

## **APPENDIX B**

### **PRWC's Ambient Water Quality Monitoring Protocol**

*NOTE: This protocol contains its own supporting appendices*

*Field Data Sheet and Chain of Custody  
PRWC's EpiCollect5 App User Guide  
Equipment Technical Specifications & User Manuals*



# **AMBIENT WATER QUALITY MONITORING PROTOCOL**

**Standard Procedures for**

**Collecting Stream Samples for Laboratory Analysis**

Bacteria as *Escherichia coli* (*E.coli*) and Nitrate as N

**Taking and Recoding Field Measurements and Observations**

Temperature and Conductivity

**Last Revised: 3/2/2022**

# AMBIENT WATER MONITORING PROTOCOL

## Monitoring Overview

Pomperaug River Watershed Coalition maintains a network of 15 fixed ambient stream monitoring stations throughout the watershed where water samples and field measurements are collected to evaluate stream health (Figure 1). For the purposes of this protocol, monitoring will include collecting ambient stream water samples to be analyzed by a state certified testing laboratory for *E. coli* bacteria and nitrate. Field measurements for conductivity and temperature and observations pertaining to water color, odor, flow, designated uses, and sampling conditions (wet/dry and weather) will also be recorded when a stream sample is collected. Field observations are recorded on Field Data Sheet and custody of samples is tracked using a Chain of Custody Form (Appendix 1). Alternatively, field observations may be recorded using the EpiCollect5 App installed on a tablet or smartphone (Appendix 2).

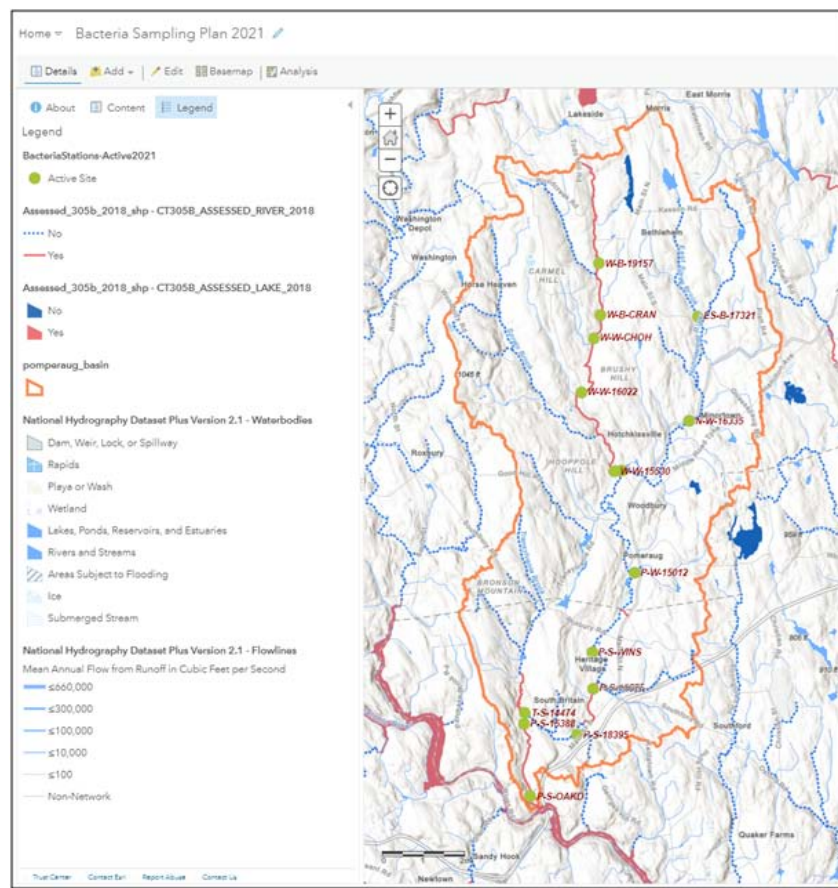


Figure 1. PRWC’s Ambient Water Monitoring Stations for the 2021 Field Season.

## General Schedule

Sampling will occur twice a month between April and October at 15 fixed stations throughout the watershed. The sampling sites are divided into two sampling routes – northern and southern (Table 1). The northern route consists of sites located on the Weekepeemee and Nonnewaug Rivers and associated tributaries in Woodbury and Bethlehem. The southern route consists of sites on the Pomperaug River, Transylvania Brook, and associated tributaries in Southbury and southern portions of Woodbury.

To the extent practicable, samples will be collected by the Ambient Water Quality Monitoring Team (“Field Team”) on the first and third Tuesday and/or Wednesday of each month. In order to meet the Representativeness and Completeness data quality objectives of this projects (i.e. at least 3 wet weather and at least 3 dry weather sampling events), samples may be collected outside of this schedule based on guidance from the QA Manager / Project Manager.

When the Field Team can be divided into two groups of at least 2 people are available, samples will be collected over the course of a single day (Tuesday). When only one team of two people is available, samples may be collected over two days -- the northern route one day and the southern route the other day.

For the southern route (Pomperaug/Transylvania), sampling will start at Oakdale Manor and continue upriver to Middle Quarter (Table 1). For the northern route (Nonnewaug/Weekepeemee/East Spring Brook), sampling will begin at the Route 47 Bridge and continue in a clockwise manner along Route 47/Route132/Route 61/Route 6-ending near/on Mill Road near the USGS Gaging Station (Table 1).

Samples must be analyzed within **6 hours** of collection and should be dropped off, along with the completed chain of custody form, at the testing lab (Hydro Technologies, 62 Bank St, 2nd Floor, New Milford, CT 06776) as soon as possible. Travel time from the final monitoring sites to the testing lab is approximately 30 minutes.

### **Station Naming Convention**

Sample Stations ID's are assigned by the Project Manager in a manner that reflects the stream name, town of sampling site, and corresponding Site ID number assigned by CT DEEP (if available) or an alpha/alphanumeric code reflective of the sampling location (see formula below). Station ID's are recorded in a master spreadsheet that captures the above information along with descriptive station name, a detailed description of where the sample should be collected, and latitude and longitude.

**Option 1:** First Initial of River Name – First Initial of Town – CT DEEP AWQ #

*Example:* P-S-15388 (Pomperaug – Southbury – Audubon Bent of the River)

**Option 2:** First Initial of River Name – First Initial of Town – 4 or 5 Digit Alpha/AlphaNumeric Abbreviation of Landmark or Road Name

*Example:* N-W-RTE47 (Nonnewaug-Woodbury-Route 47 Bridge)

**Table 1. PRWC Sample Site List (2021/2022) with Street Address for Driving to Sample Location**

<b>SOUTHERN ROUTE</b>				
<b>SITE ID</b> <i>(last 5 digits = DEEP AWQ ID)</i>	<b>RIVER</b>	<b>SITE DESCRIPTION</b>	<b>DRIVING ADDRESS</b>	<b>TOWN</b>
P-S-OAKD	Pomperaug	Oakdale Manor	190 Oakdale Manor Dr	Southbury
P-S-15388	Pomperaug	Bent of the River - East Flat Hill Rd	185 East Flat Hill Rd	Southbury
T-S-14474	Transylvania Bk	Seman Park	200 East Flat Hill Road	Southbury
P-S-18395	Pomperaug	The Gym - Flood Bridge Rd	254 Flood Bridge Rd	Southbury
P-S-15025	Pomperaug	Poverty Rd - Ewald Park - USGS Gauge	234 Poverty Rd	Southbury
P-S-WINS	Pomperaug	Heritage Village - River Gardens	447 Winship Dr	Southbury
P-W-15012 <i>(P-W-SPAVE)</i>	Pomperaug	Middle Quarter / South Pomperaug Ave	CAST Preschool 124 S Pomperaug Ave	Woodbury

<b>NORTHERN ROUTE</b>				
<b>SITE ID</b> <i>(last 5 digits = DEEP AWQ ID)</i>	<b>RIVER</b>	<b>SITE DESCRIPTION</b>	<b>DRIVING ADDRESS</b>	<b>TOWN</b>
N-W-14355	Nonnewaug	Rt 47 Bridge - Three Rivers / Young's	130 Washington Rd	Woodbury
W-W-15530	Weekeepeemee	Jacks Bridge Rd - USGS Gauge	Three Rivers Field on Jack's Bridge Rd	Woodbury
W-W-16022	Weekeepeemee	Brushy Hill Rd @ Route 132	316 Weekeepeemee Road	Woodbury
W-W-CHOH	Weekeepeemee	Chohees Trail @ Weekeepeemee Road	170 Chohees Trail	Woodbury
W-B-CRAN	Weekeepeemee	Crane Hollow Road @ Weekeepeemee Road	138 Crane Hollow Road	Bethlehem
W-B-19157	Weekeepeemee	Mill Pond Road @ Route 132 (Guilds Hollow Road)	19 Mill Pond Road	Bethlehem
ES-B-17321	East Spring Bk	Nonnewaug Road @ Porter Hill Road	98 Porter Hill Road	Bethlehem
N-W-16335	Nonnewaug	Mill Rd - USGS Gage	294 Minortown Rd	Woodbury

## **Field Safety Guidelines**

1. ALWAYS work in groups of at least two. The individual on land recording observations should maintain a line of sight of the individual collecting the water sample.
2. When parking, use established lots or as far off the traveled roadway as possible, but not on private property unless landowner access has been granted. Place a traffic cone approximately 10 paces behind the parked vehicle for extra visibility. A PRWC Stream Monitoring In-Progress Identification Card may also be placed on the dashboard when away from vehicle for an extended period of time.
3. Wear brightly colored clothing and/or a safety vest while collecting samples.
4. Wear nitrile gloves when collecting water samples.
5. Wear boots / waders (preferred) if entering the water. Preferred alternative - wear closed-toe shoes (old sneakers), otherwise wear sandals with secure straps (Chacos, Teva, etc) when entering the water. NO FLIP-FLOPS!
6. Wash hands after sampling. Avoid contact with eyes, nose, mouth and skin until hands have been washed. Always wash hands before / after eating or drinking and handling samples.
7. Avoid wading in deep or fast moving water – especially if the stream bottom is not visible. If sampling in/near deep or fast moving water is necessary, wear a personal flotation device.
8. Take heed when wading. Rocky river bottoms can be slippery. Soft river bottoms can have sinkholes. Use a walking stick to test the river bottom.
9. Samplers may wish to dress in layers (weather conditions may change through the day), wear sunscreen and insect repellent, a baseball hat, polarized sunglasses, and bring a raincoat along with an extra set of dry clothes, shoes, drinking water and snacks to stay comfortable through the sampling day.
10. Shower or rinse clean with soap and water after wading in a stream. Also check for scrapes and scratches, poison ivy, and ticks after conducting field work. Report any injuries incurred during field work to Project Manager.

## **Preparing for Field Work**

### **Day BEFORE Sampling:**

1. Familiarize yourself with all sampling equipment and sampling procedures.
2. Gather, inspect, and organize sampling equipment and supplies according to the equipment checklist the day before sampling.
  - a. Ensure you have enough sample bottles for each parameter for each sample site plus a few extras for your blank, duplicate, and just in case one is swept away by the river or accidentally contaminated. Sample bottles are provided by the testing lab.
  - b. Freeze ice packs the night before sampling.
  - c. Charge the tablet and camera.
  - d. Check tablet and EpiCollect5 App for updates before going into the field.
  - e. Print field data sheets and chain of custody forms.

### **Sampling Day:**

1. Pack coolers with ice from the freezer.
2. Calibrate equipment (i.e. conductivity meter) specific instructions included in the appendices.
3. Look up and record streamflow rates from the USGS gauging station websites.

Pomperaug Gage: [https://waterdata.usgs.gov/ct/nwis/uv?site\\_no=01204000](https://waterdata.usgs.gov/ct/nwis/uv?site_no=01204000)

Nonnewaug Gage: [https://waterdata.usgs.gov/ct/nwis/uv?site\\_no=01203600](https://waterdata.usgs.gov/ct/nwis/uv?site_no=01203600)

Weekepeemee Gage: [https://waterdata.usgs.gov/ct/nwis/uv?site\\_no=01203805](https://waterdata.usgs.gov/ct/nwis/uv?site_no=01203805)

4. Check with the Project Manager to determine where your duplicate sample and blank should be collected.
5. Transfer sampling equipment to vehicle(s) and keep organized / easily accessible while conducting field work.

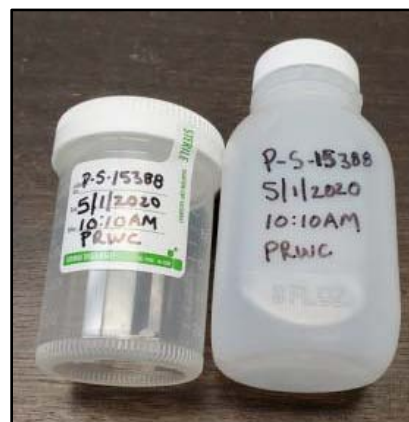


## Equipment Checklist

	ITEM
	Sterilized sample bottles provided by testing lab
	Cooler
	Ice / Frozen Ice Packs
	Distilled water
	Conductivity meter
	Thermometer
	Extension pole with clamp
	Bucket with rope (x2)
	Waders/boots
	Nitrile gloves
	Clip board
	Field data sheets
	Chain of custody forms
	Pens/Sharpie/pencils
	Charged Tablet and car charger
	Orange Safety Vests
	Traffic Cone(s)
	Camera
	GPS unit
	Hand sanitizer
	First aid kit (with insect repellent, Tecnu and sunscreen)
	Disinfecting wipes
	Flashlight
	Extra batteries for camera, Garmin, and flashlight
	Towels
	Drinking water and snacks
	Rain coat
	Baseball hat / Polarized sunglasses
	Spare dry clothes
	Sampling pole/ walking stick
	Whistle to call for help in emergencies
	PRWC Brochures / Business Cards
	Trash bag
	PRWC Stream Monitoring In-Progress ID card

## Field Observations and Sample Collection

1. **Arrive at the sampling site.** Find a safe place to park. Place traffic cone about 10 paces behind the vehicle and PRWC Stream Monitoring identification card on dashboard.
2. **Put on an orange safety vest and retrieve sampling equipment** from the vehicle. Put on waders or appropriate footwear and nitrile gloves.
3. **Look around the sampling site** for any safety hazards, unusual conditions, and to determine you are in the right location for sample collection. Decide who will be the data recorder and who will collect the sample.
4. **Label bottle with site ID, date, time, and “PRWC” with permanent marker (see photo).** If you are collecting a duplicate sample or filling a blank distinguish them by writing A or B following the Site ID on each bottle and record in the data sheet. When collecting a duplicate, you will need to repeat the sample collection procedures for Steps 5 - 12 below and record data as separate entries. Ensure that the time written on the bottle is the same time recorded on the Chain of Custody form for the lab. Refer to the section on “Quality Control Samples” for more details.



