

Item 5 – Adoption of Static Water Level Measurement Protocol

District staff began measuring static water levels in wells in early 2011. At that time, the District obtained a copy of the Texas Water Development Board protocol for proper measurement of static water levels in water wells equipped with or without an airline.

It appears the Board of Directors has never officially adopted a protocol for this purpose. The accuracy and consistency of well measurements taken by District staff is an absolute necessity. That being said, I asked John Seifert to develop a practical yet professional protocol for measuring water levels using both e-line and airline techniques.

The following protocols are in draft form. Please review for discussion and possible action.

Brazos Valley GCD Static Water-Level Measuring Protocol

Static water levels are measured in many wells each month as part of the water-level measuring program to evaluate the response of the aquifers to groundwater pumping. The pumping varies in amount and spatial distribution each month. The proposed water-level measuring protocol is for water levels measured with an electric line, sometimes referred to as an electric sounder, and an airline.

E-line Measuring Procedure

1. The well should be at as close to stable water-level condition as possible when taking a static water-level measurement. The well where that static water level is to be measured should not be pumped for 24 hours prior to taking the static water-level measurements, if possible. If the well has been pumped less than 24 hours prior to taking the water-level measurement, make note of how long the pump had been off prior to taking the measurement.

In areas of concentrated pumping, such as municipal or industrial well field or irrigation, note and record whether any wells screening sands in the same aquifer and located ½-mile or less from the measured well are pumping. Record the identifier for the well or wells pumping.

2. Identify a port or opening in the pump discharge head or in the pump foundation (surface casing vent pipe) that provides access for the e-line to the annulus between the surface casing and the pump column assembly.
3. Measure and record the height of the opening above ground level and this will become the measuring point. If possible, this measuring point should be used each time the water level is measured in the well for consistency of measurements.
4. Prior to taking the water-level measurement, review previous water-level measurements to get an idea of how deep the water level may be encountered.
5. Lower the e-line into the annulus until the e-line signals it has encountered the water level in the well. Retract the e-line about one foot above where the e-line signaled and slowly lower again until the water level is encountered again. Record that the water level is being measured with an electric line.
6. Mark the wire on the e-line at the opening and measure the water-level depth on the e-line wire to the nearest 0.01-foot.
7. Retract the e-line about 5 feet, wait five minutes and repeat the process to ensure an accurate reading has been made. If both measurements are not within 0.05-foot of each other, record both.

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8. Compare the reading with previous water-level measurements and verify a reasonable measurement has been obtained.
9. Record date and time of measurement, pumping conditions (Item 1.) and measurement height (Item 3.).
10. Retract the e-line from the well and clean for the next use.
11. Replace cap on port in discharge head or any other openings used to gain access to the well.

Airline Measuring Procedure

1. The well should be at as close to stable water-level condition as possible when taking a static water-level measurement. The well where that static water level is to be measured should not be pumped for a minimum of 24 hours prior to taking the static water-level measurements, if possible. If the well has been pumped less than 24 hours prior to taking the water-level measurement, make note and record how long the pump had been off prior to taking the measurement.

In areas of concentrated pumping, such as municipal or industrial well field or irrigation, note and record whether any wells screening sands in the same aquifer and located ½-mile or less from the measured well are pumping. Record the identifier for the well or wells pumping.

2. Prior to taking the water-level measurement, review previous water-level measurements to get an idea of how deep the water level may be encountered and records showing the depth setting of the airline.
3. Measure the height of the pump foundation as this is typically where the airline setting depth is measured from.
4. Check and record depth of airline setting below ground level.
5. If well equipped with a submersible pump, check whether the pump is in operation (if there is any vibration of the pump discharge pipe, the pump is in operation).
6. Use an air or nitrogen source with adequate pressure to blow air out the bottom of the airline.
7. Open the valve on the air supply.
8. Attached the air hose nozzle to the valve on the airline.

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9. The needle on the pressure gauge should rise to the approximate pressure of air supply or pressure at bottom of airline as the water has been purged from the bottom of the airline.
10. Remove the air hose nozzle and the needle on the pressure gauge will slowly descend and stabilize at the static water-level pressure. If this does not occur, have a spare, quality pressure gauge available that can be installed and used on a temporary basis.
11. Record the measurement from the pressure gauge. The pressure gauge may provide readings of pressure in pounds per square inch (psi), feet of water or both. The recorded measurement should be in feet of water. If the pressure gauge only has psi readings, multiply the psi reading by 2.31 to convert the reading to feet of water. Record that the water level is being measured with airline.
12. The recorded measurement in Item 10. is how many feet of water is above the bottom of the airline. Subtract the measurement from the depth setting of the airline to convert the measurement to depth to water from land surface. (Example: If airline is installed to a depth of 400 feet and the pressure gauge reading is 150 feet above the bottom of the airline, the depth to water from land surface is $= 400' - 150' = 250'$ below land surface.
13. Repeat steps in Items 6.-11. to ensure an accurate measurement has been obtained.
14. Compare the reading with previous water-level measurements and verify a reasonable measurement has been obtained.
15. Record date and time of measurement, pumping conditions (Item 1.) and measurement height (Item 3.).