



## STANDARD OPERATING PROCEDURE



### MAINE VOLUNTEER RIVER MONITORING PROGRAM

#### METHODS FOR USING THE EXTECH PORTABLE SALINITY REFRACTOMETER (MODEL RF20) WITH ATC (AUTOMATIC TEMPERATURE COMPENSATION)



**Note:** The mention of brand names does not constitute recommendation of a specific company.



## Volunteer River Monitoring Program

### Standard Operating Procedure Methods for using the Extech Portable Salinity Refractometer (Model RF20) for Measuring Salinity in Rivers and Streams

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**1. Applicability.** This standard operating procedure (SOP) is used by the Volunteer River Monitoring Program (VRMP) of the Maine Department of Environmental Protection's Division of Environmental Protection. It applies to the collection of salinity using an Extech Portable Salinity Refractometer (RF20) by volunteers from rivers and streams in Maine.

**2. Purpose.** The purpose of this SOP is to provide standardized methods for volunteer groups to determine salinity of rivers and streams as an instantaneous reading using the Extech Portable Salinity Refractometer (RF20).

#### **3. Definitions.**

**A. Extech.** Manufacturer of handheld instruments.

**B. Distilled Water.** Water that has many of its impurities removed through distillation.

**C. PPT.** Parts per thousand.

**C. Salinity.** Salinity is a measure of the total amount of dissolved salts in a sample. Sodium and chloride are the predominant ions in seawater, and other substantial ions include magnesium, calcium and sulfates. Salinity is an important factor in determining many aspects of the chemistry of natural waters and biological processes. In marine waters, salinity affects dissolved oxygen and will need to be measured separately in order to accurately calibrate the meter, if the particular dissolved oxygen meter does not directly measure salinity. Salinity may be expressed in a number of ways, parts per thousand and parts per million are the two most common measurements, and it is sometimes expressed as a percentage as well.

#### **4. Responsibilities.**

##### **A. Volunteer Monitors & Volunteer Groups**

- **Certification.** It is the responsibility of the individual obtaining this data to maintain current certification for the parameter(s) they collect if they wish their data to be entered into the VRMP database. Training will be provided to volunteers on an



annual basis by VRMP/DEP staff, and certification will last for one year from the date of training.

- **Data recording.** It is the responsibility of the individual obtaining this data to record the results and additional qualifying information on current field sheets obtained from their affiliated watershed association or through the VRMP program of the DEP.
- **Data Quality Checks and Data Submission.** The data manager for the volunteer group will collect and enter volunteer field sheet data onto the appropriate computer file, perform quality assurance checks (refer to Section 5.10 of the Quality Assurance Program Plan), and submit data to the VRMP following protocols outlined in the volunteer group's latest sampling and analysis plan (SAP) that has been approved by the VRMP.

#### ***B. Volunteer River Monitoring Program (VRMP) Staff***

- **Oversight of Volunteer Groups and Volunteers.** VRMP staff will oversee volunteer groups and volunteers through a variety of ways including maintaining an up-to-date VRMP quality assurance project plan (QAPP); reviewing sampling and analysis plans (SAPs) of the volunteer groups; providing annual training/certification sessions for volunteers; conducting quality assurance checks on data submitted by volunteer groups and laboratories; and uploading data into the DEP's EGAD database. These tasks are described in greater detail in the VRMP's latest QAPP.

### **5. Guidelines and Procedures.**

#### ***A. Salinity Measurements.***

- **Sampling period and location.** Sampling period and site location information will be documented in volunteer groups' SAPs (that require approval by the VRMP) which are submitted by the volunteer groups prior to the beginning of a sampling season. (Detailed information regarding how volunteer groups are to obtain and document site location information can be found in VRMP SOP-02 [Documenting Site Location]).
- **Familiarize Yourself With the Refractometer.** Volunteers shall familiarize themselves with the basic operation of the refractometer (Appendix A; "Operation").
- **Reading Selection.** Readings shall be recorded as parts per thousand.
- **General Sampling Protocol.** (Refer to Appendix A, section "Operation").
  - (1) Record site location on data sheet.
  - (2) Perform a zero adjustment with distilled water. Place sample on the measurement prism, ensuring that the sample covers the prism. Allow the



- sample to remain on the prism for approximately 30 seconds. Record reading in parts per thousand.
- (3) Wipe dry with a clean cloth (do not wash or rinse). Place the instrument in its supplied plastic case.

• **Quality Control**

- (1) At the beginning of each field season, all VRMP staff and VRMP volunteers who will collect salinity data will have a training/refresher session to (re)familiarize themselves with the contents of this SOP.
- (2) For every volunteer, a field duplicate shall be obtained for all parameters for at least 10% of their own sampling efforts. A field duplicate will be collected for every 10 samples monitored.
- (3) Refer to the VRMP quality assurance project plan (QAPP) for more QA/QC details.

**6. Equipment Care.**

**A. Start of field season.**

1. Inspect the instrument for damage.
2. Each refractometer “setup” should include the following items:
  - a. Field datasheet
  - b. User guide
  - c. Distilled water
  - d. Pipet (for sample)
  - e. Screwdriver (for rotating the adjustment screw)

**B. Field Season.**

1. Handle the refractometer gently and avoid touching the optical surface.
2. Clean only with the supplied soft cloth.
3. Refractometer should be kept in the supplied plastic case.
4. Store in a safe, dry environment.

**C. End of field season (also see Appendix A, section “Electrode Maintenance”).**

1. Store in a safe, dry environment.

**D. Miscellaneous.** The Extech Salinity Refractometer (Model RF20) has automatic temperature compensation. When ambient temperature varies from 68°F (20°C), readings are automatically adjusted to compensate for temperature variance between 50°F to 86°F (10°C to 30°C).

**7. Specifications**

Scale	Range	Resolution
Parts Per Thousand	0 to 100 <sup>0</sup> / <sub>00</sub>	1 <sup>0</sup> / <sub>00</sub>
Specific Gravity	1.000 to 1.070 d <sup>20</sup> / <sub>20</sub>	0.001 d <sup>20</sup> / <sub>20</sub>



## 8. Appendix.

### A. Refractometer owner's manual:

Extech. March 2015. Extech Instruments User Guide: Portable Salinity Refractometer with ATC-Model RF20. [RF20-en-US-v2.4 3/15]. Extech Instruments, New Hampshire.

## 9. References.

### A. *Maine VRMP QAPP:*

- Maine Department of Environmental Protection (MDEP). 2014. Maine Volunteer River Monitoring Program (VRMP) Quality Assurance Program Plan (QAPP). DEPLW-0984.