5. **Begin recording field observations** on the field data sheet (Appendix 1) or in the EpiCollect5 App (see Appendix 2). Field observations include water color, water odor, water level, current weather conditions, wet vs. dry sampling event, air temperature, water temperature and conductivity. **Be sure to complete all required fields including sampler names, date, time, etc.** When using EpiCollect5, enter Regular Sample when a single sample is collected from the site (i.e. no duplicate or blank). If you are collecting a duplicate sample at the site, enter Duplicate for sample type and proceed with observations (then repeat for the second sample -- giving you two entries for this site). If using a printed data sheet, record the Site ID of the duplicate in the box for “Dup:”.

### **Wet vs. Dry Weather Sampling Conditions**

The QA Manager / Project Manager will refer to the precipitation recorded from the USGS Gaging Station #01203805 on the Weekepeemee River at Hotchkissville, CT ([https://waterdata.usgs.gov/ct/nwis/uv?site\\_no=01203805](https://waterdata.usgs.gov/ct/nwis/uv?site_no=01203805)) to confirm wet or dry sampling conditions. The amount of precipitation observed at in the 24-hours, 48-hours, 72-hours, and 96-hours prior to sampling will be recorded on the field data sheet for reference.

**Wet Weather Conditions** are defined as sampling events where precipitation prior to sampling is greater than 0.1" precipitation in 24 hours *or* greater than 0.25" precipitation in 48 hours *or* greater than 2.0" precipitation in 96 hours.

**Dry Weather Conditions** are defined as all other conditions not satisfying the wet weather criteria.

6. **Use the thermometer in your field kit to measure air temperature.** Make sure your reading is in Celsius and recorded with one digit after the decimal point. Make sure it has stabilized in the ambient air. Temperature will fluctuate from a car that has the air conditioning running or a thermometer stored in a hot/cold trunk. For the best reading, hold the thermometer away from your body, and ensure that it is dry, off the ground, and not in contact with other surfaces.

**TIP: You will save time by sequencing your field measurements and observations in the following order:**

- Fill sample bottles.
- Take stream water temperature.
- Start conductivity measurement.
- Record field observations (color, odor, weather conditions, etc).
- Take site photos.

7. **Fill Sample Bottles.** Make sure they have been labeled with permanent marker before filling. Make sure the seal on the sterile bottle for the bacteria sample has not been broken and that it contains a tablet (*sodium thiosulfate, which neutralizes any chlorine that may be present in the sample*). If collecting a duplicate or filling a blank make sure the bottles are distinguished with an A or B after the Site ID. You can either wade into the stream (preferred) or use an extension pole to fill the sample bottles as described below.

a. **Wading.** This method is appropriate for sites where the streambank is gently sloped or flat, the water is shallow (less than mid-calf or knee deep) and not too fast moving, you can see the stream bottom, and the stream bottom is firm (not muddy/mucky).

- i. Carefully enter the stream and walk to the center of the channel. Use a stick or pole to test stream bottom and find good footing. Try not to disturb the sediment from the bottom.
- ii. Face upstream and plan to collect samples away from your body in areas upstream of any area you disturbed while wading.
- iii. Submerge capped bottle (with the mouth oriented slightly down) horizontally into the water. Do not fully invert the bottle or the tablet inside it will fall out.
- iv. At about 8 to 12 inches below the surface (or, if the water is shallow, at the midpoint of river depth), remove bottle cap. Do not touch inside of bottle or cap.
- v. Slowly turn the bottle upstream away from you and allow bottle to fill. Try not to let any sediment into the bottle.
- vi. Recap bottle while still submerged. Raise capped bottle back out of water.
- vii. Uncap and pour out some sample until there is approximately 2.5 to 5cm of headspace at the top of the bottle. Recap bottle and invert to check for leaks.



- b. Extension Pole.** This method is appropriate for sites with deep (above mid-thigh) or fast moving water, where the stream bottom is muddy or mucky, where the streambank is extremely steep, and/or when at a bridge crossing over the stream. If standing on a bridge, place a second traffic cone 10 paces behind you (towards oncoming traffic) for added visibility. Whether reaching or lowering the pole from the streambank or down from a bridge, aim for collecting your sample from the center of the stream channel. If sampling from a bridge, always sample on the upstream side of the bridge. **ALWAYS be sure to check for and avoid over hanging power lines! ALWAYS be sure to check for oncoming traffic and avoid extending pole into the roadway if there are oncoming vehicles!**
- i. Secure your capped sample bottle to the extension pole using the built-in clamp. Once secure, remove the cap making sure not to touch the inside of the bottle or the bottle cap. For the bacteria sample bottle, pour the sodium thiosulfate tablet into the cap without touching it and keep to the side while collecting the sample.
  - ii. Keeping the mouth of the bottle face down, lower or reach the sample bottle into the stream. Submerge the bottle below the surface and turn into the current to fill the bottle (avoid collecting surface film water). Turn the mouth of the bottle skyward before lifting the sample out of the water.
  - iii. Raise or retract the pole to retrieve the filled sample bottle. Cap the bottle before removing it from the clamp (if bacteria sample, pour the sodium thiosulfate tablet back into the bottle while capping it). Remove the bottle from the clamp.
  - iv. If necessary, uncap and dump out enough water to provide approximately 2.5 to 5cm of headspace at the top of the bottle. Recap the bottle and invert the bottle to check for leaks.

8. **To take water temperature and conductivity measurements, either wade into the stream to measure (preferred) or use bucket method to collect water from the stream to take these measurements.**

- a. **Wading.** Refer to Steps 7.a and 7.a.ii and then face upstream and plan to take readings away from your body in areas upstream of any area you disturbed while wading.
- b. **Bucket Method.** This method is appropriate for sites with deep (above mid-thigh) or fast moving water, the stream bottom is muddy or mucky, the streambank is extremely steep, and/or when at a bridge crossing over the stream. If standing on a bridge, place a second traffic cone 10 paces behind you (towards oncoming traffic) for added visibility. Use a 1 gallon to 3 gallon sized bucket with metal handle and at least 25 feet of rope securely attached. (Note: a plastic handle may break under the weight of a full bucket.)



- i. Inspect the bucket for cracks or holes and wipe down with a towel or paper towel wipe before you begin.
  - ii. Aim for collecting your sample in the center of the stream channel. If sampling from a bridge, **always sample on the upstream side of the bridge.**
  - iii. While hanging onto the rope, **toss/lower the bucket into the water 3 times to rinse** out the bucket and avoid cross contamination from the previous site or vehicle.
  - iv. Toss/lower the bucket a fourth time, fill it with water which will be used for measuring temperature and conductivity.
  - v. Avoid placing the filled bucket on a hot paved surface.
9. **Measure water temperature.** Use the thermometer in your field kit to measure water temperature. **Make sure your reading is in Celsius and recorded with one digit after the decimal point.** Dip the metal probe of the thermometer into the main current or water collected in the bucket. **Allow reading to stabilize.** For the best reading, hold the thermometer away from your body and not in contact with other surfaces (sides of bucket or stream bottom).

10. **Measure conductivity** using Oakton CTS Testr50P field meter (Appendix 3). Hold down the power button to turn on the meter. Make sure your device is on the proper screen which can be confirmed by the title at the top of the screen reading “COND” and the units below it shown as (uS/cm). Rinse cap of the meter and the sensor in the stream or with water collected in the bucket a few three times (dip cap into the river or bucket to fill/rinse; discard rinse water to the side). Then fill the cap of the meter to the “max fill line” with water from the river. The meter will automatically begin measuring conductivity. Allow the meter a few moments to show a stabilized reading. You will see a check mark (✓) at the top, once a stable reading is reached. **Record the conductivity result with one digit after the decimal point.**



11. **Record site conditions.** Note site conditions in comments (e.g., presence of water fowl, other wildlife, water appearance, weather, and/or anything that may affect the sample results).
12. **Take Site Photos.** Sequence your photography to capture upstream first and then downstream so they can be distinguished when photos are downloaded. As long as the date/time settings are set and up-to-date, it will record the date and time photo was taken and assign it to the file “properties.” This will help the Project Manager catalog photos for each site and verify the field observations made by the field team members. Tips for photos: Take photos in landscape view (turn device horizontally). It is okay to include a person in a photo for scale (also makes for good outreach photos). Include the river / stream with surrounding land features (don’t take a photo of just the water) for context. Having close-ups are okay, but the bigger picture is just as important. Avoid using a wide-angle (or “fish-eye”) lens as they distort the image.

\*NOTE: If using EpiCollect5 App to record field data, exit out of the EpiCollect5 App to take photos on the tablet itself using the camera app. Sequence photos to take upstream photo first, then downstream photo. Then return to EpiCollect5 and use the “upload photo” option from there. If uncertain how to do this, simply “take photo” in the EpiCollect5 App.

13. **Complete the Chain of Custody Form.** Make sure sample time on bottle matches sample time on data sheet and sample time on chain of custody and the number of bottles for each parameter are filled in (Enter 1 if regular sample, enter 2 if blank or duplicate also collected at the site).

#### 14. Wrap up.

- a. Review Data Sheet / Data Entry to make sure everything is complete.
- b. Make sure the chain of custody is complete.
- c. Gather your equipment, samples and any trash you might have created (or found) and return to the vehicle.
- d. Turn off the thermometer and conductivity meter to extend battery life.
- e. Place sample bottles upright in a cooler filled with ice. Samples should be stored in the dark between 1 to 4 °C.
- f. Travel to the next site.



#### 15. Transport samples to the lab.

- a. Once all samples have been collected, return to the PRWC office or designated location to consolidate samples from the Northern Route and the Southern Route into one cooler to prepare for transport to the laboratory.
- b. Review the Chain of Custody forms once again to make sure times on the bottles and the number of bottles match.
- c. Scan or take a photo of the completed Chain of Custody forms and email them to the lab and notify them you are on your way to drop off. This helps the lab begin the log-in process for the samples.
- d. Deliver samples to the lab. Unload samples from the cooler as directed by staff at the lab; the cooler will return with the courier to PRWC. The person relinquishing the samples to the lab and the person at the lab receiving the samples should sign the Chain of Custody form. Ask for a photocopy of the signed form which is to be retained by PRWC and kept in the "Bacteria Monitoring Binder."
- e. Obtain new sample bottles for the next round of sampling. The Ambient Water Quality Monitoring Team Leader or Project Manager will have notified the lab in advance to prepare bottles for pick up.
- f. Results received from the lab will also be printed and kept in the binder while the digital file will be retained in PRWC electronic files.



## Quality Control Samples

A **field blank** (distilled water) and a **field duplicate** (a second sample taken at one of the sites) should be submitted for each sampling event. When two field teams are available and samples are collected over the course of a single day, each field team will be tasked with collecting a duplicate sample and one team will be assigned a blank. When three field teams are available for the sample round, two teams will collect duplicated samples while the third team will prepare the blank. When one field team is available and samples are collected over the course of two days, one duplicate will be prepared and one blank will be prepared.

**Find out from the QA Manager / Project Manager where to collect a duplicate sample and which site to assign the field**

**blank.** Over the course of the season, each site will, at some point, have a duplicate and/or blank assigned it. The goal is to change up where they are assigned so the laboratory is unaware of which sample is the blank and which is the duplicate. This also helps ensure the collection procedures are consistent and transferable across the varying conditions of the sample sites.

## Duplicate Sample Procedures

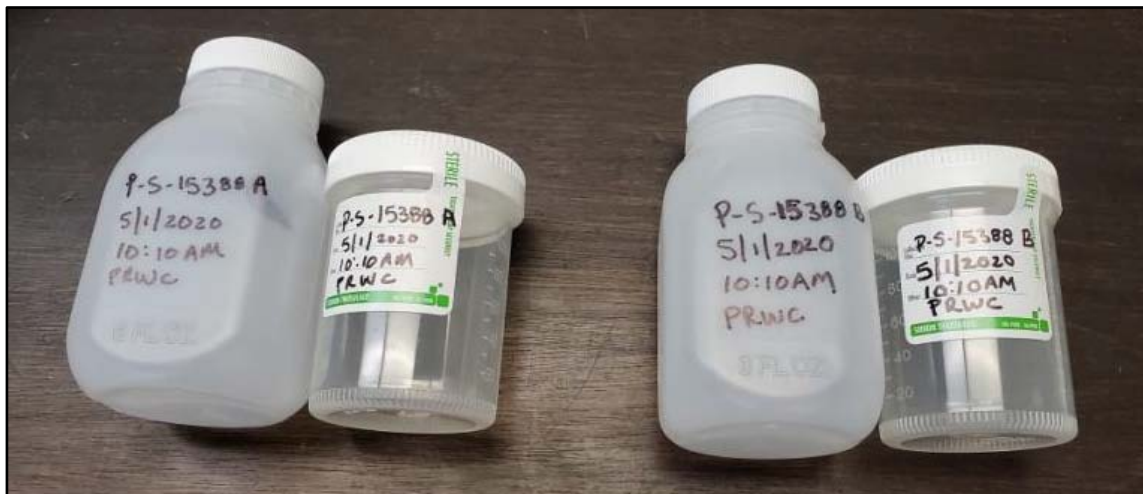
1. The intent is to **repeat the sample collection process a second time** through to ensure collection procedures and results are consistent. Thus, you **follow the protocol for the first sample and then repeat from the beginning** to take a new air temperature reading, a new water temperature reading, a new conductivity reading, and fill a second set of sample bottles. If you are using the bucket toss method - that means dumping the bucket from which the first set of sample bottles were filled and doing another bucket toss for the second set of sample bottles and readings.

