STANDARD OPERATING PROCEDURE
Obtaining Well Water Samples

KEY WORDS

Well site selection, well site criteria, permission, purging, preservation, storage, groundwater, sampling

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1.0 INTRODUCTION

This Standard Operating Procedure (SOP) provides instructions for selecting wells for sampling, obtaining well owner's/tenant's (well user's) permission to sample, purging wells prior to sampling, and collecting and preserving water samples.

2.0 MATERIALS

2.1 Documents

2.1.1 A copy of this and other appropriate SOPs:
- 2.1.1.1 QAQC005
- 2.1.1.2 QAQC011
- 2.1.1.3 EQWA002
- 2.1.1.4 FSWA007
- 2.1.1.5 ADMN006

2.1.2 A copy of the study protocol
2.1.3 Study Letters
2.1.4 Well driller's log (if available)
2.1.5 Maps of the area to be sampled
2.1.6 Field Safety Contact Information Sheet which includes phone numbers for your supervisor, other teams, and the Department of Pesticide Regulation (DPR) Human Resources Branch (HRB)
2.1.7 DPR permission form to sample well (Appendix 1) in English and Spanish
2.1.8 DPR groundwater brochures ("Your Water–Our Commitment to Safety") in English and Spanish
2.1.9 DPR Field Safety Manual

2.2 Supplies

2.2.1 Plastic bags (at least 18 in by 24 in) for groundcover
2.2.2 Replacement Schrader valves
2.2.3 Fittings for sampling ports
2.2.4 Replacement Schrader valve core stems
2.2.5 Schrader valve core stem remover
2.2.6 Schrader valve sampling tube
2.2.7 Locking pliers to secure Teflon tube to Schrader valve while sampling
2.2.8 5/16 and 7/16 box end wrenches for replacing Schrader valve if needed
2.2.9 Teflon tape
2.2.10 Sample containers (usually 1 L amber glass bottles)
2.2.11 Deionized or distilled water for field blanks and equipment rinses (refer to section 3.10)
2.2.12 Sample Packs created following SOP QAQC005
2.2.13 1 half-pint Mason jar
2.2.14 pH meter
2.2.15 Preservative, if necessary (refer to section 3.13)
2.2.16 Ice chests
2.2.17 Ice (refer to section 3.2.4)

2.2.18 Chain of Custody form (Appendix 4)
2.2.19 Well information sheet (example in Appendix 2)
2.2.20 Digital camera
2.2.21 Global Positioning System (GPS) unit
2.2.22 Water level meter
2.2.23 Measuring wheel
2.2.24 Rangefinder
2.2.25 Extra sample bottles
2.2.26 Nitrile gloves (in sizes appropriate for sampling crew)
2.2.27 Tool box which has checklist
2.2.28 Fittings for sampling
2.2.29 Ladder
2.2.30 Garden hose
2.2.31 Bucket
2.2.32 Alcohol for cleaning tubing

3.0 PROCEDURES

3.1 Training

All staff will be trained during on-boarding; thereafter, all staff will review this SOP annually. Supervisors will maintain a record of training and SOP reviews.

3.2 Pre-Study Considerations

3.2.1 Number of Wells to Sample

The total number of wells to sample in an area will be included in the study protocol. The number of wells that can be sampled on a single trip will be based on several factors that include: the number of days the crew will devote to sampling, the size of the area to be covered, the anticipated availability of wells in the area, the number of sample bottles collected from each well site, and the number of ice chests that can fit into the vehicle.

3.2.2 Number of Samples to Collect

Quantity of samples collected are dependent on the analyte that is under evaluation and the type of study that is being performed. Refer to the study protocol or laboratory specification sheet to determine the number of samples that are required to be collected for each analyte per well in the study. Unless otherwise specified, a minimum of two replicate samples (one primary and one back-up sample) and a field blank sample should be collected for each set of analyses per well site.

