Brazos Valley GCD
E-line Measuring Protocol

1. The well where the water level is to be measured should not be pumped for 24 hours, if possible, prior to taking the water-level measurements. If the well has been pumped less than 24 hours prior to taking the water-level measurement, record in the official record how long the pump has been off prior to taking the measurement, if known. Confirm and indicate in the official record that no non-exempt well completed in the same aquifer within a ½ mile radius to the well being measured is being actively pumped at the time of taking the water-level measurement. Unless this can be confirmed, no water-level measurement should be taken. Obtain permission to collect measurement at a later time.

2. If well is equipped with a submersible pump, confirm and record in the official record that the pump in not in operation. Unless it is determined that the pump in not operational, no water-level measurement should be taken or recorded. Obtain permission to collect measurement at a later time.

3. 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, water-level measuring pipe or open casing if the well is not equipped with a pump.

4. Measure and record the height of the opening above ground level and this will become the measuring point. Describe the measuring point in the official record for the well, and use the same measuring point each time when measuring the water level. If not possible, record the height of the measuring point above land surface each time the water level is measured.

5. Prior to taking the water-level measurement, review previous water-level measurements to estimate the current water level depth.

6. Turn on power to the e-line and adjust sensitivity of sound meter to about halfway. If light used to detect water level, no need to adjust sound level.

7. Lower the e-line into the well 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 water encountered and slowly lower again until the water level is encountered again.

8. Hold the electric line with a fingertip at the measuring point when the water is encountered. Using the 0.01 feet markings on the electric line, determine depth to water to the nearest 0.01 of a foot and record in the official record.

9. Retract the e-line about 5 feet, wait five minutes and repeat the process to ensure an accurate reading has been made of a stable water level. If both measurements are not within 0.05-foot of each other, note in the field log and schedule for water-level measurement at a future date.

10. Subtract the measuring point height from the measured depth to water obtained in Step 8 to determine depth of water from land surface, and record in the official record.

11. Record date and time of measurement.

12. Retract the e-line from the well and clean the lower 20 feet with Clorox bleach wipes, bleach wipes with an equivalent percentage sodium hypochlorite or a minimum 0.5% sodium hypochlorite solution (NaOCl and water) prior to measuring the water level in the next well.

13. Replace cap on any port in discharge head or casing. Leave the well and pump in same condition as observed on arrival.

Brazos Valley GCD
Airline Measuring Protocol

1. The well where the water level is to be measured should not be pumped for a minimum of 24 hours, if possible, prior to taking the water-level measurement. If the well has been pumped less than 24 hours prior to taking the water-level measurement, record in the official record how long the pump had been off prior to taking the measurement. Confirm and indicate in the official record that no non-exempt well completed in the same aquifer within a ½ mile radius to the well being measured is being actively pumped at the time of taking the water-level measurement. Unless this can be confirmed, no water-level measurement should be taken. Obtain permission to collect measurement at a later time.

2. Prior to taking the water-level measurement, review previous measurements regarding how deep the water level may be encountered and records showing the depth setting of the airline.

3. Measure and record the height of the base of the pump discharge head above ground level, and this will become the measuring point. Describe the measuring point in the records for the well, and use the same measuring point each time when measuring the depth to water.

4. Determine the manufacturer of the gauge to be used, the serial number, and the date last calibrated. Record this in the official record.

5. Check and record depth of airline setting below ground level or below pump base based on air line setting data from well owner and/or pump setting contractor.

6. If well is equipped with a submersible pump, confirm and record in the official record that the pump is not in operation. Unless it is determined that the pump is not operational, no water-level measurement should be taken or recorded. Obtain permission to collect measurement for a later time.

7. Use an air or nitrogen source with adequate pressure to blow air out the bottom of the airline.

8. Open the valve on the air supply.

9. Attach the air hose nozzle to the valve on the airline.

10. The needle on the pressure gauge should rise to the approximate pressure at bottom of airline as the water has been purged from the bottom of the airline.

11. Remove the air hose nozzle, and then the needle on the pressure gauge will slowly descend and stabilize at the current 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. Repeat Steps 7-10.

12. Record the measurement from the pressure gauge in units provided on the gauge. If the pressure gauge only has psi readings, multiply the psi reading by 2.31 to convert the reading to feet of water.

13. The recorded measurement in Item 12 is how many feet of water are above the bottom of the airline. Subtract the measurement from the depth setting of the airline to convert the measurement to depth to water below land surface. (Example: If airline is installed to a depth of 400 feet below land surface and the pressure gauge reading is 150 feet above the bottom of the air line, the depth to water from land surface is = 400'-150'= 250' below land surface). If the air line setting is depth below the pump base, subtract the measuring point from the depth to water reading to calculate depth to water below land surface.