### **What is the purpose of submitting duplicate and blank samples?**

**Duplicate samples** are used to assess variance of the total method including sampling and analysis. These samples are carried through all steps of the sampling and analytical procedures in an identical manner; thus they should yield identical or near identical results. Duplicate samples help assess accuracy and precision throughout the sampling process.

**Blank samples** are submitted to determine whether a laboratory is clean or not. They also help ensure that samplers are not contaminating samples during the collection process. A blank consists of filling a sample bottle with distilled water and submitting to the laboratory with a stream sample ID assigned to it. Blanks should yield results of 0 (zero) or not-detected for each analyses being conducted.

2. **Sample bottles should be distinguished by adding an A and B after the Site ID (see photo).** It is okay for the sample times to match. Label bottle with site ID, date, time, and “PRWC” with permanent marker.



3. **Record Field Observations as “Duplicates”.** Both the first and second set of samples and corresponding field observations are both entered as “Duplicates” in Epicollect5 (or recorded individually on the printed field data sheet) resulting in two entries for the site. If using a printed data sheet, record the Site ID of the duplicate in the box for “Dup:”. On the printed sheet, it is also helpful to make a note next to the Site ID that this is where the duplicate was collected. This can be done by writing “A & B” next to the Site ID or by writing “duplicate” in the observations/comments box.
4. **Complete Chain of Custody Form.** On the Chain of Custody, record “A & B” next to the site ID where the duplicate was prepared and enter “2” for the number of bottles for each analysis. Make sure sample time on bottles matches the sample time listed on the Chain of Custody.
5. **Wrap up.**
- Review Data Sheet / Data Entry to make sure everything is complete.
  - Make sure the chain of custody is complete.
  - Gather your equipment, samples and any trash you might have created (or found) and return to the vehicle.
  - Turn off the thermometer and conductivity meter to extend battery life.
  - Place sample bottles upright in a cooler filled with ice. Samples should be stored in the dark between 1 to 4 °C.
  - Travel to the next site.

## **Blank Sample Procedures**

- 1. Label each bottle with site ID, date, time, and "PRWC" with permanent marker. Distinguish between the regular sample and the blank by adding **an A and B after the Site ID (see photo)**. It is okay for the sample times to match.**
  
- 2. Collect your stream sample at the assigned site and enter/record field observations as a "regular sample."** Make note in the observations/comments in EpiCollect5 which letter (A or B) was assigned on the sample bottle. If using a printed data sheet, record the Site ID of the Blank in the box for "Blank:". On the printed sheet, it is also helpful to make a note next to the Site ID that this is where the Blank was filled. This can be done by writing "A & B" next to the Site ID or by writing "blank" in the observations / comments box.
  
- 3. Prepare your field blank. Start a new entry in EpiCollect5 and select "Blank" for sample type. Pour some distilled water from the sample jug into a clean, spare sample bottle (one without the tablet in it) to take the water temperature and to use for a conductivity reading. Enter these readings along with water color and water odor observations (skip water level, uses, weather, and flow entries or enter "99999" for these fields). Then fill **the labeled sample bottles with distilled water from the jug provided.****
  
- 4. Complete Chain of Custody Form.** On the Chain of Custody, record "A & B" next to the site ID where the blank was prepared and enter "2" for the number of bottles for each analysis. Make sure sample time on bottles matches the sample time listed on the Chain of Custody.
  
- 5. Wrap up.**
  - a. Review Data Sheet / Data Entry to make sure everything is complete.
  - b. Make sure the chain of custody is complete.
  - c. Gather your equipment, samples and any trash you might have created (or found) and return to the vehicle.
  - d. Turn off the thermometer and conductivity meter to extend battery life.
  - e. Place sample bottles upright in a cooler filled with ice. Samples should be stored in the dark between 1 to 4 °C.
  - f. Travel to the next site.

## **References**

Central Massachusetts Regional Stormwater Coalition. July 2013. Standard Operating Procedures 1: Dry Weather Outfall Inspection. [https://www.centralmastormwater.org/sites/g/files/vyhlf386/f/uploads/dry\\_outfall\\_inspection\\_sop\\_and\\_form\\_final.pdf](https://www.centralmastormwater.org/sites/g/files/vyhlf386/f/uploads/dry_outfall_inspection_sop_and_form_final.pdf)

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**APPENDIX 1**

**Field Data Sheet Instructions**

**Chain of Custody Form Instructions**

# Field Data Sheet Instructions

**Pomperaug River Watershed Coalition - Stream Sampling Program**  
*Field Data Sheet: Northern Route 2022*

*Note: Please submit this sheet with water samples.*

Samplers: \_\_\_\_\_ Streamflow at USGS Gauge (Nonnewaug): \_\_\_\_\_ flow (CFS) \_\_\_\_\_ Time \_\_\_\_\_ Rainfall (inches) at USGS Gauge (Weekeepemec) \_\_\_\_\_  
 \_\_\_\_\_  
 Date: \_\_\_\_\_ Streamflow at USGS Gauge (Weekeepemec): \_\_\_\_\_ flow (CFS) \_\_\_\_\_ Time \_\_\_\_\_ Past 24 hours: \_\_\_\_\_  
 \_\_\_\_\_ Past 48 hours: \_\_\_\_\_  
 \_\_\_\_\_ Past 72 hours: \_\_\_\_\_  
 \_\_\_\_\_ Past 96 hours: \_\_\_\_\_

Site Number	River	Nearest Road	Town	Sample time	Sample Method	Wet or Dry?	Air Temp C	Water Temp C	Observation Codes	Conductivity (us/ml)	Observations/ Comments
N-W-14355	Nonnewaug	Rt 47 Bridge	Woodbury								
W-W-15530	Weekeepemec	Jacks Bridge Rd	Woodbury								
W-W-16022	Weekeepemec	Brushy Hill Rd	Woodbury								
W-W-CHOH	Weekeepemec	Chohees Trail	Woodbury								
W-B-CRAN	Weekeepemec	Crane Hollow Road	Bethlehem								
W-B-19157	Weekeepemec	Mill Pond Road	Bethlehem								
ES-B-17321	East Spring Brook	Nonnewaug Road / Porter Hill Road	Woodbury								
N-W-16335	Nonnewaug	Mill Rd - USGS Gauge	Woodbury								
Dup:											
Blank:											

**SAMPLING METHOD**  
(enter number code for each method used)

1. Wading  
2. Extension Pole  
3. Bucket

**OBSERVATION CODES**  
(enter letter code for each observation that applies):

<b>Water Level</b>	<b>Water Odor</b>	<b>Water Color</b>	<b>Observed Use</b>	<b>Current Weather</b>
A. Very Low	F. Rotten Egg	L. Murky (Brown)	R. Swimming	W. Sunny
B. Low	G. Chlorine	M. Silty	S. Fishing	X. Cloudy w/ some sun
C. Average	H. Milky	N. Green	T. Boating	Y. Cloudy/Overcast
D. High	I. Gas or Oil	O. Teal	U. Other	Z. Raining
E. Very High	J. None	P. Cloudy		
	K. Other: _____	Q. Clear		

**Wet vs. Dry Weather Sampling Conditions**

The QA Manager / Project Manager will refer to the precipitation recorded from the USGS Gauging Station #01203B05 on the Weekeepemec River at Hotchkissville, CT ([https://waterdata.usgs.gov/cf/rtw/st/v0/site\\_no=01203B05](https://waterdata.usgs.gov/cf/rtw/st/v0/site_no=01203B05)) to confirm wet or dry sampling conditions.\*

**Wet Weather Conditions** are defined as sampling events where precipitation prior to sampling is greater than 0.1" precipitation in 24 hours or greater than 0.25" precipitation in 48 hours or greater than 2.0" precipitation in 96 hours.

**Dry Weather Conditions** are defined as all other conditions not satisfying the wet weather criteria.

\*The amount of precipitation observed at in the 24-hour, 48-hour, 72-hour, and 96-

Other field notes: \_\_\_\_\_

A partially pre-filled Field Data Sheet will be used by the sampling team.

Pre-filled fields on the data sheet include Site Number, River, Nearest Road, Town, which are listed in order of the sampling route.

The field sampler should complete the top of the form at the beginning of sample day by entering:

- Sampler Name(s) – Use first and last for each person
- Date
- Streamflow (cfs) for each relevant USGS gaging station

The field sampling team needs to complete the following fields at each site:

- Sample Time
- Sample Method (Wading, Pole, Bucket)
- Wet or Dry (type of sampling condition - see definition in gray box)
- Air Temperature

- Water Temperature
- Conductivity
- Observation Codes (list code for each applicable observation)
- Observations and comments (site specific)

**The field sampling team needs to record sample ID codes for duplicates and blanks on the field data form.**

- Where “Dup:” is listed, simply enter the Site ID Number in the same box and complete the River, Nearest Road, Town.
- Where “Blank” is listed enter the Site ID you have assigned to the blank based one where it was filled.
- It is also helpful to add a note in the comments field indicating a duplicate or blank for that site.

### **Other Field Notes**

This is a place to write down any other observations or questions that might come up throughout the sampling day. (*Example: You might get a question from a passerby that you don’t know how to answer and want to pass it along to the Project Manager.*)

### **Wet vs. Dry Weather Sampling Conditions**

The QA Manager / Project Manager will refer to the precipitation recorded from the USGS Gaging Station #01203805 on the Weekepeemee River at Hotchkissville, CT ([https://waterdata.usgs.gov/ct/nwis/uv?site\\_no=01203805](https://waterdata.usgs.gov/ct/nwis/uv?site_no=01203805)) to confirm wet or dry sampling conditions. The amount of precipitation observed at in the 24-hours, 48-hours, and 72-hours, and 96 hours prior to sampling will be recorded on the field data sheet for reference.

- **Wet Weather Conditions** are defined as sampling events where precipitation prior to sampling is greater than 0.1" precipitation in 24 hours *or* greater than 0.25" precipitation in 48 hours *or* greater than 2.0" precipitation in 96 hours.
- **Dry Weather Conditions** are defined as all other conditions not satisfying the wet weather criteria.

## Chain of Custody Form Instructions

HYDRO TECHNOLOGIES, INC. P.O. BOX 1987, 62 BANK ST. NEW MILFORD, CT 06776				PHONE: (860) 358-6773 FAX: (860) 350-2288				
<b>CHAIN OF CUSTODY RECORD</b>								
COMPANY NAME: Pomperaug River Watershed Coalition				ANALYSES REQUESTED				TOTAL
ADDRESS: 39 Sherman Hill Rd Suite 103C								# OF
Woodbury, CT 06798								
PROJECT NAME: Pomperaug E.Coli & Nitrate		Email: cshaw@pomperaug.org						B
PROJECT MANAGER: Carol Robbins		PH:						
SAMPLER(S) NAME:		FAX:						O
LAB ID: 149-CT -CLAS 950-04-71		CLIENT SAMPLE ID	TYPE	COLLECTION DATE/TIME	E. Coli	COMMENTS OR NOTES (PRESERVATION)		T
Woodbury / Bethlehem					Number			
N-W-16335 Mill Rd - USGS Gauge		SW			X	1 bio bottle		L
					X	250 ml plastic		E
N-W-14355 Rt 47 Bridge		SW			X	1 bio bottle		S
					X	250 ml plastic		
N-W-16274 Rt 61 Bridge		SW			X	1 bio bottle		
					X	250 ml plastic		
W-W-16022 Brushy Hill Rd		SW			X	1 bio bottle		
					X	250 ml plastic		
W-W-CHOH Chochoes Trail		SW			X	1 bio bottle		
					X	250 ml plastic		
W-W-15530 Jacka Bridge Rd		SW			X	1 bio bottle		
					X	250 ml plastic		
W-B-15009 Wood Creek Rd		SW			X	1 bio bottle		
					X	250 ml plastic		
TYPE: SW - Discharge Water SU - Surface Water				SPECIAL INSTRUCTIONS/NOTES:				
RELINQUISHED BY:		RECEIVED BY:		DATE	TIME	COMMENTS		

**A partially pre-filled sample form will be provided. Pre-filled fields include:**

- Company name, address, phone, email, and Project Manager's name.
- Client Sample ID's with sites listed in order of the sampling route.
- Type of Sample ("SW" indicates surface water)
- Analyses requested (which appear in line with type of sample bottle/preservation)

**The field sampling team needs to complete the following fields:**

- Sampler Name(s) – Use first and last
- Date and Time sample collected at each site.
- The number of each bottle type filled for each site. If more than one sample, add a note to indicate A & B under the Client Sample ID.
- Signatures of the person relinquishing the samples to the lab and person receiving the samples and date/time samples are relinquished.

**The lab will retain the original Chain of Custody Form and provide PRWC with a hard copy of the signed Chain of Custody Form at the time samples are released.**



**APPENDIX 2**

**EpiCollect5 App User Guide for  
PRWC's Ambient Water Quality Monitoring Program**



# EpiCollect5<sup>1</sup> App User Guide for PRWC's Ambient Water Quality Monitoring Program

Last Revised: 3/2/2022



Epicollect5 Data Collection  
Oxford University, CGPS

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<sup>1</sup> Epicollect5 is a free and easy-to-use mobile data-gathering platform. It provides both the web and mobile applications for the generation of forms (questionnaires) and freely hosted project websites for data collection.

