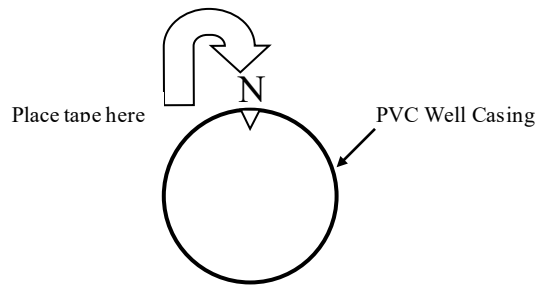


ACME, INC.
Environmental

Low Flow Sampling Procedures

1. Check and record the condition of the well for damage or evidence of tampering. Unlock the wellhead or flush-mount cap and remove the inner casing cap.
2. Measure the depth to water relative to a reference measuring point on the well casing with an electric water level indicator and record in the logbook and/or daily field sheets. Groundwater levels will be measured relative to a common elevation. A notch should be made on the top of each well PVC casing (north) for use as a monitoring reference point. If notch is unidentifiable, then use a compass to determine the northern coordinate and measure from that point. Decontaminate water level indicator with a detergent (simple green) and rinse water.

3.



4. Check the available well information for the total depth of the monitoring well. Use the information to calculate the volume of water in the monitoring well or the volume of one casing. Record information in logbook. Formula is as follows to determine one case volume:

6" PVC Casing = 0.1963 ft² for area

4" PVC Casing = 0.0873 ft² for area

2" PVC Casing = 0.0218 ft² for area

$$A = \pi r^2$$

Step one: Subtract depth to water (DTW) from the total depth (TD) of the well.
(Example: 34' (TD) – 9.67 (DTW) = 24.33)

Step two: Multiply area of PVC (0.0218) by depth (24.33) to get ft³.
(Example: 24.33 x 0.0218 = .530394)

Step three: Convert feet (ft³) into gallons (7.48).
(Example: .530394 x 7.48 = 3.9673 gallons)

Conclusion: 3.96 gallons of water in one well casing.

5. Re-check and record the depth to water approximately 5 minutes after the first check. If the measurement has changed by more than 0.02 feet, check and record the measurement again prior to purging.
6. Connect the submersible pump (Grundfos) to its converter box and plug into a generator.
7. Attach tubing to submersible pump (Grundfos) and slowly lower into the well until the pump intake is located at a depth within the screen interval. Each well will have a

different screen interval. Research prior to sampling to identify well screen interval depths. Refer to well logs for this information. Measure the depth while lowering the pump to the appropriate location in the screen interval.

8. Start pumping the well at a flow rate of 300 to 700 mL/minute. Maintain a steady flow at this rate.
9. During purging, monitor and record the pump rate and depth to water. Ideally, the rate of recharge to the well should equal the pump rate, so that no drawdown occurs (the goal for drawdown is less than 0.3 foot during purging). However, if the recharge rate is very low and the well is purged dry, the sampling team must wait until the well recharges to a sufficient level before sample collection.
10. During purging, monitor and record the water quality field parameters: pH, temperature, conductivity, turbidity, dissolved oxygen and redox-potential. Field parameters should be measured through a flow through cell. Field parameters should be measured at regular intervals (approximately every 3-5 minutes) and a minimum of seven sets of parameters collected. The stabilization criterion is based on three successive readings of the water quality field parameters, and the following criteria must be used:
 - ☐ pH +/- 0.1
 - ☐ specific conductance +/- 3%
 - ☐ ORP +/- 10mv
 - ☐ dissolved oxygen +/- 10%
 - ☐ turbidity < 10 NTUs or +/- 10%
10. Once the water quality field parameters are stabilized, sample collection can take place.
11. Maintain the same pumping rate for sampling as for purging (between 300 and 700 ml/minute) in order to minimize disturbance of the sample. Sample collection should be conducted directly from the pump tubing into sample containers. Remember to always collect sample duplicates. Sample analysis and bottles differ from project to project as well as required preservative(s) and holding time(s). Research prior to sampling.

Note: If dissolved metals is a parameter that is designated to be sampled and analyzed for, then dissolved inorganics (metals) will be collected from the discharge of an in-line, 0.45-micron filter fitted at the end of the discharge tubing.
12. Remove the intake tubing and pump from the well. Decontaminate the pump with detergent and rinse water. Dispose of the tubing. If required, dedicated tubing should be labeled with a piece of tape and placed in a plastic bag.
13. Replace cap on inner casing and lock if necessary. Close outer well cap and/or lock flush mount cap.

EQUIPMENT LIST

Field Sheets
Maps

Tables (identify sampling depths)
Sample Labels
Writing Utensils (sharpie, water proof)
Calculator
Well Keys
Tools (ratchet, wrench, screwdriver, etc., pocket knife)
Watch

Sampling Equipment

Water Level Indicator
Water Quality Meter
Sample Tubing
Grundfos Pump
Converter Box
Generator
5-gallon Buckets (2 or 3)

Sampling

Latex Gloves
Sample Containers
Preservative (if needed)
Cooler
Styrofoam Peanuts
Blue Ice (if needed to cool to 4°C)

Decontamination Equipment

Garden Sprayers or Spray Bottles
Brushes
Simple Green
Rinse Water
5-gallon Buckets (2 or 3)

Health and Safety

Latex Gloves
Hard Hat
Respirator (if needed)
Tyvek Suit (if needed)

Water

Hat/Boots
Sunscreen
Warm Clothes/Rain Gear

