STANDARD OPERATING PROCEDURE FOR PRESSURE TRANSDUCER INSTALLATION AND MAINTENANCE

UTAH DEPARTMENT OF ENVIRONMENTAL QUALITY

WATER QUALITY

State of Utah
Department of Environmental Quality
Division of Water Quality

Revision 1.1
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Foreword

Utah Division of Water Quality (DWQ) Standard Operating Procedures (SOPs) are adapted from published methods, or developed by in-house technical experts. This document is intended primarily for internal DWQ use. This SOP should not replace any official published methods.

Any reference within this document to specific equipment, manufacturers, or supplies is only for descriptive purposes and does not constitute an endorsement of a particular product or service by DWQ. Additionally, any distribution of this SOP does not constitute an endorsement of a particular procedure or method.

Although DWQ will follow this SOP in most instances, there may be instances in which DWQ will use an alternative methodology, procedure, or process.

The methodology detailed below is the protocol followed by DWQ's monitoring staff and verified by DWQ's Quality Assurance officer.

Benjamin R. Brown 06/02/2020

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Revision Page

Date	Revision #	Summary of Changes	Sections	Other Comments
5/1/14	0	not applicable	not applicable	New SOP. Began document control/revision tracking.
4/14/20	1	Updated language, grammar, and structure	All	Clarified and revised sentence structure and grammar throughout the entire document.
4/24/20	1.1	Added baroTROLL language and clarified amount of flow measurements needed	All	Updated procedure to ensure a baroTROLL is installed alongside a PT. Related amount of flow measurements to strength of the curve.

Table of Contents

1.0 SCOPE AND APPLICABILITY

This document presents the Utah Division of Water Quality's (DWQ) Standard Operating Procedure (SOP) for the installation and maintenance of pressure transducers in Utah's natural (rivers, streams, lakes) or engineered (ditches, canals, reservoirs) surface water bodies. This SOP applies to any DWQ monitor or cooperator installing or maintaining pressure transducers. This SOP also outlines the responsibilities of DWQ monitors to perform inspections of pressure transducers and associated equipment while collecting water samples or performing flow measurements at a site where a pressure transducer has been installed.

In-situ Level TROLL® pressure transducers are a low-cost and robust method of determining near-continuous flow in streams that are not gaged by another agency (such as the US Geological Survey). The pressure transducer consists of an "absolute" or "uncompensated" pressure sensor that measures absolute pressure and is not vented to allow for compensation for atmospheric pressure. Therefore, atmospheric pressure is subtracted from the absolute measurement to determine the pressure from water. The determination of atmospheric pressure at a site is often done with an In-situ baroTROLL® logger, however, data from nearby weather stations can be used in some situations. The pressure transducer will log the depth of water at set time intervals. Recorded values are stored in the sensor itself and are periodically retrieved by field personnel. By combining these logs of depths with a number of discharge measurements taken at the site, a rating curve can be developed, correlating the depth of water with the measured discharge. Once this correlation has been established, discharge may be inferred from water depth alone. **In order to establish a strong rating cure, flow measurements need to be taken at the site of the pressure transducer across a range of flow conditions.**

Flow data is used by DWQ scientists and engineers for a variety of purposes including but not limited to:

- understanding the effect of hydrologic condition on aquatic life uses
- determining pollutant loading and inputs into waterbodies
- setting permit requirements for discharge of treated wastewater
- understanding groundwater/surface water interactions
- characterizing current water quality conditions and detecting long-term trends

The information discussed in this SOP is not a substitute for equipment user manuals or other technical documentation. Consult the appropriate manual for a complete guide to the proper use, calibration, maintenance, deployment, and troubleshooting of a particular brand of pressure transducer equipment/software. This SOP is to be used as a reference but the complete user manual should always accompany field personnel.

2.0 SUMMARY OF METHOD

The transducers are programmed to log the depth of water every 15 minutes (can be in any increment of time). Prior to installation, the site will be scoped for feasible placement of the transducer inside a PVC pipe. Ensure that the bottom of the pipe is as close as possible to the low-water level of the stream and the top of the pipe as close as possible to the expected high water level. In order to retrieve data, the pressure transducer must be accessible (i.e., cannot be downloaded remotely). The PVC pipe will act as a stilling well to even out the wave action of the flowing water, and to prevent damage to the transducer by natural causes or intentional damage. The pipe will be installed using one of a number of methods to safeguard against high flows and vandalism. Typically, a baroTROLL® or some other method of atmospheric pressure correction is required at each pressure transducer site and should be described in detail in the project-specific SAP. After installation, streamflow measurements should be taken using the procedures detailed in Utah DWQ's SOP for Stream Flow Measurements.

