Equipment Calibration & Calibration-Check General Information

(Rev 5/29/18)

In order to verify accuracy of the sampling instruments, any sampling event must be followed by a successful calibration-check. In order to assure accuracy prior to sampling, instruments should be preceded by a calibration and/or check of the instrument. (Note that certain sensors—e.g., temperature thermistors—can't be calibrated and can only be checked.) The time periods before and after can vary, as long as the post-sampling check is successful. Here, "success" is defined as the instrument reading within quality-control (QC) limits as set in a Quality Assurance Project Plan (QAPP). Typically, in Streamkeepers' quarterly sampling schedule, pre-sampling calibrations/checks occur at the beginning of each quarterly sampling period, and post-sampling checks occur at the end. However, any sampling done under the auspices of Streamkeepers will follow the basic principle stated above (a concept often called "bracketing"), and pre- and post-check timing may vary depending on the sampling activity occurring at the time. **It is crucial that any instrument that has been involved in sampling be checked for conformance to QC limits prior to any recalibration or maintenance of the instrument**.

The longer the period between checks, the greater the risk that the post-check will fail, in which case all of the intervening data will have to be flagged as "estimate" or "reject" (EST or REJ codes per the WA Dept. of Ecology Environmental Information Management system), depending on the control limits that have been set by the QAPP. So when possible, more frequent checking is advised to minimize the risk of flagged data.

Some instruments are accompanied in the field by secondary field standards which are used to calibrate or check the instruments on a daily basis. (This is the case, for example, with Streamkeepers' SOP's for the YSI-60 pH meter and HF-DRT 15 CE turbidimeter.) When these instruments are calibrated with primary standards at the beginning of the season, the calibrated instruments are then used to assign values to the secondary standards. At the end of the season, the instrument is checked by using the secondary standards to calibrate it per typical daily field procedure, then checking the instrument against primary standards. Such a procedure effectively checks the integrity of both the instrument and secondary standards.

In the case of dissolved oxygen sensors, water-saturated air can serve in the role of a secondary standard, and we typically test these sensors in the field in water-saturated air to see if they read within tolerance of 100% local saturation, which is what they theoretically should read.

Streamkeepers' equipment is generally maintained and calibrated per the following chart, with intervals sometimes being more frequent per discussion above:

Parameter	**Meter**	**Maintenance activity**	**Calibration check interval**	**Calibration interval**
Flow	Swoffer 2100	Clean/dry all parts; replace fiber-optic rotor when efficiency is reduced by 10%	Semi-annually	Semi-annually
Barometric pressure	Barometers	Check battery	Quarterly vs. weather station	Quarterly vs. weather station
Conductivity/ Salinity	YSI-85 & ProDSS, Hydrolab Quanta	Quarterly electrode cleaning	Quarterly	Quarterly

pH	YSI-60, Hydrolab Quanta	Clean bulb, replace when stabilization becomes too slow	Quarterly 3-point check; daily 1 or 2-point check	Quarterly 3-point calibration; daily 2-point calibration
pH	YSI ProDSS	Clean bulb, replace when stabilization becomes too slow	Quarterly 3-point check	Quarterly 3-point calibration
Temperature	YSI-60/85/ ProDSS, HydrolabQuanta	Clean probe	Quarterly 2-point check	N/A
Temperature	Stick thermometers	Assure that column is unbroken	Quarterly 2-point check	N/A
Dissolved oxygen—membrane electrode	YSI-85, Hydrolab Quanta	Quarterly electrode cleaning & membrane replacement; membrane integrity check	Quarterly check vs. Winkler titration	Calibrate in water-saturated air immediately prior to sampling
Dissolved oxygen—luminescent	YSI ProDSS	Clean sensor cap, replace when reading stability and response time are unacceptable	Quarterly check vs. air-saturated water or Winkler titration	Quarterly in air-saturated water
Turbidity	HF DRT-15CE Turbidimeter	Annual check/ replacement/re-indexing of cuvettes & replacement of secondary standards	Quarterly, including secondary standards	Quarterly, plus re-labeling of secondary standards
Turbidity	Hach 2100P	Clean meter and sample vial	Check as needed (not part of regular field kit)	Recalibrate & re-label secondary standards as needed
Turbidity	YSI ProDSS	Clean sensor	Quarterly 2-point	Quarterly 2-point