3.2.3 Preparing Sample Packs and COCs

Prior to leaving, sample packs and COCs should be prepared per SOP QAQC005, and with consideration for the estimated number of wells and samples to collect.

3.2.4 Ice

Generally, bagged ice is best; however, ice packs can be used as a substitute depending on the circumstances upon the selected type of sample containers, the volume of water in the container, the required sample storage temperature during transportation to the laboratory, and the method of transportation (ground or airfreight). **Do not use dry ice with liquid water samples.**

3.3 Obtaining Permission to Sample a Well

You must obtain the well user's permission to collect samples before beginning any part of the sampling procedure, including evaluating the suitability of the well.

3.3.1 Introduce yourself and explain the project. Give the person at the sampling location a copy of DPR's groundwater brochure, "Your Water–Our Commitment to Safety," with your business card attached.

3.3.2 Determine if the person at the location is the person who occupies the land in question and/or has the right to access/use the well (well user: can be a homeowner, renter, manager, company owner, etc.).

3.3.2.1 Only the well user may give you permission to sample their well.

3.3.2.2 If the occupant is not in possession of the well and the land, ask them for the well user's contact information and contact the well user.

3.3.3 Review the Well Sampling Permission Form (Appendix 1) with the well user.

3.3.3.1 If the well user permits you to sample a well located at their location, obtain both the well location and the user's mailing address.

3.3.3.2 If the user permits you to sample the well but is not available or declines to sign the form, note this on the permission form (i.e., "John Doe, Verbal permission by phone, 01/01/2022, 3 PM").

3.3.4 Ask the well user if they would permit you to take photos of the well and sampling port.

3.3.5 Ask if you are permitted to replace the Schrader valve should this be necessary to prevent leaks following sampling (see section 3.7.2). You should also receive permission before proceeding with the repairs. Components should only be replaced in extenuating circumstances and ALWAYS with permission.

3.3.6 Fill out the Well Information Sheet (Appendix 2) with the following information, if it is obtainable:

3.3.6.1 The last name of the well user

3.3.6.2 Year the well was drilled

3.3.6.3 Well depth (drilled and standing water)

3.3.6.4 Depth to the first perforations in the well casing

3.3.6.5 Previous well sample results

3.3.6.6 The proximity of other wells (if any) on the property

3.4 Selecting Suitable Wells for Sampling

3.4.1 Well Condition

3.4.1.1 For an ideal sample, the aboveground equipment and concrete pad should be in good condition (Figure 1). Wells with minor cracks in the pad are acceptable as long as they do not affect the integrity of the well. Wells without pads are acceptable if they are sealed well around the casing and meet the other criteria in this SOP for a suitable well site.

3.4.1.2 Wells that have missing well caps, openings and/or water running into the wellhead, have large cracks in the pad, pesticides or other chemicals stored near the wellhead, are generally not ideal (Figure 2, Figure 3). If the well is sampled, be sure to note the concerns on the well information sheet.

3.4.1.3 Generally, wells located within 100 feet of a pesticide mixing or loading site are not acceptable. Great care should be taken when sampling wells with chemigation tanks; samples should be taken from a port behind (on the wellhead side of) a backflow preventer. If a chemigation tank is present, this should be noted on the well information sheet along with a list of pesticides that have been used in the chemigation system.

3.4.2 Well Depth

3.4.2.1 Shallow wells are preferable to deep wells. Generally, domestic wells are shallower and are generally sealed more carefully than irrigation wells.

3.4.2.2 Domestic wells are less likely to contain contaminants often introduced by the lubrication systems found on turbine pumps that power public water systems and irrigation wells.

Figure 1. An example of a well with aboveground equipment and concrete pad in very good condition.

Figure 2. An example of a well in very poor condition. Note the severely cracked pad and gap at the casing. This well should not be sampled due to the potential for point-source contamination from surface water runoff.

Figure 3. An example of a highly undesirable well site. Note the clutter around the well, much of which is old pesticide containers. This well should not be sampled due to the potential for point-source pesticide contamination.