Projects are created by using the web application at [five.epicollect.net](https://five.epicollect.net) then downloaded to the device to perform the data collection. Data are collected (including GPS and media) using multiple devices and all data can be viewed on a central server (via map, tables, and charts). Data can be exported in csv and json format.

The mobile app is available for both Android (5+) and iOS (8+).

Epicollect5 is part of the **Big Data Institute at Oxford University** (<https://www.bdi.ox.ac.uk>) and hosted on the world-class cloud hosting provider, **Digital Ocean**: <https://www.digitalocean.com>, in their **UK** data center.

## PRWC USER GUIDE for EpiCollect5

### Downloading the App & Finding the PRWC Bacteria Sampling Field Data Form in EpiCollect5

Connect device to wi-fi or enable 3G/4G/5G data connection.

Download EpiCollect5 App from Google Play or Apple Store and install accordingly. App will need permission to access the device camera and location features.

Once installed, open the app and use the Add Project option in the upper right corner to access PRWC Bacteria Sampling Field Data Form (note - name will be updated prior to 2021 field season; disregard the PRWC Bacteria Sampling 2020 project). Search **PRWC Ambient Water Quality Monitoring** to locate and select. The project will be added to the projects list. This is the form where all field data is to be entered starting in 2021.

### Preparing Device for Field Work

As you gather, inspect, and calibrate your sampling equipment and supplies as described in PRWC's Ambient Water Monitoring Manual **make sure to fully charge the tablet or smart phone** you plan to use in the field **the night before** sampling day.

On sampling day, check for app updates while connected to wi-fi before going into the field. Turn on the device to confirm that it is fully charged. Then open the EpiCollect5 app and select the PRWC Bacteria Sampling Project to open the field data form while connected to the internet. A dialogue box will appear to alert you of any changes/updates to the form. Install any updates.

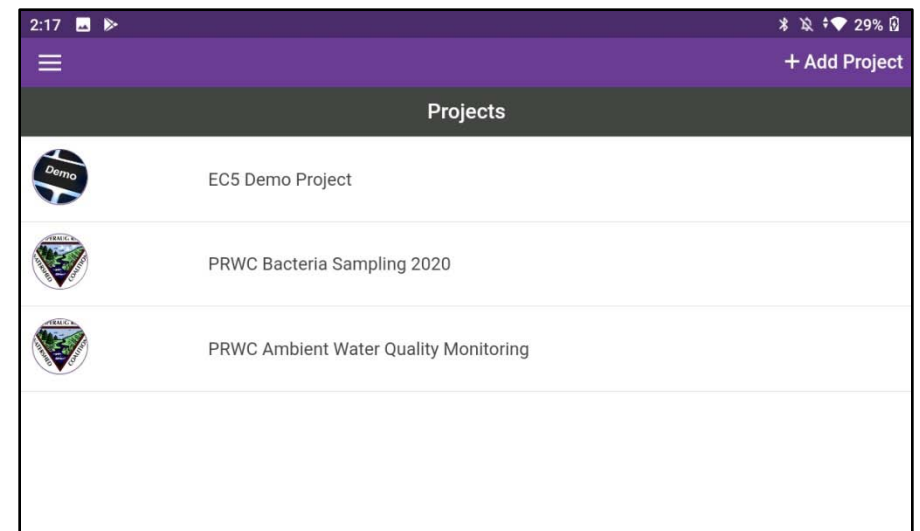


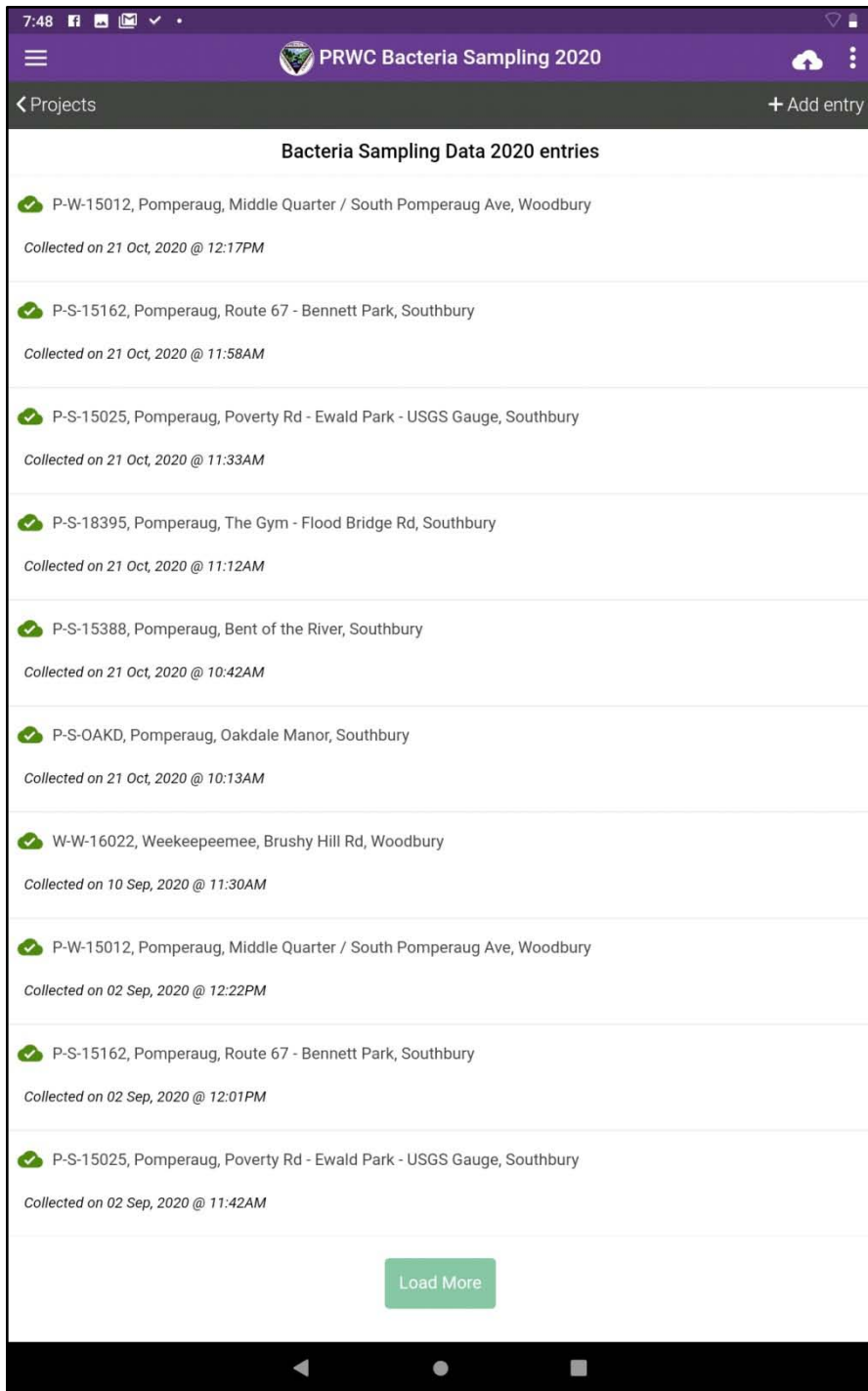
Epicollect5 Data Co.  
Oxford University, CGPS

You may find a list of previously entered data available to view in the app. Note each entry listed displays the date and time of data collection and a cloud shaped icon. A green cloud icon containing a white check-mark indicates that the entry has been uploaded/synced to the master data-sheet. A white cloud with a black outline indicates a data entry made while offline and that has not yet been uploaded/synced to the master datasheet.

Once each entry has been uploaded/synced to the master data-sheet, it can be cleared from the list by clicking on the three dot icon in the upper right hand corner (next to the cloud) and selecting clear synced entries.

The device may then be used offline. Note - the location feature on your device does not need wi-fi or 3G+ to find your location in the field, but the Location setting on your device needs to be turned on. Check "Location" status in Settings under Privacy before heading into the field.



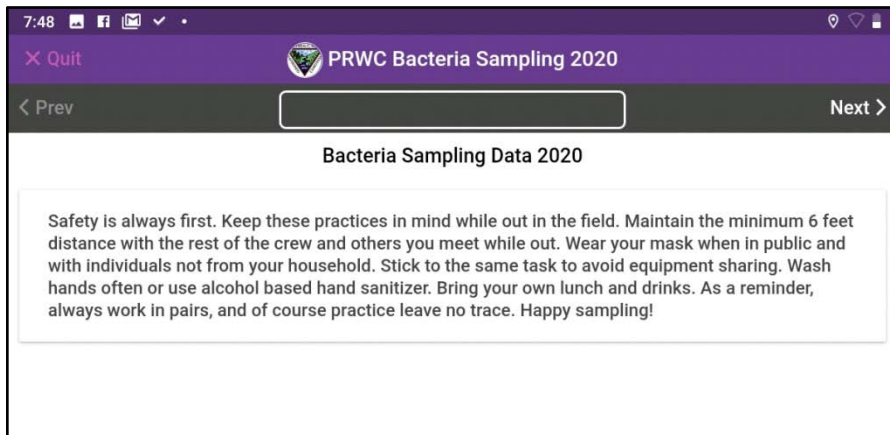


## Adding New Sampling Entries

**After Preparing Device for Field Work**, you are ready to start entering data.

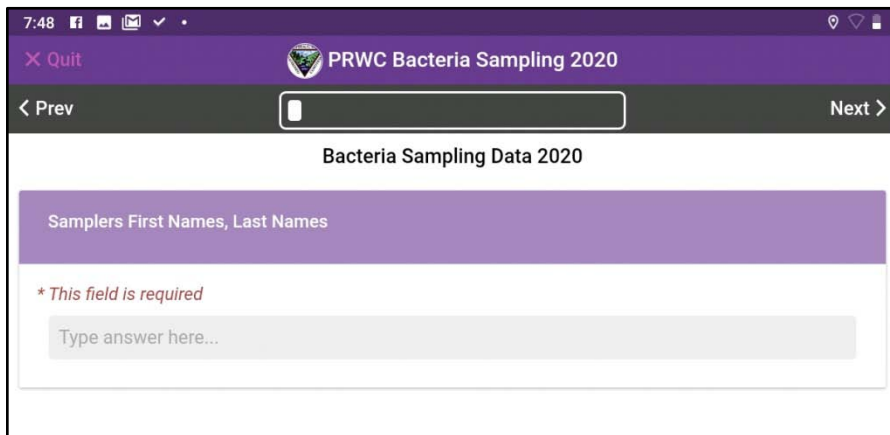
Open the PRWC Bacteria Sampling Project, click the +Add Entry icon in the upper right corner, and follow the prompts. Note each screen will contain a single question and response field. Most fields are required and you will not be able to click Next without entering data.

In the event the information is not available, enter 99999 to move forward but make sure to add a comment at the end of the form in the Observations/Comments section to document the situation that necessitated this entry. Example situations might be that you misplace your thermometer, forget to look-up streamflow, or your conductivity meter fails while in the field.



**Welcome screen with friendly reminders.**

Click next to proceed.



**Enter First AND Last Names of each person on the sample team.**

Tip -- Copy this text to your clipboard after you type it in your first entry so you can paste it in your next entry. This will help eliminate typos and save time.

Click next to proceed.

## Site Location

Toggle the radio button to identify your sampling site. Sites are listed in the order of the sampling route to make them easier to find in the list. Click Next to proceed.

**Bacteria Sampling Data 2020**

Site location?

*\* This field is required*

- N-W-14355, Nonnewaug, Rt 47 Bridge, Woodbury
- W-W-15530, Weekeepeemee, Jacks Bridge Rd, Woodbury
- W-W-16022, Weekeepeemee, Brushy Hill Rd, Woodbury
- W-W-CHOH, Weekeepeemee, Chohees Trail, Woodbury
- W-B-15009, Weekeepeemee, Wood Creek Rd, Bethlehem
- N-W-16274, Nonnewaug, Rt 61 Bridge, Woodbury
- N-W-16335, Nonnewaug, Mill Rd - USGS Gauge, Woodbury
- P-S-OAKD, Pomperaug, Oakdale Manor, Southbury
- P-S-15388, Pomperaug, Bent of the River, Southbury
- P-S-18395, Pomperaug, The Gym - Flood Bridge Rd, Southbury
- P-S-15025, Pomperaug, Poverty Rd - Ewald Park - USGS Gauge, Southbury
- P-S-15162, Pomperaug, Route 67 - Bennett Park, Southbury
- P-W-15012, Pomperaug, Middle Quarter / South Pomperaug Ave, Woodbury

**Bacteria Sampling Data 2020**

What is your current latitude and longitude?

Latitude	41.535588
Longitude	-73.205670
Accuracy	64

## Latitude / Longitude

Click the green button to update your location.

Note - the location feature on your device does not need a wi-fi or 3G/4G/5G connection to find your location in the field. However, to do this, the Location setting on your device needs to be turned ON. If the device does not automatically populate the latitude, longitude, and accuracy fields, the location setting may be turned off. To turn on, return to your device home screen and turn on the location feature. This is typically found in Settings under Privacy.

Click next to proceed.

The screenshot shows a mobile application interface for 'PRWC Bacteria Sampling 2020'. At the top, there is a purple header with the title and a 'Quit' button. Below the header is a navigation bar with 'Prev' and 'Next' buttons. The main content area is titled 'Bacteria Sampling Data 2020' and contains a question: 'Is this a duplicate, blank, or regular sample?'. There are three radio button options: 'Duplicate' (selected), 'Blank', and 'Regular sample'. A notification bell icon is visible in the bottom right corner.

## Type of Sample

Distinguishing the type of sample is important for data management.

### “Regular Sample”

For most sites, you will be collecting only ONE sample (or filling one sample bottle for each type of analysis) and each bottle will be labeled using the Site ID code, date, time, and organization name. In this case select “Regular sample”.