3.0 DEFINITIONS

BaroTROLL®: An atmospheric pressure measuring device that is manufactured by In-situ®. It is used alongside a transducer to correct for offsets in atmospheric pressure.

Discharge: A term used in this SOP interchangeably with "flow." This is the volume of water flowing per unit of time.

Gaging station: This is a site where flow is being measured continuously and automatically using devices such as, but not limited to, pressure transducers.

Pressure transducer: A device that measures pressure. Sometimes referred to as a "PT" or a "transducer."

PVC pipe: Polyvinyl chloride pipe.

Q-boat: Acoustic Doppler current profiler (ADCP) is a device used by DWQ to measure discharge at non-wadeable sites.

Reference level: The fixed elevation or height under the water at which the pressure transducer is installed

Stage: The height of the surface of the water in relation to the reference level

Stilling well: A cylinder installed near a body of water used to hold and protect hydrological sensors. The stilling well allows water to move in and out freely to interact with sensors but dampens wave and current action so as to provide a representative water level and to reduce noise in water level data.

4.0 HEALTH AND SAFETY WARNINGS

Hazardous conditions potentially exist at every waterbody. If unfavorable conditions are present at the time of sampling, it is recommended that the sampling be rescheduled. If hazardous conditions arise during sampling, such as lightning, high winds, rising water, or flash flood warning, personnel should cease sampling and move to a safe location.

When working in Utah and other warm climates, take steps to avoid heat induced illnesses such as heat stroke or heat exhaustion.

Use caution when working in waders as drowning hazards exist.

Take appropriate precautions when operating equipment and working on, in, or around water, as well as possibly steep and unconsolidated banks, rip rap, bridges, or edges of ponds/lagoons. All field crews should follow DWQ health and safety procedures and be equipped with safety equipment such as proper wading gear, personal flotation devices (PFDs), gloves, first aid kits, cellular phone, etc.

Use caution when sampling from a bridge or boat and take appropriate actions to make the situation as safe as possible; suspend the sampling if conditions are unsafe.

Power tools can be hazardous if used improperly.

5.0 CAUTIONS

No additional cautions for this procedure.

6.0 INTERFERENCES

Since the pressure transducer relates recorded depth of the transducer to recorded flow at the site, it is imperative that the elevation of the transducer remains at reference level for the duration of measurements. The transducer will need to be removed from the PVC pipe to download data and to clean out any debris or sediment, and then reinstalled at the same level from which it was retrieved. **Any deviations of transducer elevation from reference level must be documented in project-specific field notebooks and pressure transducer tracking sheet.**

The PVC pipe must be anchored firmly to prevent movement, which would change the reference depth of the transducer. Anchor PVC pipe in an area that won't be affected by extreme flow events.

Avoid backwater conditions. For example, if the system has a heavy influence from beavers, find an area that is not conducive to beaver dam construction. If the area where the transducer is local is in the backwater from a beaver dam, the water surface elevation will not reflect a higher flow and your stage-discharge relationship will be affected erroneously.

If the transducer is buried in sediment (caused by any change in channel shape), it will measure erroneous values and your stage-discharge relationship will be affected.

A strong stage-discharge relationship requires an abundance of flow measurements; however, conditions and logistics may inhibit the amount of flow measurements taken. Therefore, flow measurements recorded at the site should be as accurate as possible to ensure a strong relationship.

7.0 PERSONNEL QUALIFICATIONS/RESPONSIBILITIES

A Utah DWQ monitoring staff member will have primary responsibility for installation of pressure transducers, PT data collection, and development/maintenance of rating curves. Personnel installing pressure transducers and taking flow measurements should be knowledgeable of the relation between stream depth, or stage, and stream flow. Programming the transducers requires knowledge of computers and deployment software. Installation of the stilling wells and transducers is physically demanding and requires the use of a T-post driver, 3 pound hammer, hammer drill, and cable cutters.