3.4.3 Well Operation

3.4.3.1 Wells that operate regularly are preferable to those that are operated occasionally. Wells that are run regularly allow for a greater possibility that fresh water is being withdrawn from the aquifer. In addition, regularly operated wells are generally in better condition and less likely to introduce contaminants into a well sample.

3.4.4 Sample Port Location

3.4.4.1 A sample port located between the pump and the storage tank is highly preferable to one located after/downstream of the storage tank (Figure 4). The airspace and the temperatures that exist within the storage tank can cause pesticides to degrade more rapidly than they would in groundwater. Consequently, a sample from the tank may not provide an accurate measurement of the pesticides that might be present in the aquifer. Do not sample from a port downstream of the tank unless the tank is a fixed bladder tank (no air-water interaction in a fixed bladder tank, see section 3.4.7.2). If a water softener or a filter are present, make sure the sampling port is before any of this equipment.

3.4.4.2 Examine the system carefully (Figure 5) to understand the direction of flow to determine which potential sample ports are before the tank and before any water treatment, such as chlorination or water softening.

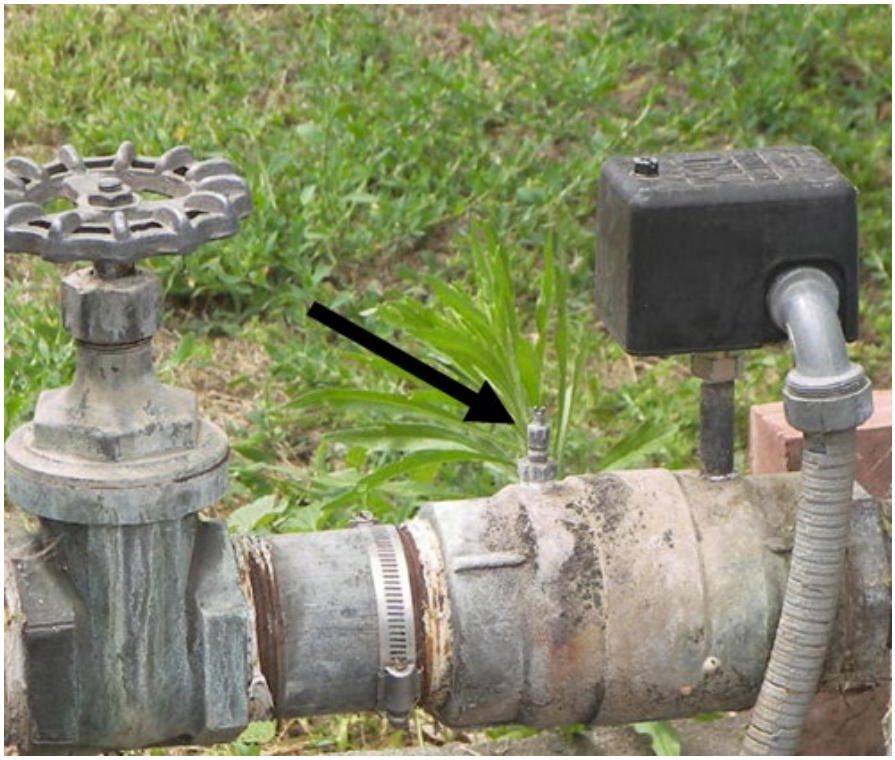

Figure 4. Schrader valve sampling port in between the pump and storage tank.

Figure 5. Locating the sampling port is not always easy. In this case, a faucet outside the shed wall to the right (not shown) could be used as the sample port as long as the proper valves were opened, negating the need to collect samples through the Schrader valve.

3.4.5 Sample Port Type

Determine the type of sample port you will be using. Sample port types include Schrader valves, discharge pipes, faucets, or petcocks.

3.4.5.1 Schrader Valves

The Schrader valve (Figure 6) is typically associated with pressure tanks. The Schrader valve is the same type of valve you will find on a car or bike tire. It is normally closed until you press down on the valve to open it. The Schrader port usually is located on the backflow valve on the inlet side. This means that on a properly functioning backflow valve, you will only be able to sample while the pump is running.