### “Duplicate”

At one of your sites, you will be asked to collect a duplicate sample. That means filling TWO sample bottles for each type of analysis. An “A” or “B” will be added after the SITE ID code on the sample bottle to indicate a duplicate sample. By selecting “Duplicate” on sample type, you will only need to enter the field data once for that site. The project manager will then know to average the results for the two samples.

### “Blank”

At one of your sites, you will be asked to create a field blank. That means filling the sample bottle with distilled water. This is a quality assurance measure for both the lab and the sample team to make sure sample bottles are not being contaminated in the sampling process and that meters are functioning correctly.

For the site where you fill the blank, you will label your sample bottles using the SITE ID and adding an “A” or “B” after each. Each of these samples needs its own entry in the field data form. For the stream sample, enter as you would for a regular sample and complete the form based on your field observations. For the blank, enter it as a “Blank”. For both the regular and the blank, use the observation/notes section of the form to add a comment indicating how the bottles were labeled (i.e. A = regular sample and B = Blank).

**See “Entering Field Observations for Blanks” at the end of this document for further instructions on how to capture field data for the blank.**

7:49

Quit

PRWC Bacteria Sampling 2020

Prev Next

Bacteria Sampling Data 2020

Date? (MM/dd/YYYY)

\* This field is required

02/03/2021 X

The date selected is: 02/03/2021

### Sample Date

The date field will auto-populate. Confirm that it is recorded in MM/DD/YYYY format. Click Next to proceed.

7:50

Quit

PRWC Bacteria Sampling 2020

Prev Next

Bacteria Sampling Data 2020

Time? (HH:mm:ss)

\* This field is required

7:50:01 PM X

The time selected is: 19:50:01

### Sample Time

The time field will auto-populate. Confirm that it is recorded in HH:MM:SS format followed by AM or PM.

NOTE - The HH:MM captured here is the sample time that should be written on the sample bottle and recorded on the Chain of Custody Form.

Click Next to proceed.



7:50 [social icons] PRWC Bacteria Sampling 2020

< Prev [input field] Next >

Bacteria Sampling Data 2020

Nearest USGS streamflow gauge?

\* This field is required

Pick possible answer

## Streamflow

Recording streamflow helps the QA Manager / Project Manager understand stream conditions at the time of the sample (high, low, average flow rate, recent rain events, etc).

For sites on Pomperaug River, Transylvania Brook, or Bullet Hill Brook select Pomperaug from the dropdown list.

For sites on the Nonnewaug, East Spring Brook, or Lewis Atwood Brook select Nonnewaug from the dropdown list.

For sites on the Weekepeemee, Sprain Brook or Wood Creek, select Weekepeemee.

7:50 [social icons] PRWC Bacteria Sampling 2020

< Prev [input field] Next >

Bacteria Sampling Data 2020

Streamflow (cfs)?

\* This field is required

[Type answer here...]

To look up the current streamflow rate (measured in “cfs” or cubic feet per second), visit the website for the respective gauging station and to find “Most recent instantaneous value” and enter value in form. The value should contain one digit after the decimal point.

Pomperaug Gage:

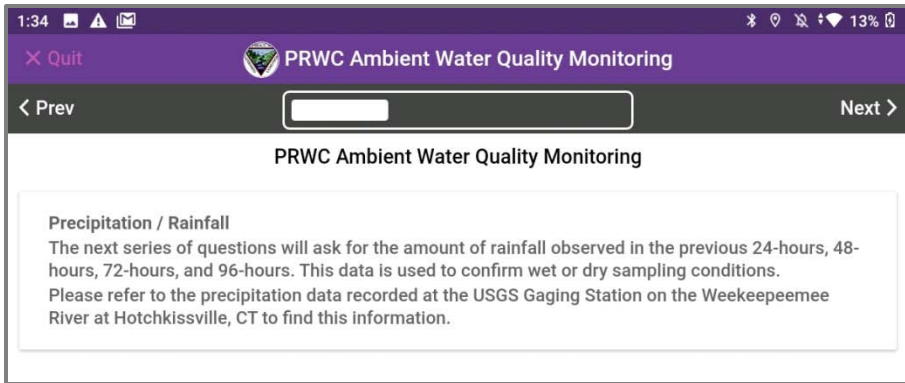
[https://waterdata.usgs.gov/ct/nwis/uv?site\\_no=01204000](https://waterdata.usgs.gov/ct/nwis/uv?site_no=01204000)

Nonnewaug Gage:

[https://waterdata.usgs.gov/ct/nwis/uv?site\\_no=01203600](https://waterdata.usgs.gov/ct/nwis/uv?site_no=01203600)

Weekepeemee Gage:

[https://waterdata.usgs.gov/ct/nwis/uv?site\\_no=01203805](https://waterdata.usgs.gov/ct/nwis/uv?site_no=01203805)



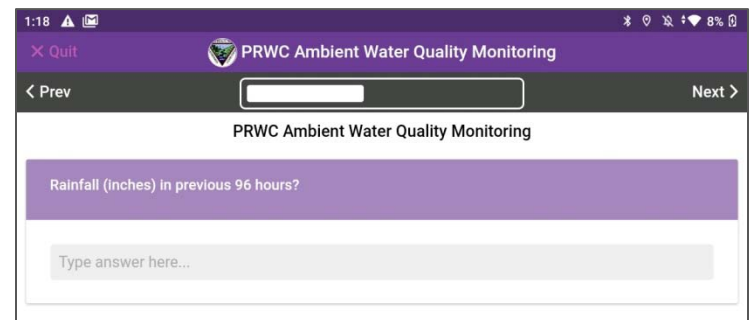
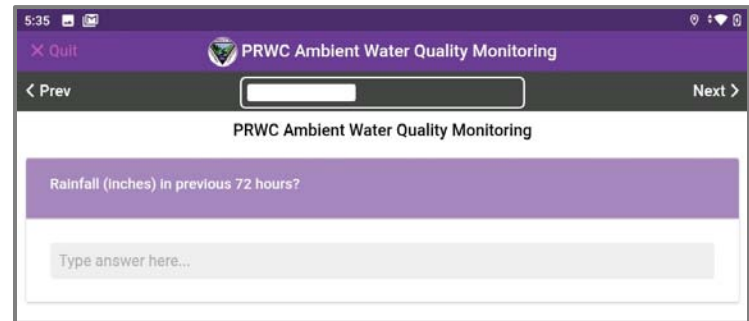
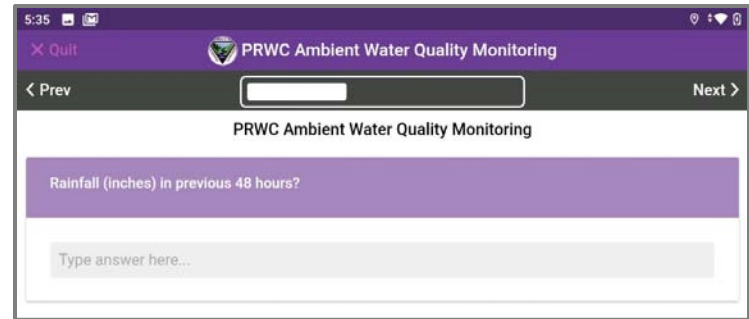
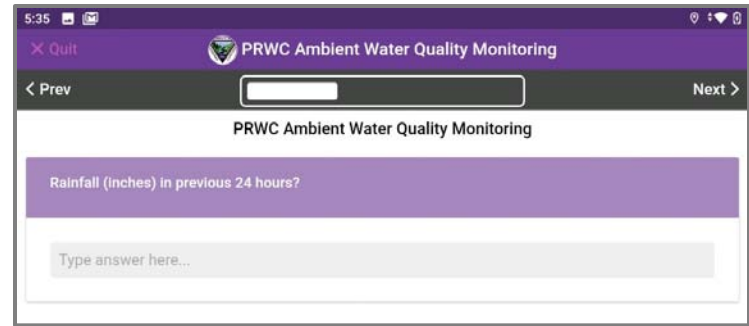
## Precipitation

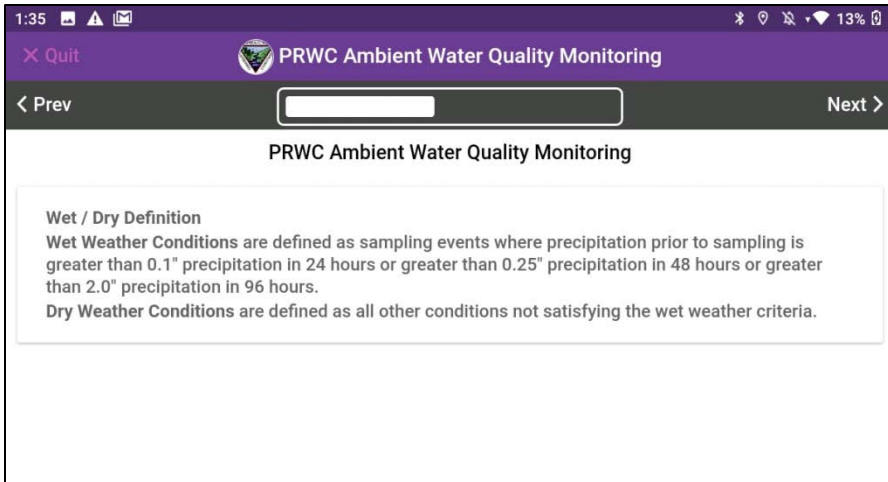
Recording precipitation in the previous 24, 48, and 72, and 96 hours helps the QA Manager / Project Manager determine if the sampling conditions are defined as Wet Weather or Dry Weather.

Please refer to the precipitation data recorded at the USGS Gaging Station on the Weekepeemee River at Hotchkissville, CT (link below) to find this information. Precipitation is measured in inches To look up the precipitation data, visit the website and at the top of the page make sure the check box for the “precipitation” parameter is checked. Select “Graph” for the output format and adjust the “Days” to 1 or 2 or 3 or 4 days respectively. Refer to the graph to find the total precipitation during the defined timeframe. Enter value in the form. The value should contain two digits after the decimal point. If less than 1, please record the 0 before the decimal point.

Weekepeemee Gage:

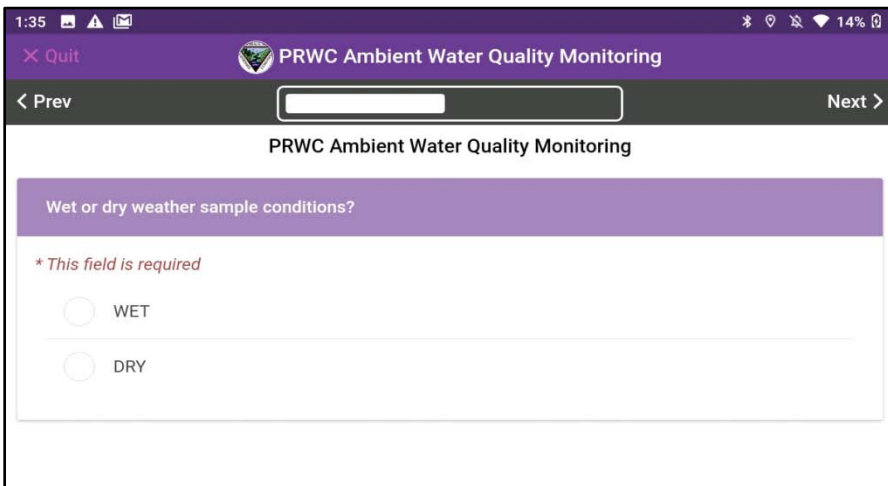
[https://waterdata.usgs.gov/ct/nwis/uv?site\\_no=01203805](https://waterdata.usgs.gov/ct/nwis/uv?site_no=01203805)





## Wet vs. Dry Weather Sampling

Dialogue screen provides definitions for “WET” and “DRY” weather sampling conditions. Review the definition and determine which type of sample you are collecting. Click next to proceed.



Select Wet or Dry based on the definition provided.

Click next to proceed.

Note: The Principal Investigator will review the weather conditions to make an official determination on the WET / DRY sample designation and correct entry if necessary.

7:51

Quit PRWC Bacteria Sampling 2020

< Prev  Next >

Bacteria Sampling Data 2020

Current weather conditions?

\* This field is required

Sunny

Sun with some clouds

Clouds with some sun

Cloudy

Foggy/misty

Light rain

Moderate or steady rain

Heavy rain

### Current Weather Conditions

Select the weather description that best matches the conditions at the time of your sample. Note - weather conditions may change throughout the sample day and that's okay!

7:51

Quit PRWC Bacteria Sampling 2020

< Prev  Next >

Bacteria Sampling Data 2020

Air temperature? (Celsius)

\* This field is required

### Air Temperature

Use the thermometer in your field kit to measure air temperature.

**Make sure your reading is in Celsius and recorded with one digit after the decimal point.**

Tips: Make sure it has stabilized in the ambient air. Temperature will fluctuate from a car that has the air conditioning running or a thermometer stored in a hot/cold trunk. For the best reading, hold the thermometer away from your body, ensure that it is dry, off the ground, and not in contact with other surfaces.

7:51 [Icons] PRWC Bacteria Sampling 2020

< Prev [Input Field] Next >

Bacteria Sampling Data 2020

Water level?

*\* This field is required*

Very low

---

Low

---

Average

---

High

---

Very high

### Water Level

This observation can be somewhat subjective until the sampler sees the site in various conditions. Do your best to compare water level to the height of the streambank and extent of wetted area within the width of the channel as described in PRWC's Ambient Water Quality Monitoring Protocol.

This observation is supported by sites photographs and compared to the streamflow rate recorded at the nearest gauge to confirm the selection made.

7:52 [Icons] PRWC Bacteria Sampling 2020

< Prev [Input Field] Next >

Bacteria Sampling Data 2020

Water odor?

*\* This field is required*

Rotten egg

---

Chlorine

---

Musky

---

Gas or oil

---

None

---

Other

### Water odor

Sniff water in the sample bucket or near stream level if you have waded into the stream.