DWQ personnel performing water sampling must be familiar with sampling techniques, safety procedures, proper handling, and record keeping. Samplers are responsible for attending refresher meetings held each spring/summer to review procedures and techniques. New staff will be trained in the field and lab by DWQ personnel.

Cooperators are required to read this SOP annually and acknowledge they have done so via a signature page (see **Appendix 1**) that will be kept on-file at DWQ along with the official hard copy of this SOP.

8.0 EQUIPMENT AND SUPPLIES

- ❑ Copy of this SOP
- ❑ PT Tracking Form (**Appendix 2**)
- ❑ In-situ Level TROLL® logging pressure transducer or equivalent.
- ❑ Win-Situ® 5 logger software
- ❑ In-situ® USB TROLL Com Direct Connect communication cable
- ❑ Laptop or desktop computer to communicate with the Level TROLL®
- ❑ 1.5-in PVC Schedule 40 electrical conduit pipe, 10-ft length cut to fit installation
- ❑ Two 1.5-inch PVC caps
- ❑ 3/32-inch vinyl coated braided stainless-steel (SS) cable; cut to fit specific installation
- ❑ 3/32-inch cable ferrules to attach SS cable to pressure transducer
- ❑ Attachment materials and tools:
    - ❑ ¾-inch SS strapping, seals, and tensioner
    - ❑ Hammer drill, 3/32-inch masonry bits, ¼-inch X 2-inch masonry screws
    - ❑ Power-actuated nailer, power charges, and concrete pins
    - ❑ 1.5-inch two-hole metal conduit straps
    - ❑ 5-foot T-posts, post driver, 3 pound single jack sledgehammer, 2-foot rebar
- ❑ Combination padlock to secure the transducer on the SS cable in the PVC pipe
- ❑ In-situ BaroTROLL® (may be unnecessary depending on geographic area)

9.0 PROCEDURE

9.1 Calibration and Pre-installation Procedure

1. The In-situ Level TROLLs® are calibrated at the factory and no calibration or standardization is necessary before use. Record the serial number and factory calibration date for the pressure transducer on the electronic tracking form (see **Appendix 2**)

2. The life of a transducer and how long it will maintain its calibration is dependent upon the duration of use, exposure to extreme environmental conditions, and how carefully it is handled during storage, transportation, and use. If needed, calibration is possible with the Level TROLL® and the procedure is detailed in the Level TROLL® Operators Manual (link found in **Section 12**).

3. Prior to installation, coordinate with Marshall Baillie, DWQ Monitor, to document PT information and site installation details.

9.2 Installation

1. Determine where detailed flow measurements are required and assess the best location to install the stilling well and transducer. The stilling well should be mounted to a permanent object (*e.g.*, bridge piling) at a location where the channel cross section is not likely to change over time. In addition, this location should be suitable for obtaining discharge measurements by wading or deploying a Q-boat from a bridge or cable.

*Note: The location for the pressure transducer should avoid areas with: **influence of beaver**, **backwater**, **sediment build-up**, and **change in channel cross section**.*

2. Using Win-Situ® 5 software, program the transducers to log depth readings every 15 minutes, using the procedure outlined in the software. The Level TROLLs can be programmed to log immediately, or a delayed start may be used. In either case, ensure in the software that the unit is programmed and is logging or will begin logging at the programmed time and date. Include in the programming the name of the site and date of deployment.

3. Based upon the site, determine the length of the PVC pipe that will reach down to low water and ideally above high water. The transducers are water-tight, so no damage will occur if the top of the pipe is not above water throughout the year, *however the accuracy of results will be compromised*.

4. Using this determined length, cut the PVC pipe to the appropriate length.

5. Drill a 3/8 in hole for the padlock 2 inches below the top of the PVC pipe.

6. Drill several holes near the bottom of the PVC pipe to allow for water flow through the system.

7. Using the 3/32 in SS cable and ferrules, make a tether for the pressure transducer inside the PVC pipe (See **Figure 1** and **Figure 2** for a view of this set-up).

a) Place a ferrule on the cable, run the end through the eyelet on the top of the transducer then through the ferrule again, forming approximately a 2 in loop. Clamp in place using an assuage tool or the 3 pound sledge and a hard surface.

b) To determine the location of the transducer in the stilling well:

   i) Lower the transducer into the pipe from the top until there is tension on the cable.

   ii) Pull the transducer up approximately ½ in above the top and mark the cable at the location of the 3/8 in hole in the pipe for the padlock.

   iii) Form a loop with this mark at the top, and cut the cable with adequate length to make this loop.

   iv) Verify that the transducer will be approximately ½ in above the bottom cap when the padlock is run through the pipe and top loop of the tether, and secure the loop with a ferrule (See **Figure 3**).

