WATER QUALITY PROGRAMS DIVISION

Standard Operating Procedure for the Recording of Physical/Chemical Parameters Using a Multiparameter Instrument

Revised and Adopted June 2016

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OKLAHOMA
Water Resources Board

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STANDARD OPERATING PROCEDURE FOR THE RECORDING OF PHYSICAL/CHEMICAL PARAMETERS USING A MULTIPARAMETER INSTRUMENT REVISED AND ADOPTED JUNE 2016

1.0 General Information

A multiparameter sonde is used to collect and store information for some of the physical/chemical parameters of the stream being studied. Parameters measured by these sondes can include water temperature, dissolved oxygen (D.O.), dissolved oxygen % saturation, pH, specific conductivity, depth, oxidation-reduction potential (redox), Blue-Green Algae (BGA), chlorophyll-a (chloro-a), and turbidity. There are many similarities in operating both types of sondes. Some instructions on operating the sondes are provided in this document but specific training on the operation of each sonde will be provided by the supervising F.T.E. The important thing to remember is to always use the same type of sonde (even the same serial number sonde, when possible) throughout a particular study so that data collected is comparable.

2.0 Definitions/Terms

- Team Leader—crew member of team who provides support, expertise, and opinions; gives instruction and has final say on how work will be done
- Team Member—crew member of team who provides support, expertise, and opinions; follows the instructions of the team leader
- Multiparameter Instrument—instrument used in the field for grab sample collection of measured data *in-situ*

3.0 Safety

Upon reaching the sampling location, site safety determinations should be made before proceeding. These will be different for all sites. Please refer to the OWRB safety manual for instructions on how to safely sample various kinds of sites. When regulating the flow of traffic is necessary, please refer to the portion of the safety manual outlining “Traffic Safety Protocols”.

4.0 Quality of the Measurement

Principle investigators for the OWRB are required to have degrees and/or experience with biological or other applicable sciences. Principle investigators are defined as crew leaders, and this designation may be made upon the leader of a multi- or a one person crew. Training is required for all SOPs dealing with water quality and quantity collections and measurements as well as habitat assessments and biological collections. In-house training will be conducted for the use of all meters and digital titrators used for water quality or quantity measurements. Investigators must be familiar with OWRB SOP document and all training will follow the methods outlined in that document. Extra training will be provided when new SOPs are developed. Training of field crews will be done through dry run exercises in the laboratory to familiarize field

crews with sample collection, sample preservation, instrument operation, calibration, and maintenance. In addition, when new personnel are hired or new methods developed, qualified staff will train on sample collection, measurement, and field analysis methods through side-by-side field trips. These trips will familiarize staff with SOP requirements. When training is considered adequate, a qualified staff member will check field staff for adherence to SOPs.

When sampling for all programs, Quality Assurance/Quality Control (QA/QC) samples will be routinely collected to assure that environmental samples meet the Data Quality Objectives (DQO's) that are outlined in the controlling Quality Assurance Project Plan (QAPP). QA/QC sampling is designed to control each step of the sampling process. Known standards for each parameter should be routinely measured. Protocols for these calibrations are listed in Section 5.12 of this document

5.0 Personnel and Equipment

In most instances, the collection of water quality samples requires two field personnel. However, depending on the safety requirements of a particular station, additional crew members may be necessary to ensure a safe work zone. Equipment used to collect the turbidity sample are described in the document "Standard Operating Procedure for the Collection of Water Quality Samples".

5.1 Mulitparameter Sonde

Check calibration and maintenance logs before leaving office to ensure that the pre-trip calibration has occurred. If calibration has not occurred, perform the pre-trip calibrations (a supervising F.T.E. will demonstrate calibration techniques and the unit's operations manual can be consulted for calibration techniques). **ALL CALIBRATIONS AND MAINTENANCE MUST BE RECORDED.**

5.11 Maintenance

When not in use, the sondes should be in kept in their carrying case. The instrument should be kept dry and clean both inside and out. After each measurement, the probes should be rinsed twice with tap water and stored in the storage cap in tap water. Instruments should never be stored in temperatures below freezing or in extremely hot temperatures. Stored data should be recorded and deleted on a weekly schedule. Failure to do so may result in shortening the life of the internal lithium battery and/or the loss of valuable field data.

Specific pre-trip and in field maintenance should occur for the sonde as follows

- **Sonde casing.** Check the sonde casing periodically for cracks or looseness of connections. Connections may need to be tightened or re-siliconed periodically (only after the approval of a supervisor or senior staff member).
- **Bulkhead.** Periodically check the bulkhead connection for bent pins or looseness.