3.4.5.2 Faucets

Being able to sample from a faucet (Figure 7) is dependent on the location and tank type. You can sample from any tank type with a faucet as long as it is between the well and the tank.

3.4.5.3 Pressure Relief Valves

You can also sample from the pressure relief valve (Figure 8). This is typically found directly on top of the pump and is designed to open if the well pump pressure gets too high. They have a lever on top to operate them, but only function when the pump is running.

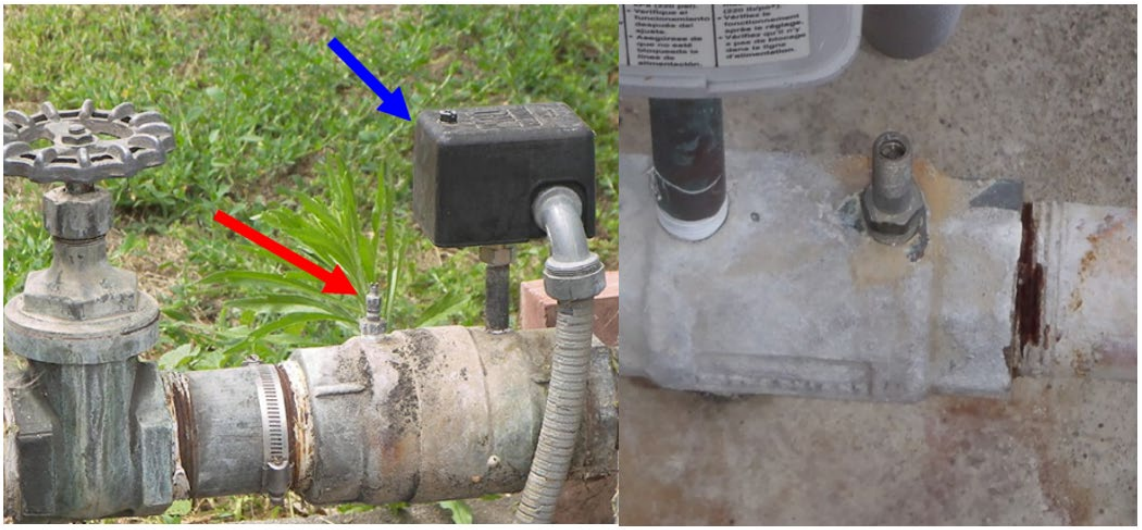

Figure 6. A Schrader valve sampling port (red arrow) and an electrical points box (blue arrow) installed on a backflow valve.

Figure 7. Examples of faucets.

Figure 8. A pressure release valve.

3.4.6 Well Pump Type

The type of well pump may determine the availability of a suitable sample port. Some well systems, particularly wells with jet pumps or unpressurized storage tanks, rarely have sample ports before the tank.

3.4.6.1 Submersible pump

With a submersible pump (Figure 9), the entire pump is submerged in the well casing. A typical sample port will be a Schrader valve. The majority of domestic wells we encounter have this setup. The pump pushes water up from within the well and out through a pipe in the cap. The only aboveground components visible with this setup are the outlet pipe and power lines to the pump. Because the motor/pump assembly is located within the casing, this is a very quiet running system that makes it ideal for domestic settings. Many times, when sampling from this type of system, you will have to feel the outlet pipe or check the points to determine if the pump is running.

3.4.6.2 Turbine pump

Turbine pumps (Figure 10) can be found in both agricultural and domestic well systems. Turbine pumps consist of an external motor connected to a shaft that spins impellers deep in the well. Domestic turbine pumps can look similar to jet pumps on the surface, but the motor is vertical instead of horizontal in a jet pump setup. Turbine pumps can also draw water from very deep wells.