8. Secure the transducer inside the stilling well by inserting the free end of the padlock shackle through one of the 3/8 in holes at the top of the well, hooking the tether loop over the shackle inside the pipe, then inserting the shackle through the other hole (other side of pipe) and locking the padlock (See **Figure 1**).

9. Place the top cap on the stilling well.

10. To attach the stilling well at the determined site, it must be attached so that it will not be dislodged in any high flow events. Below are some examples of different set-ups, however depending on site specific information, other techniques may need to be used. See **Figures** section for a visual of these set-ups.

    a) If using a bridge pylon or other vertical structure that extends into the stream as low as the low water mark, the stilling well can be strapped to the downstream side (to minimize wakes caused by the structure). See **Figure 2**.

    b) If using a vertical surface, such as a bridge abutment at the downstream side where the SS strapping cannot be wrapped around the surface, the 1.5 in metal conduit straps can be used to attach the stilling well. If the vertical surface is concrete, a hammer drill and concrete screws or powder-actuated nailer and concrete nails will be used to attach the stilling well, nailing or screwing down the straps over the stilling well in at least two spots, typically just above current water level and near the top of the well. See **Figure 4**.

    c) If no vertical surface is present, the transducer can be attached to a diagonal surface, such as a stream bank. The transducer records absolute depth of water, so the stilling well in a diagonal position will not affect readings. The stilling well could be attached to T-posts, sections of rebar, or a tree root in the stream bank. Attach the stilling well using the SS strapping around the well and post to prevent movement. See **Figure 5**.

11. A baroTROLL® should be installed along with the pressure transducer. Some sites may not need a baroTROLL® installed alongside a transducer. Refer to the project-specific SAP for more site specific information. See **Figure 6** for a baroTROLL® set up.

12. Record the date of deployment on the PT tracking form (**Appendix 2**).

9.3 Flow Measurements

In order to establish a strong rating curve, an abundance of flow measurements at the site of the transducer must be taken. Ideally these flow measurements would be taken on a monthly basis, but the following considerations need to be taken into account:

- A strong rating curve is based on the flow measurements at a variety of flow conditions. Therefore flow measurement sampling should be targeted to measurements of high, regular, and low flow.
    - This is an iterative process that is influenced by the data relationship. For example, if the relationship is lacking low flow measurements, the field monitor should be sure to obtain flow measurements during a lower flow period.

Any additional information about flow measurement frequency can be found in the project specific SAP and at the discretion of the DWQ Monitor sampling.

9.3 Inspection and Maintenance

1. The transducers should be inspected whenever feasible to ensure no damage, shifting, or vandalism has occurred. Monitors perform a visual inspection of the gage each time they visit that site. In addition, the monitor responsible for maintaining DWQ's gaging stations may visit the site to perform inspections and maintenance at more frequent intervals.

2. The monitor responsible for maintaining DWQ's gaging stations will determine the frequency at which more detailed inspections of the pressure transducer and inside of the stilling well will be performed. The transducer can be removed from the well to remove debris or sediment and the pressure transducer and stilling well can be cleaned. At a minimum, a detailed inspection and maintenance should be performed during data retrieval.

3. Record that an inspection and/or maintenance was performed on the PT Tracking document (**Appendix 2**).

4. See **Figure 7** for a guide to troubleshooting transducer installation and maintenance.

9.4 Data Retrieval

1. To retrieve the pressure transducer, remove the PVC cap and unlock the padlock. Pull on the SS cable to lift the pressure transducer out of the pipe.

2. To download the data, remove the protective cap from the transducer and plug it into the laptop using the RS232 Direct Connect cable. Win-Situ® 5 will recognize the instrument, and prompt the user to connect and download the data.