If you selected Other - use the Observations / Comments section at the end of the form to describe.

7:52 [Icons] PRWC Bacteria Sampling 2020

Quit [Search Bar] Prev Next

Bacteria Sampling Data 2020

Water color?

\* This field is required

Muddy (brown)

Silty

Green

Tea

Cloudy

Clear

### Water color

Check all that apply.

Base your selection on the appearance of water in your sample bucket or sample bottle to eliminate glare or reflections or influence of the stream substrate in your observation.

If you selected Other - use the Observations / Comments section at the end of the form to describe.

7:52 [Icons] PRWC Bacteria Sampling 2020

Quit [Search Bar] Prev Next

Bacteria Sampling Data 2020

Observed use?

\* This field is required

Swimming

Fishing

Boating

Other

### Observed Uses -

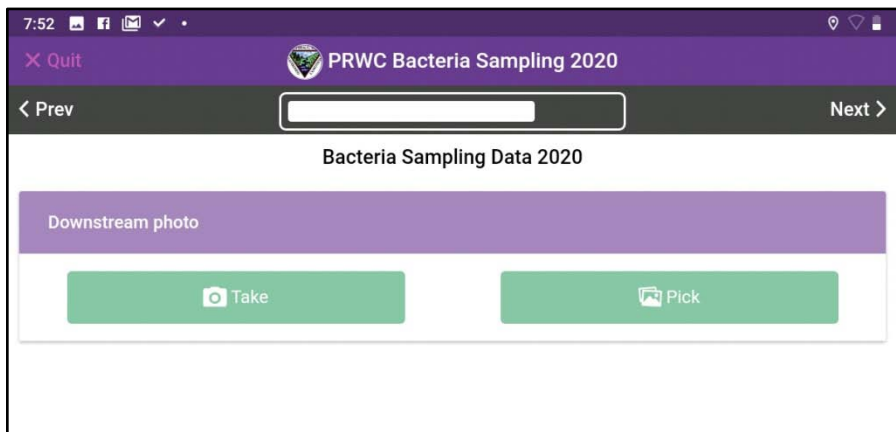
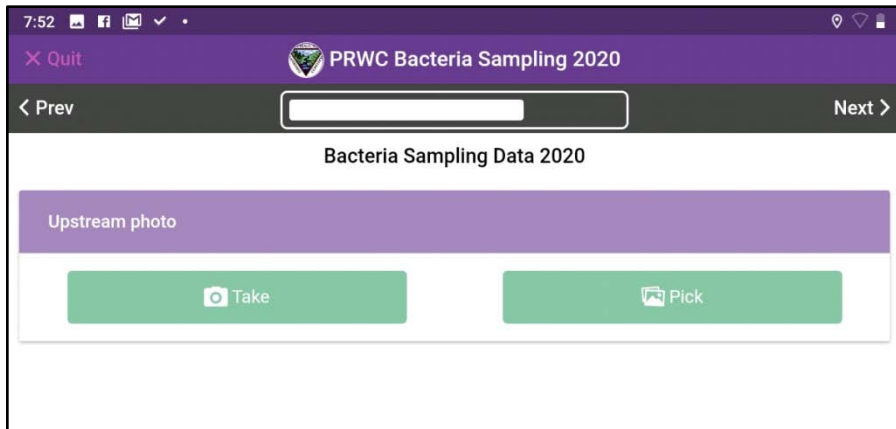
Check all that apply.

Swimming should only be selected if the site is a public swimming area. None of PRWC's sites correspond to public swimming areas.

Unless posted, fishing is permitted at most sites.

Pomperaug is considered a navigable waterway, but boating is not realistic except for the most downstream portion where it joins Lake Zoar / Housatonic River.

Other can be used to distinguish areas that have restrictions for fishing, swimming, and boating. (Example - Audubon at Bent of the River restricts these activities and is a wildlife sanctuary).



## Site Photos

Users are encouraged to select the “PICK” option for uploading a photo rather than “TAKE”. If you use “take” the camera will open and allow you to take a photo within the EpiCollect App. You will be shown a preview of the photo and given an option to save or retake. The photo you save will be saved to the EpiCollect cloud and not be saved on the device.

When using “PICK”, you are selecting a photo from the photo gallery on the device -- photos taken using the device camera outside of the Epicollect app. You will need to open the Camera outside of the Epicollect and switch between the two apps to take the photos and then select one from your photo gallery.

If you are unsure of how to navigate between the two programs, just stick to the TAKE option.

**NOTE:** Please take photos in landscape view (turn device to the horizontal) to capture stream surroundings. Please DO NOT use the wide angle lens option if the device has this feature. It warps the proportions of the photograph.

### ***Which way is Upstream? Downstream?***

If you are not sure which way the river is flowing, toss a stick or leaf or other item that floats to see which direction it moves.

4:49

Quit

PRWC Bacteria Sampling 2020

Prev Next

Bacteria Sampling Data 2020

Which method did you use to take temperature and conductivity readings?

\* This field is required

Wading method

Bucket method

### Sampling Method Used for Temperature and Conductivity Measurements

Check the box to indicate which sampling method was used when taking the water temperature and conductivity measurements.

7:52

Quit

PRWC Bacteria Sampling 2020

Prev Next

Bacteria Sampling Data 2020

Water temperature? (Celsius)

\* This field is required

Type answer here...

### Water Temperature

Use the thermometer in your field kit to measure water temperature.

**Make sure your reading is in Celsius and recorded with one digit after the decimal point.**

Tips: Make sure the temperature reading has stabilized. For the best reading, hold the thermometer away from your body when measuring it in the stream and make sure the thermometer is not in contact with other surfaces when taking the reading from water in a sample bucket (edges or bottom of the sample bucket).



7:53 [Icons] PRWC Bacteria Sampling 2020

Quit [Search Bar] Prev Next

Bacteria Sampling Data 2020

Conductivity? (µS/cm)

\* This field is required

Type answer here...

## Conductivity

Use the meter in your test kit to measure conductivity.\*\*\*

Make sure your device is on the proper screen which can be confirmed by the title at the top of the screen reading COND and the units below it shown as (uS/cm).

**Record the conductivity result with one digit after the decimal point.**

\*\*\* See “Operation Manual for Oakton CTSTestr 50” for specific instructions on how to use this field meter.

4:50 [Icons] PRWC Bacteria Sampling 2020

Quit [Search Bar] Prev Next

Bacteria Sampling Data 2020

Which method did you use to fill sample bottles?

\* This field is required

Wading Method

Extension Pole Method

## Sampling Method Used to Fill Sample Bottles

Check the box to indicate which sampling method was used to fill the sample bottles for bacteria and nitrate analysis.

### Observations / Comments

Use this field to enter descriptions for “other” water color, odor, notes on blanks and duplicates and other observations you made while in the field. Example -- perhaps some wildlife encounters, question from a passerby, pollution event in progress like an oil or sewage plume entering the stream. Anything you think might influence sample results or be helpful or of interest to the Principal Investigator.

### Bacteria Result and Nitrate Result

Leave Blank. These will be entered by the Project Manager after results are received from the testing laboratory.



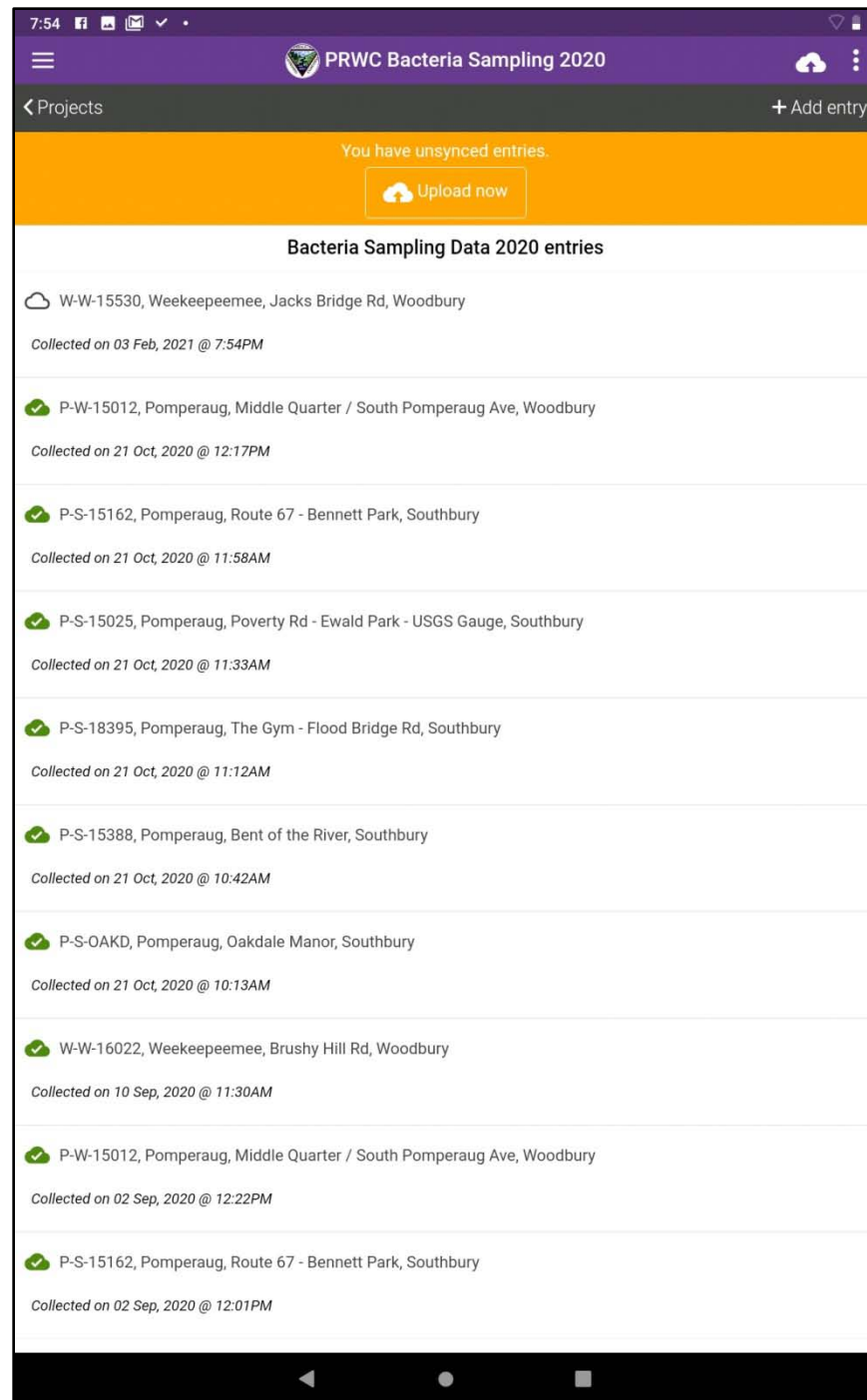
### Save Entry

Congratulations! You have completed your field observations for this site. Click Save Entry and you will be taken back to the entries list. Confirm your entry has been added to the list. If you are offline, you will see a message at the top of the screen that there are unsynced entries. Entries will be synced at the end of the sample day when connected to Wi-Fi.

Travel to your next site and start a new entry following instructions from the “Adding New Sampling Entries” step.

Complete your sampling route and when connected to Wi-Fi, sync your entries for the day by clicking “Upload Now”. Your entries will be populated to the master sheet hosted through the EpiCollect5 website. Please do not delete any entries from your device until the Project Manager confirms that entries have been uploaded successfully to the master sheet.

The master data-sheet that can be viewed on the EpiCollect5 website. Only when logged in as the Project Manager can data records be edited after they have been uploaded. It is at this step in the sequence that bacteria and nitrate results from the testing lab are entered.



### **APPENDIX 3**

**OAKTON CTS Testr® 50P Technical Specs and User Manual**

**Traceable Digital Thermometer Technical Specs**

**Lenovo tab M10 FHD PLUS (Tablet) Technical Specs**

...setting the standard again and again<sup>®</sup>



## Oakton<sup>®</sup> 50 Series Conductivity Pocket Testers

### New design stands up to the challenges of measuring water quality—even stands upright

The Oakton conductivity pocket testers stand up to everyday use, harsh environments, and the test of time. The testers can even stand upright when the cap is used as the stabilizing base. When you choose one of these conductivity testers, you get a pocketful of useful features and benefits.

- Easy-to-replace sensor module lets you use the tester body over and over again
- Intuitive interface has self-diagnostic error messages, and battery-life and stable reading indicators
- Simple operation at your fingertips with MENU button, 1-button calibration, and HOLD button to freeze readings for recording
- Valox<sup>®</sup> body resists most chemicals and is rugged, dustproof, waterproof, and IP67 rated
- Leakproof cap functions as a sample cup, hydrating cup, and stabilizing base to stand the tester upright
- Uses common AAA batteries

### Cap Design: versatile and functional



Tester stands upright with wide, stable base



Leakproof: use to store and keep electrode hydrated



Use as a sample cup to calibrate or measure

## Applications

Agriculture | Aquaculture & Aquariums | Cooling Towers | Education |  
 Electroplating | Environmental Monitoring | Food & Beverage |  
 Hydroponics | Manufacturing | Photo Development | Pools & Spas |  
 Printing | Water & Wastewater Treatment



Easily replace sensor module with a twist—no tools required

## CTSTestr™ 50P and 50C Pocket Testers

- 3-in-1 testers measure conductivity, TDS, and salinity
- Up to 3-point conductivity calibration with automatic standard recognition
- Selectable TDS factor adds versatility
- Factory calibrated against NaCl standards—ideal for testing salinity in pools
- Available with pin-style or cup-style sensor



Immerse and read with pin-style sensor



Draw or grab samples with cup-style sensor

## PCTSTestr™ 50 Multiparameter Pocket Tester

- Measures pH, conductivity, TDS, and salinity
- Long-life pH electrode and stainless steel pin-style conductivity sensor provide compatibility with a wide range of samples
- Up to 3-point pH calibration with NIST or USA autobuffer recognition, user-adjustable temperature coefficient, and self-adjusting TDS and salinity factors



Includes: protective plastic storage case, lanyard, and batteries.