Some large turbine pump setups can have an external lubrication system for the motor. This oil tank is not to be confused with a chemigation system (Figure 11). This oil is only used to prolong the life of the motor and there is no oil/water interaction, so sample integrity will not be compromised.

3.4.6.3 Jet Pump

Jet pumps (Figure 12) are usually used for wells with shallow depth to water. These set-ups are usually limited to water depths no more than 25 ft. deep. Jet pumps may be positioned vertically over the well casing, appearing similar to a small turbine pump.

Jet pumps contain an impeller type pump attached to an electric motor located aboveground. They have one pipe going down into the well and an outlet pipe that is connected to the tank. Sampling from jet pumps can be tricky because they may not contain an in-line sample port before the tank. Jet pumps often do not have a sample port before the tank; allowing air into the line may break the vacuum needed for the pump to function. Because jet pumps are for shallow wells, make sure that they are pumping groundwater and not connected to a surface water system. Extreme caution must be exercised to ensure the jet pump is pumping water directly from the well and not from a storage tank.

Figure 9. Examples of submersible pumps.

Figure 10. Examples of turbine pumps.

Figure 11. Oil tank for a turbine pump, not to be confused with a chemigation system.

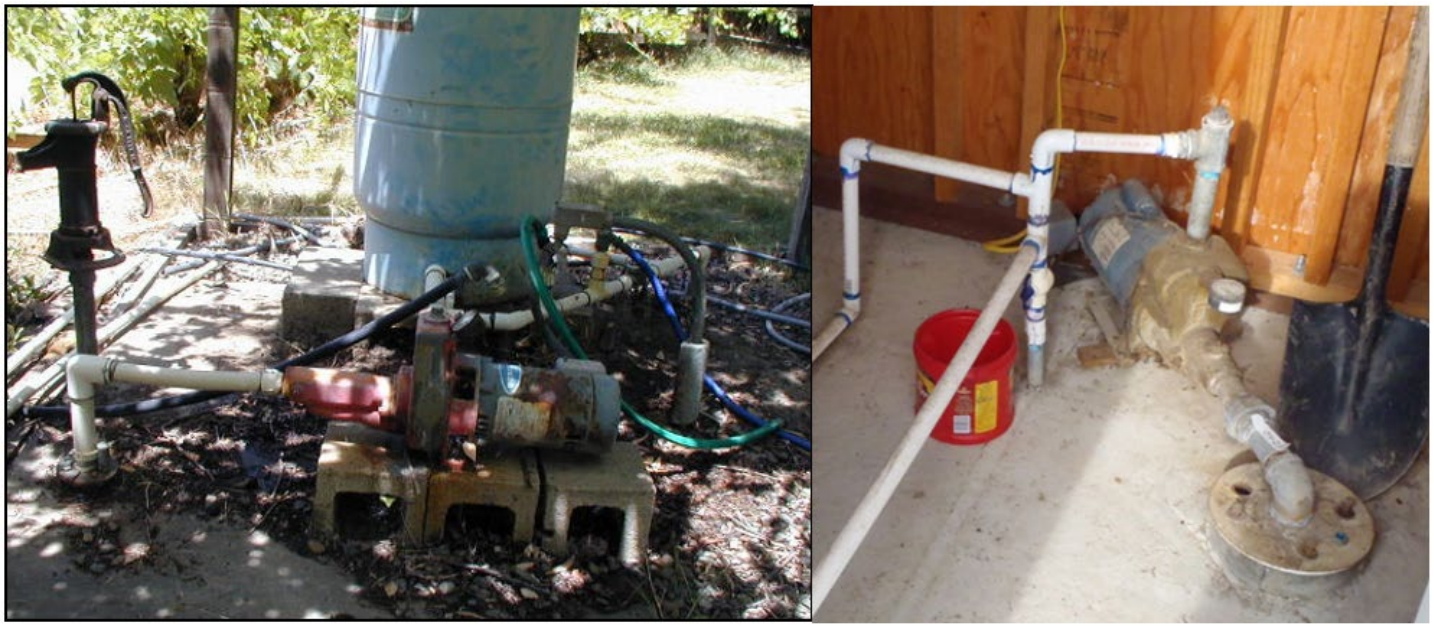

Figure 12. Examples of jet pumps.