3. Make certain the transducer is once again logging at the 15 minute intervals, and reinsert into the stilling well, attaching the tether with the padlock. The 2 in loop ensures that the pressure transducer is lowered to the same depth from which it was retrieved.

4. Record that data retrieval was performed on the field form (**Appendix 2**).

5. Upload data to the DWQ server at this link:

U:\PERMITS\MONITORS\YEAR_wy_Data\YEAR_wy_PressureTransducerData

For more information on the data retrieval process, see the operating manual from In-situ® (**Section 12.0**)

9.5 Long-Term Deployments

For long-term deployments, changes in channel cross-sections must be taken into account. Any additional information on this will be detailed in the project-specific SAP.

10.0 DATA AND RECORDS MANAGEMENT

- The PT tracking form in **Appendix 2** should be included in the site portfolio of every site where a pressure transducer has been installed. Use this form to record installation of the pressure transducer, inspections and maintenance performed and data retrievals performed. Make note of any elevation changes for the transducer to as they need to be accounted for during the data review process.

- There is an electronic PT data tracking form (**Appendix 3**) to detail where the download transducer data is located, and where the flow measurement data is located. Any flow measurement, if performed for DWQ sampling, has a file where flow measurements are recorded. Upon returning to the office with downloaded transducer data, the file should be uploaded on the Utah DWQ server as a back-up, found at this link: **U:\PERMITS\MONITORS\YEAR_wy_Data\YEAR_wy_PressureTransducerData**

- The Win-Situ® 5 software will store the logged depths and the logged barometric pressures. In-situ® Inc.'s Baro Merge Software will compensate the logged depths for changes in barometric pressure, improving accuracy.

- The BaroTROLL® is identical to the Level TROLL® except it is deployed in air. The BaroTROLLs® record barometric pressure every 15 minutes, and should be downloaded the same way as well, at the same time as the Level TROLLs®.

- Using flow determinations and the logged depth at the time of flow measurement, a stage-discharge rating curve will be created. From the curve, an equation can be made that will allow all of the logged depths to be converted into flow estimations. Generally, flow measurements are performed each time monitors collect water samples; however, pressure transducer sites can be independent of sampling sites. If this is the case, only flow measurements need to be taken, if conditions allow.

- The monitor responsible for maintaining DWQ's gaging stations will determine the frequency at which flow measurements performed specifically for rating curve assessments/adjustments need to be performed. See **Section 9.3** for more information.

11.0 QUALITY ASSURANCE AND QUALITY CONTROL

Follow all procedures described in this SOP to ensure valid, high quality pressure transducer measurements. Follow all procedures described in DWQ's SOP for Stream Flow Measurement to ensure valid, high quality flow measurements that can be used to develop rating curves for gaged sites.

Keep up-to-date equipment maintenance records and calibration data (**Appendix 2**) with other site records to provide defense of quality data from installed pressure transducers.

12.0 REFERENCES

The In-situ® website (http://www.in-situ.com/) has Win-Situ® software updates and helpful Quick Guides, Instrument Manuals, Instruction Sheets and Technical Notes including:

- Level TROLL Operator's Manual (https://in-situ.com/us/rugged-troll-100)
- Win-Situ® 5.0 User's Guide
- Technical Note: Using Baro Merge Software
  - (https://in-situ.com/us/support/categories/software-firmware)

Freeman, Lawrence A., et al. "Use of submersible pressure transducers in water-resources investigations." *US Geological Survey, Techniques of Water-Resources Investigations* 8 (2004): A3.

Goering, T. 2008. Pressure transducer installation, removal, and maintenance. Los Alamos National Laboratory Standard Operating Procedure SOP-5227, Revision 0, Effective Date 10/28/2009. Online at http://www.lanl.gov/environment/all/ docs/qa/ep_qa/SOP-5227.pdf.

U.S. Environmental Protection Agency (EPA). 2014. Best Practices for Continuous Monitoring of Temperature and Flow in Wadeable Streams. Global Change Research Program, National Center for Environmental Assessment, Washington, DC; EPA/600/R-13/170F. Available from the National Technical Information Service, Springfield, VA, and online at http://www.epa.gov/ncea.