Model	CTSTestr 50P (pin-style sensor)	CTSTestr 50C (cup-style sensor)	PCTSTestr 50
Catalog number	WD-35634-55	WD-35634-65	WD-35634-35
Range	pH	—	-1.00 to 15.0
	Conductivity	0.0 to 200.0 µS, 200 to 2000 µS, 2.00 to 20.00 mS	
	TDS	0.0 to 100.0 ppm, 100 to 1000 ppm; 0.10 to 10.00 ppt (TDS factor 0.5)	
	Salinity	0.00 to 10.00 ppt	
Resolution	Temperature	32 to 140°F (0 to 60°C)	
	pH	—	0.01
	Conductivity	0.1 µS, 1 µS; 0.01 mS	
	TDS	0.1 ppm, 1 ppm; 0.01 ppt	
Accuracy	Salinity	0.10 ppt	
	Temperature	0.1°C / 0.1°F	
	pH	—	±0.01
	Conductivity	±1% full-scale	
pH buffer recognition	TDS	±1% full-scale	
	Salinity	±1% full-scale	
Calibration	Temperature	±0.9°F (0.5°C) from 32 to 122°F (0 to 50°C); ±1.8°F (1.0°C) from 122 to 140°F (50 to 60°C)	
	Power	Four AAA 1.5 V batteries (included)	
TDS factor	Up to 3 points (pH, conductivity and TDS); 1 point (salinity)		
Temperature compensation	Automatic		
TDS factor	0.40 to 1.00 (selectable)		



## Operating Instructions

# OAKION®

### CTS Testr™ 50 Pocket Testers

#### Applications

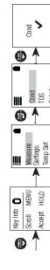
- Aquaculture
- Electroplating rinse tanks
- Aquariums and fish farms
- Printing industry
- Boiler blow-down
- Swimming pools
- Drinking water
- Verification of reverse osmosis system operation
- Water & wastewater treatment
- Hydroponics

#### Getting Started

The CTS Testr 50 Pocket Tester has been factory calibrated and usually works well out of the box. However, it is best practice to take a few minutes to perform the sensor cap and soak the sensor in warm tap water for 10 minutes or so. Prior to taking the measurements, periodic calibration with certified standards is recommended for best accuracy.

#### Measurement Parameter Setting

1. Press ON/OFF (o) to power on the tester.
2. Press MENU/V to enter setup window. Press HOLD/← to select Measure. The display shows Cond, TDS and Salinity.
3. Scroll down by pressing MENU/V to toggle between Cond, TDS and Salinity. Press HOLD/← to select Cond.
4. The display shows the selected measure with a ✓.



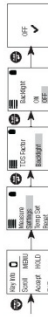
#### TDS Factor Setting

1. Press MENU/V to enter setup window. Scroll down by pressing MENU/V to select Settings.
2. Press HOLD/← to select Settings. The display shows TDS factor and Backlight.
3. Press HOLD/← to select the default TDS factory setting or MENU/V to adjust the setting.
4. Press HOLD/← to confirm the selection of the setting. The display shows the set TDS factor with a ✓.



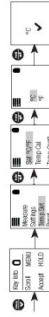
#### Backlight Settings

1. Press MENU/V to enter setup window. Scroll down by pressing MENU/V to select Settings.
2. Press HOLD/← to select Settings. The display shows TDS Factor and Backlight.
3. Scroll down by pressing MENU/V to toggle between TDS Factor and Backlight. Press HOLD/← to select Backlight.
4. The display shows ON and OFF. Scroll down by pressing MENU/V to toggle between ON and OFF. Backlight ON increases readability in low-light conditions.
5. Press HOLD/← to select the desired backlight option. The display shows the selected backlight option with a ✓.



#### Temperature Settings

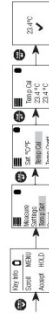
1. Press MENU/V to enter setup window. Scroll down by pressing MENU/V to select Temp Set. Press HOLD/← to select Temp Set. The display shows Set °C/°F, Temp Cal and Temp Coeff.
2. Press HOLD/← to select Set °C/°F. Scroll down by pressing MENU/V to toggle between °C and °F.
3. Press HOLD/← to select temperature unit. The display shows the selected temperature setting with a ✓.



#### Temperature Calibration

1. Press MENU/V to enter setup window. Scroll down by pressing MENU/V to select Temp Set.
2. Press HOLD/← to select Temp Set. The display shows Set °C/°F, Temp Cal and Temp Coeff.
3. Scroll down by pressing MENU/V to toggle between Set °C/°F, Temp Cal and Temp Coeff. Press HOLD/← to select Temp Cal.
4. The lower display shows the current measured temperature reading based on the test cell and the upper display shows the current measured temperature reading based on factory default calibration.
5. Dip the tester into a solution of known temperature and allow time for the built-in temperature sensor to stabilize.
6. Press MENU/V to adjust the temperature value or press the HOLD/← to confirm the calibrated value as the new temperature value of the solution.

**Note:** To exit this program without confirming the calibration, press CAL/ESC.



#### Temp Coefficient

1. Press MENU/V to enter setup window. Scroll down by pressing MENU/V to select Temp Set.
2. Press HOLD/← to select Temp Set. The display shows Set °C/°F, Temp Cal and Temp Coeff.
3. Scroll down by pressing MENU/V to toggle between Set °C/°F, Temp Cal and Temp Coeff.
4. Press HOLD/← to select Temp Coeff or MENU/V to adjust the Temp Coeff.
5. Press HOLD/← to confirm the Temp Coeff value. The new value is automatically confirmed with a ✓.



#### Calibration for Conductivity, TDS, or Salinity

For best results, periodic calibration with an accurate standard is recommended prior to measurement. Use the calibration standard value that is close to your intended sample value. The tester will retain one calibration value in each mode (conductivity, TDS, salinity) when the instrument is powered off. The conductivity value can be automatically updated when the instrument is powered on. Salinity values require manual calibration. The instrument will retain the last calibration value in the mode that was powered off. See "Measurement Parameter Setting" to change the desired parameter.

#### Automatic Calibration for Conductivity

1. Remove the cap and press ON/OFF (o) to power on.
2. Dip the sensor in at least 30 mm of calibration standard.
3. Stir gently and press CAL/ESC key to begin the calibration.
4. The display will show CAL followed by the default value. CAL is indicated on the display during calibration mode.
5. If the reading is within the calibration range of the automatically recognized standards: 80 (84 µS/cm), 1410 (1413 µS/cm), or 12,90 (12,88 mS/cm), the ✓ icon is displayed when the automatic calibration standard value has been detected.
6. Press HOLD/← to accept the auto conductivity standard and finish the calibration.
7. Display returns to Measurement window.



#### Manual Calibration

When the conductivity reading is outside calibration range of the automatic conductivity standards or when TDS or salinity is used, the tester will require manual adjustment.

1. Repeat steps 1 to 4 from "Automatic Calibration for Conductivity".
  2. Press MENU/V to manually adjust the value to the desired reading.
- Note:** The adjustment will decrease only, however the adjustment will eventually cycle to the highest available value after decreasing by 40% of the initial value.

3. Press HOLD/← to accept and finish the calibration when the desired value is selected.

**Note:** To abort calibration, press CAL/ESC to escape.

4. Once the calibration is finished and user has accepted the changes, measurement window will now show the calibrated reading.

**Note:** The auto conductivity standards are 84 µS/cm, 1413 µS/cm & 12.88 mS/cm.



#### CTS Measurement

1. Press ON/OFF (o) to power the tester on if needed.
2. Dip the electrode about 2 cm to 3 cm into the test solution. Stir and let the reading stabilize. The timer icon will blink during this time. Once the reading is stabilized, the timer stops blinking and ✓ will appear to indicate the stability of the reading.

**CAUTION:** Testing dry samples is not accurate and can lead to sensor damage or leakage. Solids must be wet and free of particulates that may break the glass sensor. Excessive force into dry samples can cause glass breakage.

3. Note the CTS value or press HOLD/← to freeze the reading. To release the reading, press HOLD/← again.
4. Press ON/OFF (o) for 3 seconds to turn off tester. If key is not pressed for 6.5 minutes, the tester will automatically shut off to conserve batteries.



### User Reset

- Reset the CTS calibration to the user's default settings by using the user reset function. Temperature user calibration is not affected by the user reset function.
1. Press MENU/√ to enter setup window. Scroll down by pressing MENU/√ to select Reset. Press HOLD/← to select User Reset. The display shows User Reset and Factory Reset.
  2. Press HOLD/← to select User Reset.
  3. The display automatically shows No and Yes. Scroll down by pressing MENU/√ to toggle between No and Yes.
  4. Press HOLD/← to confirm either No or Yes. Display shows User Reset option with a ✓.



### Factory Reset

- Reset the CTS/50 to the factory default settings by using the factory reset function.
1. Press MENU/√ to enter setup window. Scroll down by pressing the MENU/√ to select Reset. Press HOLD/← to select Reset. The display shows User Reset and Factory Reset.
  2. Scroll down by pressing MENU/√ to toggle between the resets. Press HOLD/← to select Factory Reset.
  3. The display automatically shows No and Yes. Scroll down by pressing MENU/√ to toggle between No and Yes.
  4. Press HOLD/← to confirm either No or Yes. The display shows the Factory Reset option with a ✓.



### HOLD Function

This feature helps to freeze the display for a delayed observation.

1. Press HOLD/← button to freeze measurement.
2. Press HOLD/← again to release measurement.



### Sensor Maintenance

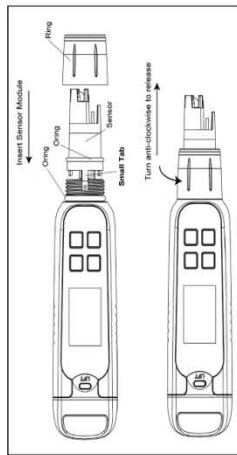
1. Always keep the sensors electrodes clean. Rinse the electrodes with deionized water and wipe them dry with clean cloth before storing with its protective cap. For cup type electrodes, remove the white plastic cap and thoroughly clean viscous solutions. Never scratch electrodes with a hard substance.
2. For better performance, soak the electrode in alcohol for 10 to 15 minutes and rinse with de-ionized water before starting any measurement process. This is to remove dirt and oil stains on the electrode which may affect the accuracy of the measurements.

### Sensor Replacement

Replace the sensor module at the fraction of the cost of a new tester. When the tester fails to calibrate or gives fluctuating readings in calibration standards, you need to change the electrode.

1. With dry hands, grip the ring with sensor facing you. Twist the ring counter-clockwise. Save the ring for later use.
2. Pull the old sensor module away from the tester.
3. Align the four tabs on the new module so that they match the four slots on the tester.
4. Gently push the module onto the slots to sit it in position. Push the smaller O-ring fully onto the new sensor module. Push the other O-ring over the module and thread it into place by firmly twisting clockwise.

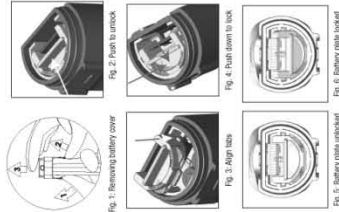
**Note:** It is necessary that you recalibrate your tester prior to measurement after a sensor replacement.



### Replacing the Batteries

The CTS Testr 50 Pocket Tester uses four AAAA 1.5 V batteries.

1. To remove the battery cover, see Figure 1. Clear the front catch and then the back catch, before sliding the cover off.
2. To remove the battery plate, push the center tab towards the front of the tester as shown in Figure 2. Once unlocked, invert the plate upside down to remove batteries. Each side uses two AAAA batteries. Open the cover with positive terminal facing downward.
3. To lock the battery plate, align the small tabs (Figure 3) into the guide ribs on the housing and then press down. See Figure 4.



### Warranty

This instrument is supplied with a warranty against manufacturing defects for a period of one year from the date of purchase.

### Return of Items

Authorization must be obtained from your distributor before returning items for any reason. When applying for authorization, please include information regarding the reason the item(s) are to be returned. We reserve the right to make improvements in design, construction and appearance of products without notice. Prices are subject to change without notice.

### Self-Diagnostic Messages

<b>0</b>	Batteries are weak and need replacement soon.
stable error	Appears when calibration is attempted but the reading is not yet stable. Wait for the reading to stabilize or manually confirm the calibration by pressing enter.
over range	The reading is above the measuring range of tester.