3.4.7 Storage Tank Type

The combination of the storage tank type and sample port chosen will determine the sampling procedure to follow.

3.4.7.1 Pressure Tank

Typically, pressure tanks (Figure 13) are a gray galvanized color, but sometimes they are painted. Pressure tanks are usually larger compared to fixed bladder tanks.

A good way to recognize a pressure tank is by locating the separate inlet and outlet pipes. Pressure tanks rarely have faucets before the tank but often have a Schrader valve in the backflow preventer; this is the best spot to sample. The best practice is to collect samples from a port before the tank because water and air can mix inside of pressure tanks, which could introduce airborne pesticides into the tank water, possibly contaminating the sample, and because pesticides can degrade while the water is stored in the tank.

3.4.7.2 Fixed Bladder Tank

Fixed bladder tanks (Figure 14) are typically blue, tan, or white in color and can range in size from small to large. Fixed bladder tanks have only one pipe going in and out of the tank. An internal membrane prevents air/water mixing. Thus, we can take samples after the tank without risk of contamination. Most of the time, fixed bladder tanks will not have a Schrader valve, and sampling will most likely be done from a nearby faucet while the pump is running.

3.4.7.3 Unpressurized Tank

Unpressurized tanks (Figure 15) are typically used for additional water storage; they usually use additional pumps or gravity to remove the water from the tank. Unpressurized tanks mix water and ambient air, thus you should always sample at a port before the tank to prevent contamination.

If you are sampling from a well with an unpressurized storage tank or a standpipe (Figure 16), sample the groundwater before it enters the storage tank. If there is no port available, keep in mind the DPR Field Safety Manual (FSM) classifies an unpressurized storage tank as a confined space.

If the unpressurized tank is full you risk overflowing the tank and flooding the surrounding area. This can be troublesome because the tanks are often located next to a field.

Understand that forcing the well to turn on by lifting the float valve can cause the well to no longer turn off or on properly. Before leaving, ensure that the well can turn on and off.

Figure 13. Example of a pressure tank. The faucet on the right is being used to keep the pump running. The faucet on the left is the best sample port.

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Figure 14. Examples of fixed bladder tanks. Note that there is only one pipe connected to the tank itself. Samples can be collected from the faucet on the left after the hose has been removed.

Figure 15. Example of unpressurized storage tanks. Samples were collected from the inflow into the tank from the small pipe going up the side and entering at the top by reaching inside the tank through the access port.

Figure 16. Sampling from a well discharge pipe into a standpipe. Extreme care is required to prevent dropping a bottle while sampling. The force of the water exiting the discharge pipe can be very high.

3.5 Taking a Water Level Measurement

Note: Only take this measurement when the pump is not running, ideally before the pump has been turned on for the day. Static water level is the depth of the water in the well when the pump is off long enough for the aquifer to return to its normal level. A good time to measure static water level is early in the morning before water is used. This will usually not be possible. Thus, take this measurement before purging the well, taking the sample, opening faucets, or starting the pump. Note on the well information sheet if the pump has been on.

3.5.1 Start by carefully checking to see if you can remove the test port plug on the cap of the well (Figure 17a). This plug can be made out of metal or plastic. With the metal plugs, they can be rusted in place making extraction almost impossible without damaging something. For the plastic plugs, they can get very brittle over time to the point that if you try to remove them they will crumble apart. If in doubt, do not try to remove the plug.

3.5.2 Next, you will need to calibrate the meter by setting the temperature for the particular region and month for which you are sampling; there is a document in the case that will provide this information. Set the temperature with the toggle switches on the front of the meter.