- **Optical Sensors (Dissolved Oxygen, Turbidity, BGA, and Chloro-a).** For optical probes check to ensure there is no visible damage to the probe and the membrane/lens is intact.

- **PH Probe.** Check the probe bulb for cracks, dirt, scum, or other abnormalities, and change or clean probe if necessary (only after the approval of a supervisor).
    - Clean the pH bulb with warm soapy water and Q-tip.

- **Specific Conductance (SpC) and Temperature.** Check the probe for any obstructions in the casing where the anodes are located and clean them using warm water and a small pipe cleaner if any blockages exist.

5.12 Weekly Calibration

Specific weekly calibrations should occur for each probe according to manufacturer recommendations or project specifications

5.13 Site Specific Calibrations or Checks

The following in-field calibrations and checks should occur as follows:

- **Depth:** If a depth sensor is present and that data is being recorded, depth (meters) should be calibrated to 0.1 at each station.
- **Dissolved Oxygen Percent Saturation (D.O.):** At each station, check to ensure that no damage has occurred to the membrane cap and if a wiper is present that it is not parked on top of the sensor membrane. Dissolved oxygen percent saturation should also be calibrated when BP change is greater than 0.5 inHg in comparison to the previous calibration, when the reading is below the screening, or when the reading is outside the norm for a particular station (refer to the description of lab calibration). Also, the tap water used for calibrating should be changed each time calibration is done. Fresh tap water should be collected in the morning and at least once during the day and should always be kept in the cab of the vehicle to avoid freezing or over-heating.
- **pH:** At each station, check the probe bulb for cracks, dirt, scum, or other abnormalities, and change or clean probe if necessary (only change probe after consulting with supervisor). Clean with warm soapy water and Q-tip. Determine the expected range of pH by consulting the station data. Refer to the description of lab calibration. If the initial reading at a site is outside the range of current calibration, the instrument needs to be calibrated to the correct two-point calibration. If the reading is outside the OWQS standard of 6.5 to 9.0 s.u.'s, then the instrument needs to be calibrated at the appropriate range to ensure that the reading is accurate.
- **Specific Conductance (SpC):** Check the probe for any obstructions in the casing where the anodes are located and clean them using warm water and a small pipe cleaner if any blockages exist. Refer to the description of lab calibration.
- **Oxidation/Reduction Potential (ORP):** Do not perform in field.
- **Optical Sensors:** Do not perform in field.

5.14 Post-Trip Checks

All units should undergo a post-trip check. After each trip (normally before pre-trip calibration for the following week), the unit should be checked against known standards to ensure that probes are reading correctly. If a probe is not reading correctly, the information should be recorded and the appropriate flags should be assigned to all data collected with the sonde.

6.0 Measurement of *in-situ* Parameters Using Multiparameter Instruments in streams/rivers

No matter which sonde is used, similar techniques are used to collect data. At each site, data is collected at the thalweg (the major channel). The collection method will be different for bridge sites and wadeable sites. For bridge sites, the sonde unit will be connected to the data logger using the 150-foot cable. It is important to ensure that sonde unit is in the water, and depending upon flow, different sized weights may be necessary. If the flow is so high that an accurate reading cannot be obtained, the reading may be taken outside of the thalweg in an area of lesser flow (note in the "sampler's comments" portion of the laboratory log-in sheet). After lowering the sonde into the water, allow the unit to equilibrate. Equilibration should take no more than 1 to 2 minutes. The key is to allow all the parameter readings to stabilize before storing the information. Because streams and rivers have a constant mixing zone, the sonde readings can be taken from just below the surface of the water to the midpoint of the water column (sampling near the stream bed may bias certain parameters). The supervising F.T.E. will instruct you on how to operate and store data in the logger unit and also how to extract data from the surveyor unit for recording on the field sheet. Use a 5-meter cord for wadable streams. Record data according to manufacturer's instruction manual.

7.0 Forms

Multiparameter data are maintained on the station field form. They are data and should be treated as such. Therefore, they should be accurate and complete. To avoid confusion and loss of data, a new sheet should be used at each new project site. Field notes should be initialed and dated by the collecting personnel and data entry personnel. Both sonde and surveyor serial numbers should be recorded on the field notes. For guidance on proper procedure to complete the field notes, refer to your supervisor and or FTE.

8.0 Data Storage

All completed data sheets should be maintained with the appropriate network folder. The data from the field notes and laboratory data sheets should be uploaded to the Ambient Water Quality Monitoring System (AWQMS). Each sample should be maintained electronically in the database under a unique sample number.