Yerington Mine Site. 2009. Pressure transducer water level monitoring standard operating procedure SOP-21, Revision 1, Revision Data 4/28/2009. Online at http://yosemite.epa.gov/r9/sfund/r9sfdocw.nsf/cf0bac722e32d408882574260073faed/120f26eb0d420d8b882575e1006899ae/$FILE/SOP-21r1%20Pressure%20Transducer%20Water%20Level%20Monitoring.pdf.

Related DWQ SOPs: Standard Operating Procedures for Stream Flow Measurement

13.0 FIGURES

Figure 1: Top view of installed pressure transducer.

Figure 2: View of a pressure transducer attached to a metal sign.

Figure 3: View of pressure transducer with clamped ferrules.

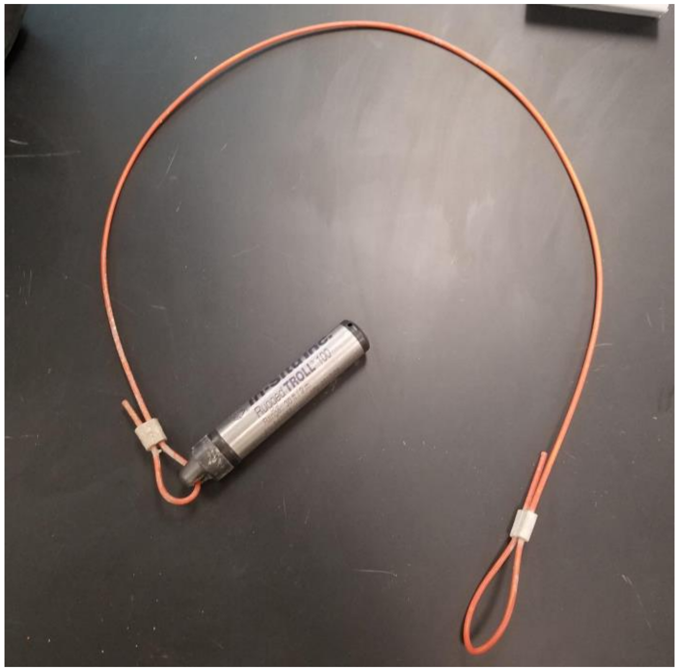

Figure 4: View of pressure transducer attached to a bridge

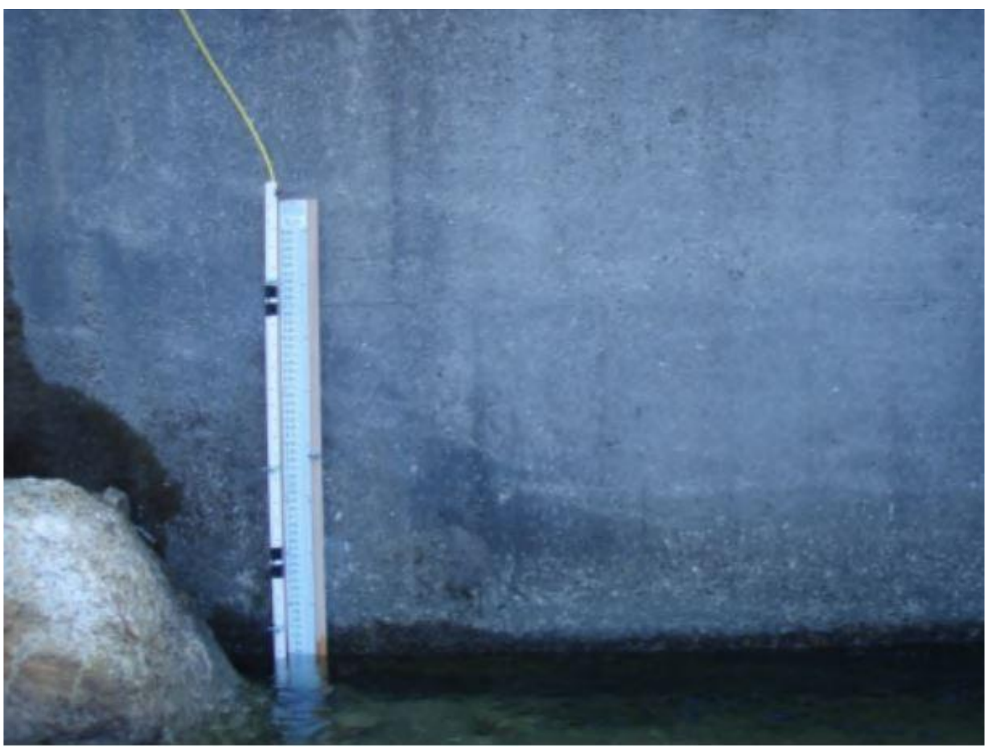

Figure 5: View of a pressure transducer attached to a tree root.