3.5.3 Unless the depth to water is over 500 ft., keep the depth switch set to normal. To use, remove the protective red cap covering the probe end of the meter. Insert the metal probe into the test port on the top of the well casing (Figure 17c). To take a reading, push the red button on the front of the unit. This will send out pulses of air for

approximately 5 seconds and return a reading. Record this reading on the well information sheet.

3.5.4 When finished, replace the protective cap on the meter probe and put the plug back into the test port on the well cap.

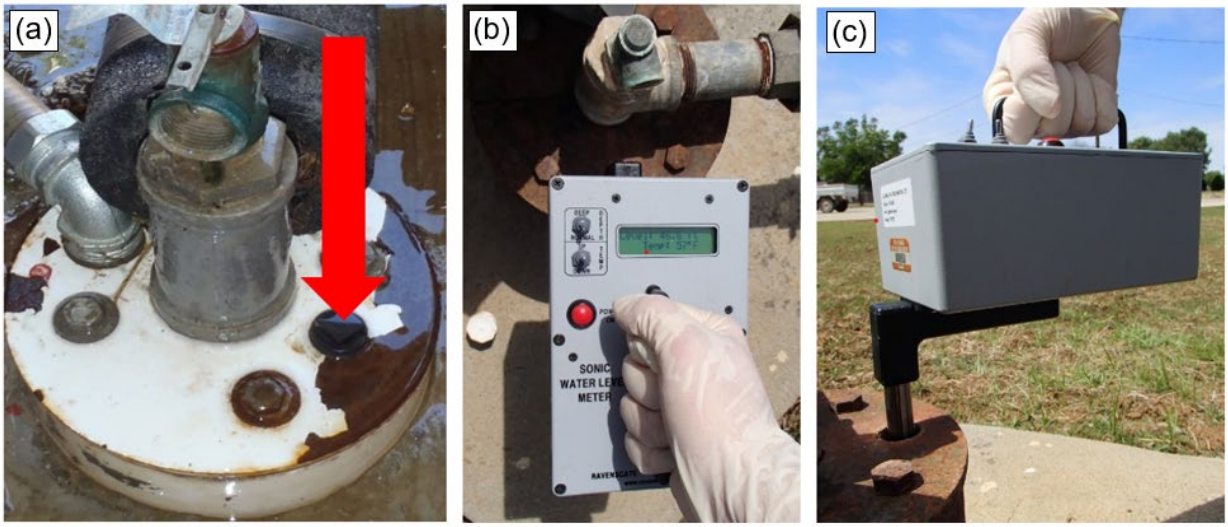

Figure 17. Using the water level meter. (a) Location of the test port on the well cap, (b) Top view of water level meter in use, (c) side view of water level meter in use.

3.6 Purging the System

3.6.1 Purging

Purging is required before collecting any samples. Purging eliminates standing water from a well and allows the system to recharge with water from the aquifer. Purge system to achieve parameter stabilization. If you cannot purge to stabilization (malfunctioning meter, etc.), purge the well for 10 minutes according to 3.6.3. To expedite the process of purging, ensure the well tank is emptying at the same rate as the pump is refilling. This can be achieved by opening adequate faucets around the property and monitoring the pressure gauge on the storage tank. If the output is equal to the inflow, the gauge will hold at a steady level below the pump's shutoff pressure.

3.6.2 Purging to parameter stabilization

When purging to achieve parameter stabilization, the parameter data should be collected from the port in which you intend to sample, or a nearby in-line port. The procedures below were developed based on the guidelines in the National Field Manual for the Collection of Water-Quality Data (USGS, 2006).

3.6.2.1 Parameter stabilization using a single-read pH/Total Dissolved Solids (TDS) /temperature meter

Allow water to flow continuously out of the port. Collect one half-pint jar of water every 3 minutes and use meter to record pH, TDS, and temperature on the Well Information Sheet. When the parameters remain stable (pH within 0.1 standard units, Temperature within 0.2 °C, and TDS within 5%) for three consecutive

readings, the sample can be collected. The pump should be actively running when the sample is collected.