CTSTestR 50	
<b>Specifications</b>	
<b>Conductivity</b>	
Conductivity range	0.0 to 200.0 µS, 200 to 2000 µS, 2.00 to 20.00 mS
Resolution	0.1 µS, 1 µS, 0.01 mS
Relative accuracy	±1% full scale
Normalization temperature	25.0°C (77°F)
Temperature co-efficient	0.0% to 10.0%
Calibration points	Up to 3 points
<b>TDS</b>	
TDS range	0.0 to 100.0 ppm, 100 to 1000 ppm, 0.10 to 10.00 ppt (TDS Factor 0.5)
Resolution	0.1 ppm, 1 ppm, 0.01 ppt
Relative accuracy	±1% full scale
Calibration points	Up to 3 points
TDS factor	0.40 to 1.00 (selectable)
<b>Salinity</b>	
Salinity range	0.00 to 10.00 ppt
Resolution	0.10 ppt
Relative accuracy	±1% full scale
Calibration points	1
<b>Temperature</b>	
Temperature range	0 to 80°C (32.0 to 140.0°F)
Temperature resolution	0.1°C / 0.1°F
Temperature accuracy	From 0 to 50°C (±0.5°C / ±0.9°F + 1.1SD); from 50 to 80°C (±1.0°C / ±1.8°F + 1.1SD)
Temperature compensation	Yes (Automatic Temperature Compensation)
<b>General</b>	
Display	Graphics, dot matrix 80 x 100 pixel
Auto off	8.5 minutes (from last key press)
Reset	User / Factory
Power requirement	Four AAAA 1.5 V batteries
Battery life	20-50 hours
Water proofing	IP57
<b>Environmental operating conditions</b>	
Ambient operating temperature	5 to 45°C / 41 to 113°F
Relative humidity	5% to 85% noncondensing
Storage temperature	-20 to 60°C / -4 to 140°F
Storage humidity	5% to 85% noncondensing

### Accessories

Ordering Code	Product Description
35634-55	CTS Testr 50P pin-style pocket tester with case, lanyard, and batteries
35634-65	CTS Testr 50C cup-style pocket tester with case, lanyard, and batteries
35634-57	Replacement sensor module for CTS Testr 50P pin-style tester
35634-07	Replacement sensor module for CTS Testr 50C cup-style tester
35634-09	Replacement sensor cap
09376-00	Replacement alkaline batteries, AAA, 1.5 V. Pack of 12
17101-45	NIST-traceable calibration with data for pocket testers

**OAKTON**  
INSTRUMENTS

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August, 2017

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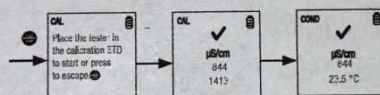


# OAKTON CTS Testr® 50P

## At-a-Glance User Instructions for Calibration and Making Conductivity Measurements

### Automatic Calibration for Conductivity

1. Remove the cap and press ON/OFF (⏻) to power on.
2. Dip the sensor in at least 30 mm of calibration standard.
3. Stir gently and press CAL/ESC key to begin the calibration.
4. The display will show CAL followed by the default value. CAL is indicated on the display during calibration mode.
5. If the reading is within the calibration range of the automatically recognized standards; 80 (84  $\mu\text{S}/\text{cm}$ ), 1410 (1413  $\mu\text{S}/\text{cm}$ ), or 12.90 (12.88  $\text{mS}/\text{cm}$ ), the ✓ icon is displayed when the automatic calibration standard value has been detected.
6. Press HOLD/↵ to accept the auto conductivity standard and finish the calibration.
7. Display returns to Measurement window.



### Manual Calibration

When the conductivity reading is outside calibration range of the automatic conductivity standards or when TDS or salinity is used, the tester will require manual adjustment.

1. Repeat steps 1 to 4 from "Automatic Calibration for Conductivity".
2. Press MENU/√ to manually adjust the value to the desired reading.

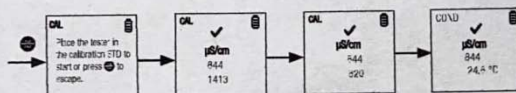
**Note:** The adjustment will decrease only, however the adjustment will eventually cycle to the highest available value after decreasing by 40% of the initial value.

3. Press HOLD/↵ to accept and finish the calibration when the desired value is selected.

**Note:** To abort calibration, press CAL/ESC to escape.

4. Once the calibration is finished and user has accepted the changes, measurement window will now show the calibrated reading.

**Note:** The auto conductivity standards are 84  $\mu\text{S}/\text{cm}$ , 1413  $\mu\text{S}/\text{cm}$  & 12.88  $\text{mS}/\text{cm}$ .



**Measure conductivity** using field meter. Hold down the power button to turn on the meter. Make sure your device is on the proper screen which can be confirmed by the title at the top of the screen reading COND and the units below it shown as ( $\mu\text{S}/\text{cm}$ ). Rinse cap of the meter and the sensor in the stream or with water collected in the bucket a few times (dip cap into the river or bucket to fill/rinse and then discard to the side). Then fill the cap of the meter to the "max fill line" with water from the river. The meter will automatically begin measuring conductivity. Allow the meter a few moments to show a stabilized reading. You will see a check mark at the top, once a stable reading is reached. **Record the conductivity result with one digit after the decimal point.**



# Long-Stem Traceable® Thermometer Specs and Use Manual

The screenshot shows the Traceable website product page for the Long-Stem Traceable Thermometer. The page includes a navigation bar with 'TRACEABLE PRODUCTS' and a search bar. The main content area features a large image of the thermometer, a 'MORE VIEWS' section with a smaller image, and a detailed description. The description highlights that the thermometer is ideal for replacing glass and mercury thermometers, replaces mercury and glass thermometers, and lists various features such as temperature range, resolution, accuracy, and stem dimensions. It also mentions that the thermometer is supplied with a Traceable Certificate, protective sleeve, and battery.

DESCRIPTION SPECS INSTRUCTIONS & LITERATURE REVIEWS (0)

**Traceable® Long-Stem Thermometer**

Ideal for replacing all glass and mercury thermometers in the lab

- On/off switch provides longer battery life, °F/°C switchable range
- Long stem allows for taking readings while stirring and is ideal for use in incubators and ovens

**Replaces mercury and glass thermometers.**

Perfect-sized unit fits into flasks, cuvettes, test tubes, beakers, ovens, and incubators. Read temperatures in foods, gases, samples, reagents, water baths, and semisolids. Stainless-steel probe (304) is resistant to most laboratory chemicals. ABS plastic and stainless-steel construction (no glass or mercury) makes it safe. Readings are updated every second.

**Features**

- Temperature range: -58 to 302°F and -50 to 150°C
- Resolution is 0.1° from -20 to 200° (1° outside this range)
- Accuracy is (Choose above)
- Brilliant LCD is 1/4-inch-high
- Stem Dimensions: 0.14" diameter.Length: Choose above

**Traceable® Certificate**

Multi-point calibration on an individually-numbered Traceable® Certificate which assures accuracy from our ISO/IEC 17025:2017 (1750.01) calibration laboratory accredited by A2LA. It indicates traceability of measurements to the SI units through NIST or other recognized national measurement institutes (NMI) that are signatories to the CIPM Mutual Recognition Agreement. Probe materials is 304 Stainless-steel. Supplied: Traceable® Certificate, protective sleeve, and battery.

DESCRIPTION SPECS INSTRUCTIONS & LITERATURE REVIEWS (0)

Temperature Range	4052/4352 : - 50°C to 150°C ; 4353/4354 : -50 to 300°C
Temperature Resolution	0.1° from -20 to 200°(1° otherwise)
Probe Dimensions	4052/4352: 1/8" stem diameter, 8" stem length, 1.2" Top, 11" overall; 4353/4354: 1/8" stem diameter, 11 3/8" stem length, 14 3/8" overall
LCD Digit Size	1/4 in
Supplied With	Traceable® Certificate, protective sleeve, and battery

**SPECIFICATIONS**

**Mode: 8" stem length**

Range: -58 to 302 °F / -50 to 150 °C

**Model: 11.4" stem length**

Range: -58 to 482 °F / -50 to 250 °C

Resolution: 0.1° from -20° to 200°  
(both models) 1° otherwise

**OPERATION**

Remove the stem from the protective sheath. Slide the ON/OFF switch to ON to turn the unit on. Slide the °F/°C switch to °F to display the temperature in Fahrenheit or to °C to display the temperature in Celsius. Insert the stem of the thermometer into the material to be measured.

Slide the ON/OFF switch to OFF to turn the unit off. Replace the protective sheath. To conserve battery life, always turn the unit off when not in use.

**ALL OPERATIONAL DIFFICULTIES**

If this thermometer does not function properly for any reason, replace the battery with a new high-quality battery (see the "Battery Replacement" section). Low battery power can occasionally cause any number of "apparent" operational difficulties. Replacing the battery with a new fresh battery will solve most difficulties.

**BATTERY REPLACEMENT**

Erratic readings, a faint display, or no display, are all indicators that the battery must be replaced. Remove the battery cap, located at the top of the unit by turning it in the direction of the arrow (counterclockwise). Remove the exhausted battery and replace with a new 1.5 volt silver oxide size 357 battery. Make certain the positive (+) side is visible. Replace the battery cover. Do not overtighten the cap.

**WARRANTY, SERVICE, OR RECALIBRATION**

For warranty, service, or recalibration, contact:

**TRACEABLE® PRODUCTS**

12554 Old Galveston Rd, Suite B230  
Webster, Texas 77598 USA  
Ph. 281 482-1714 • Fax 281 482-9448  
E-mail support@traceable.com • www.traceable.com

Traceable® Products are ISO 9001:2018 Quality-Certified by DNV and ISO/IEC 17025:2017 accredited as a Calibration Laboratory by A2LA.

Cat. No. 4052 / 4352 / 4353 / 4354

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**TRACEABLE®  
LONG-STEM  
THERMOMETER  
INSTRUCTIONS**

## PERFORMANCE

### Processor

**Processor Family**

MediaTek Processor

**Processor**

Processor Name	Cores	Threads	Base Frequency	Max Frequency	Cache	Memory Support	Processor Graphics
MediaTek Helio P22T	8x A53	8	-	A53@2.3GHz	-	LPDDR3	IMG PowerVR GE8320 GPU

### Operating System

Android Pie

### Graphics

Graphics	Type	Memory	Key Features
IMG PowerVR GE8320 GPU	Integrated	Shared	-

### Chipset

MediaTek SoC (System on Chip) platform

### Memory

**Memory Type**

LPDDR4x-3200

### Storage

**Storage Support**

- 128GB eMMC on systemboard
- 64GB eMMC on systemboard
- 32GB eMMC on systemboard
- MicroSD card, supports FAT32 up to 256GB, exFAT up to 1TB

**Storage Type**

Disk Type	Interface	RPM	Security
Flash Memory	eMMC	-	-

### Removable Storage

**Card Reader**

- MicroSD card slot (WiFi model, supports up to 256GB FAT32)
- Nano-SIM + microSD card slot (WWAN model, supports up to 256GB FAT32)

### Multi-Media

**Speakers**

Dual side speaker, tuned with Dolby® Atmos®

**Microphone**

Dual array microphone (with dedicated DSP)

**Camera**

Front 5.0-megapixel, fixed focus; and rear 8.0-megapixel, auto focus

**VoiceCall**

- VoiceCall
- Not support

**Notes:**

- Lenovo® TB-X606V only

## Sensor

### Vibrator

Vibrator

### Sensors

- Ambient light sensor (ALS)
- Hall sensor
- Accelerometer (G) sensor
- Proximity sensor

## Battery

### Battery

Integrated Li-Polymer 5000mAh (minimum) / 5100mAh (typical)

### Max Battery Life

Standby Time: Over 6 weeks

Online Video Playback Time: 8.5 hr

Browsing Time: 9 hr

### Notes:

- All battery life claims are approximate maximum and based on results using the MobileMark® 2014 and/or MobileMark 2018 battery-life benchmark tests. Actual battery life will vary and depends on many factors such as product configuration and usage, software use, wireless functionality, power management settings, and screen brightness. The maximum capacity of the battery will decrease with time and use.

### Charging Time

Over 3.5 hours

## Power Adapter

5V/2A USB-C AC adapter

## DESIGN

## Display

### Display

Size	Resolution	Touch	Type	Brightness	Surface	Aspect Ratio	Contrast Ratio	Color Gamut	Viewing Angle	Key Features
10.3"	FHD (1920x1080)	Multi-touch	IPS	330 nits	Glossy	-	-	70.3% NTSC	160°	-

### Notes:

- California Electronic Waste Recycling Fee  
In California, per state law, Lenovo charges an electronic waste recycling fee on this covered device at the time of sale of the product. For more information, go to <https://www.calrecycle.ca.gov/Electronics/Consumer>

### Touchscreen

Capacitive-type multi-touch, supports 10-point touch, TDDI technology

## Input Device

### Pen

- Lenovo Active Pen 3 with replaceable battery
- Not support

## Mechanical

### Dimensions (WxDxH)

244.2 x 153.3 x 8.15 mm (9.61 x 6.03 x 0.32 inches)

### Weight

460 g (1.01 lbs)



**Case Color**

- Iron grey
- Platinum grey

**Case Material**

Metal

**Buttons**

- Volume button
- Power button

**CONNECTIVITY**

**Network**

**WLAN + Bluetooth™**

802.11ac Dual Band 1x1 Wi-Fi + Bluetooth 5.0

**WWAN**

- 4G LTE
- Not configured

**SIM Card**

Not Support

**Cellular Bands**

GSM: B2/B3/B5/B8

UMTS: B1/B2/B5(B6/B19)/B8

FDD LTE: B1/B2/B3(Expanded Band3)/B4/B5(B19)/B7/B8/B20

TDD LTE: B38/B40

**WIFI Direct**

WIFI Direct

**WIFI Display**

WIFI Display

**FM Radio**

FM Radio

**Location**

Models	Location
WWAN model	GPS + GLONASS + A-GPS
Wi-Fi model	GPS + GLONASS

**Ports**

**Standard Ports**

- 1x USB-C 2.0 (support data transfer, OTG and Power Delivery)
- 1x headphone / microphone combo jack (3.5mm)
- 1x Pogo pin connector (2-point)

Notes:

- Depending on many factors, actual data transfer speed may be lower than theoretical speed

**Optional Ports**

- 1x microSD card slot (WiFi model)
- 1x Nano-SIM + microSD card slot (LTE model)

**SERVICE**

**Warranty**

**Base Warranty**

- 1-year carry-in service



- 1-year mail-in service
- 1-year depot service
- 2-year carry-in service
- 2-year mail-in service
- 2-year (1-yr battery) depot service
- 2-year (1-yr battery) depot or carry-in service

## SOFTWARE

### Preinstalled Software

- Tips
- Lenovo Vantage
- Netflix
- Google Photos
- Google Play
- Kids Mode
- Google
- Google Chrome
- Dolby Atmos

## CERTIFICATIONS

### Green Certifications

- ENERGY STAR® 8.0
- RoHS

Notes:

- ENERGY STAR 8.0 (TB-X606F, TB-X606X)

### Other Certifications

TÜV Rheinland Low Blue Light certified

