

MS5 Cleaning
Use only dish detergent and water with a soft brush (old toothbrush) to clean the probes and storage/calibration cups. If the pH readings are drifting, the pH reference junction probably needs to be replaced. See manual for instructions. If other readings are drifting after a thorough cleaning, it may need to be serviced by Hach/Hydrolab. Call service technicians at 800-949-3766 opt. 2.

Charging the Units

The MS5 Surveyor 4a **must be turned on** to charge. There are no replaceable batteries.

There are two coin cell batteries in the MS5 that need to be replaced every 2 year or you will get a calibration error.

Storage

There is a fast growing algae in the park headquarters water system so please use pH 4 buffer solution instead of tap water in the cup for storage.

SOP Revision History

All protocols, regardless of how sound they are originally, require modification as new and different information becomes available. SOP version numbers increase incrementally by tenths (e.g. version 1.1, version 1.2…etc.) for minor changes. Major revisions should be designated with the next whole number (e.g., version 2.0, 3.0, 4.0 …). Small changes or additions to existing methods will be reviewed in-house by Shenandoah or Mid-Atlantic Network staff. However, if a complete change in methods is sought, an outside review is required.

Revision History Log:

Prev. Version #	Revision Date	Author	Changes Made	Reason for Change	New Version #