14. Only record data if the air gauge pressure holds constant for five minutes.

15. Record date and time of measurement.

Brazos Valley GCD
Steel Tape Measuring Protocol

1. The well where the water level is to be measured should not be pumped for 24 hours, if possible, prior to taking the water-level measurements. If the well has been pumped less than 24 hours prior to taking the water-level measurement, record in the official record how long the pump has been off prior to taking the measurement, if known. Confirm and indicate in the official record that no non-exempt well completed in the same aquifer within a ½ mile radius to the well being measured is being actively pumped at the time of taking the water-level measurement. Unless this can be confirmed, no water-level measurement should be taken. Obtain permission to collect measurement at a later time.

2. If well is equipped with a submersible pump, confirm and record in the official record that the pump is not in operation. Unless it is determined that the pump is not operational, no water-level measurement should be taken or recorded. Obtain permission to collect measurement at a later time.

3. Identify a port or opening in the pump discharge head or casing or in the pump foundation (surface casing vent pipe) that provides access for the steel tape to the annulus between the surface casing and the pump column assembly, water-level measuring pipe or open casing if the well is not equipped with a pump.

4. Measure and record the height of the opening above ground level and this will become the measuring point. Describe the measuring point in the official record for the well, and use the same measuring point each time when measuring the water level. If not possible, record the height of the measuring point above land surface each time the water level is measured.

5. Prior to taking the water-level measurement, review previous water-level measurements to estimate the current water level depth.

6. Use carpenter's chalk to coat the lowest 15-30 feet of the steel tape.

7. Lower the steel tape in the annulus between the pump column and casing, down the open casing if not equipped with a pump or down a water-level measuring pipe until the depth of the tape is 10 feet lower than the last recorded water level. Record the length of tape installed in the well with the footage marker exactly at the measuring point. Refer to this length as the "hold". Retract the steel tape and record the length of the tape to the nearest hundredth of a foot that is wet. This measurement is called the "cut". Record both measurements. Remove the wet chalk on the tape.

8. Wait 5 minutes after initial measurement, re-chalk tape and lower the tape 1-2 feet deeper than the hold depth for the previous measurement. Retract the tape and record the cut length. Subtract the cut length from the hold length to calculate the depth to water. The difference between the two measurements should be no greater than 0.02 feet. If the

difference in depth to water is greater than 0.02 feet, note in the field log and schedule for water-level measurement at a future date.

9. Subtract the measuring point height from the measured depth to water to obtain depth of water below land surface and record in the official record.

10. Record date and time of measurement.

11. Remove the chalk from the steel tape and clean the lowest 30 feet with Clorox bleach wipes, bleach wipes with an equivalent percentage sodium hypochlorite or a minimum 0.5% sodium hypochlorite solution (NaOCl and water) before measuring the water level in another well.

12. Replace cap on any port in discharge head or casing. Leave the well and pump in same condition as observed on arrival.

Brazos Valley GCD
Pressure Transducer Utilization Protocol

1) Select and purchase all equipment best suited for long term monitoring needs. The equipment needed for the transducer includes pressure transducer, cable, adapters for computer and software.

2) Install manufacturer supplied software to computer(s) that will be used to interface with the transducers.

3) Install transducer onto cable and follow manufacturer's instructions.

4) Use an open-ended pipe perforated at its bottom and extending to at least the transducer setting or open casing void of a pump to provide protective housing for the transducer.

5) Measure the water level in the water-level measuring pipe or open casing with a steel tape following the steel tape measuring protocol.

6) Connect transducer cable to computer allowing software to establish signal to transducer.

7) Input correct settings for data recording task. Start with a data collection frequency of one measurement per hour. After signal established and transducer programmed, disconnect transducer from computer.

8) Install transducer in well at a depth deemed suitable to capture all anticipated water levels. Secure transducer and cable following manufacturer's recommendations to keep unit stable. Reconnect transducer to computer and program the pressure transducer so that water level measured is the same as the water level measured with the steel tape. Use ground level as the depth datum.

9) Record water level data for two months and download data. Measure water level in the well with a steel tape and record depth to water. Compare depth to water measured with the steel tape with the depth to water measured with the pressure transducer. Record both readings in the official record. Both readings should be within 1.0 foot of each other.

10) If pressure transducer and steel tape depth to water measurements are within 1.0 foot of each other after the first two months of data collection, record measurements in the official record and resume data collection. Repeat Step 9. If the water level measurements are not within 1.0 foot of each other, recalibrate or replace transducer and reinstall the recalibrated or new transducer. Record the transducer equipment change and any transducer depth setting change in the official record.

11) Program transducer to collect water-level data at least once per day and resume data collection. Repeat Steps 9 and 10.