Figure 6: View of a baroTROLL® attached to a nearby tree.

Figure 7: Troubleshooting Guide. Taken from EPA, 2014.

Problem	Recommended action
Missing data	Leave blank
Stream pressure transducer was dewatered or buried in sediment for part of the deployment period	Use the plot (and temperature data, if available) to determine the period during which the problem occurred. Exclude these data when calculating summary statistics.
Recorded values are off by a constant, known amount (e.g., due to a calibration error)	Adjust each recorded value by a single, constant value within the correction period.
Drift is large and when and how much the sensor was 'off' cannot be determined (when drift occurs, the difference between staff gage or depth readings and pressure transducer readings increases over time)	The data should be removed.
Discrepancy between pressure transducer reading and discrete measurement taken during a staff gage or depth check	General rules: • If the errors are smaller than the accuracy quoted by the manufacturer and cannot be easily corrected (e.g., they are not off by a constant amount), leave the data as is, and include the data in summary statistics calculations. • If the transducer fails a staff gage or depth accuracy check, review field notes to see if any signs of disturbance or fouling were noted, and also look for notes about the quality of the gage measurement (Were flows fluctuating rapidly at the time of the measurement?). Also check whether the same time setting was used for both the transducer and gage or depth measurements (daylight savings time vs. standard time). Based on this information, use your best judgment to decide which action (leave as is, apply correction, or remove) is most appropriate.
A shift is detected and an elevation survey reveals that the stream pressure transducer has moved	Stage readings can be adjusted by adding or subtracting the difference in elevation. If the exact date of the elevation change is unknown, compare gage data to transducer data to observe any shifts. If no gage data for the time period are available, transducer data should be examined for any sudden shifts in stage. Changes in the elevation typically occur during high flows, so closely examine all data during these time periods.
The sensitivity of the pressure transducer changes with stage (e.g., the transducer is less sensitive or accurate at high stages)	Sensitivity drift can be detected by graphing the difference between transducer and staff gage readings against the gage height and plotting a linear trend line through it. A strong correlation between the data sets and a positive or negative trend line as stage increases or decreases could indicate a sensitivity shift. Based on this information, use your best judgment to decide which action (leave as is, apply correction, or remove) is most appropriate.

14.0 APPENDICES

APPENDIX 1 - SOP ACKNOWLEDGMENT AND TRAINING FORM

SOP Acknowledgement Form

This SOP must be read and acknowledged annually, and this form must be kept on file at DWQ.

Document Title:	
Document Revision Number:	
Document Revision Date:	

Please sign below in accordance with the following statement:

"I have read and understood the above referenced document. I agree to perform the procedures described in this SOP in accordance with the document until such time that it is superseded by a more recent approved revision."

Date	Printed Name	Signature

SOP Training Form

Training is required for all new samplers and Refreshers are required annually.

Trainee: Sign below to acknowledge that training on this SOP was received, understood, and all questions/concerns were addressed by the trainer.

Trainer: Sign below to acknowledge that training on this SOP was completed for the individual listed and that trainee is competent to perform the procedures described within.

Date	Trainee Printed Name	Trainee Signature	Trainer Printed Name	Trainer Signature
Management Approval				
Printed Name:				
Signature:				
Date:				

Appendix 2

Appendix 2: Example. Pressure transducer tracking form

DWQ Monitoring PT Tracking Sheet

PT or BaroTroll	PT Serial #	Battery Status%	Memory Status%	Personnel name	Date In Service	Date out of Servive	Project associated with?	Location General	Latitude	Longitude	Factory calibration date	Comments:
In-Situ Level Troll 100												

Appendix 3: Example. Pressure transducer data tracking form

Sampler Initials	Project Name	Agency	Sampling Start Date	Sampling End Date	Comments	Flow Data	Raw - PT files	Completed - Hydrolab Files	Field Coordinator QC Review		Supporting Documents
									QC Reviewer Initials	eview Completion	Comments