3.6.2.2 Parameter stabilization using a continuous read multi-parameter meter

Place stainless steel bucket near collection port and direct water to fill bucket with the hose outlet at the bottom of the bucket. Place meter in bucket. Allow the bucket to overflow with water while the well is purged. Record one measurement each of pH, TDS, and temperature every minute on the Well Information Sheet. When the parameters remain stable (pH within 0.1 standard units, Temperature within 0.2 °C, and TDS within 5%) for five consecutive readings, the sample can be collected. The pump should be actively running when the sample is collected. Save the full, continuous log of parameters to the meter's internal computer and download when you return to the office.

3.6.3 10-Minute Purge

If the well cannot achieve parameter stabilization, purge the well for 10 minutes. Document this on the Well Information Sheet. In this case, purge time is based on the number of minutes the pump actually runs. If the pump cycles on and off during the purging process, be sure to keep account of and record the total time the pump is running. If the well is already running when the crew arrives at the well, the time the well has been running may be applied to the required purging time. The pump should be actively running when the sample is collected.

3.7 Preparing a Schrader Valve Sample Port for Sample Collection

3.7.1 Do not touch any electrical components, shut off power at the circuit/switch box, or interrupt the points in the point box. If you cannot safely sample without interacting with the electrical system, do not sample.

3.7.2 Replacing a Schrader Valve

3.7.2.1 Unless the existing Schrader valve (Figure 18) is relatively free of corrosion or deposits it may not reseat after sampling. The best practice is to replace the entire Schrader valve to prevent leakage. When replacing the Schrader valve, use the Teflon tape to wrap the threads to prevent leaking, and take care not to strip the threads. See Appendix 8 for more detail.

3.7.2.2 DPR staff must obtain permission from the well user prior to replacing a Schrader valve or making any other changes to the well.

3.7.2.3 First, determine if the Schrader can be removed without causing any damage to the well or valve.

3.7.2.4 Make sure the pump is not running and will not turn on during replacement.

3.7.2.5 Next find the correct size box wrench and remove the bad valve.

3.7.2.6 On the new Schrader, apply Teflon tape to the threads clockwise from the bottom.

3.7.2.7 Reinstall the new Teflon taped Schrader valve. Tighten until it is snug in the hole. Turn the pump back on and check for leaks.

3.7.3 Use a ballpoint pen, or any pointy object, to push on the center of the valve to check. If a little water comes out, the valve is good to sample from.

3.7.4 Confirm that the pump is off.

3.7.5 With the pump off, attach the 90 degree adaptor to the Schrader valve (Figure 19, left).

3.7.6 Attach a Schrader sampling tube (Figure 19, right). This is a Tygon connector/Teflon tube attachment that is slipped over a fitting for sampling.

3.7.7 Open some faucets.

3.7.8 Let water flow through sampling tube for >20 seconds to flush out the tube as a native rinse.

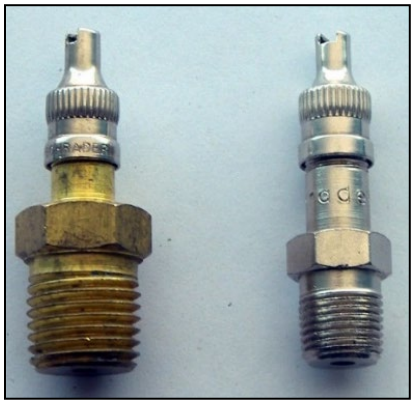

Figure 18. 1/4 inch and 1/8 inch (also called brass and silver) Schrader valves. The 1/4 inch Schrader valve may also have a chrome finish. Caps may be used to tighten or remove the valve cores. Use a 7/16 inch wrench on the 1/4 inch valve and a 5/16 inch wrench on the 1/8 inch valve.

Figure 19. Left: A 90 degree adaptor. Right: A Tygon/Teflon sampling tube attached to a 90 degree adaptor that has been screwed onto a Schrader valve.

3.8 Preparing a Faucet or Petcock Sample Port for Collection

3.8.1 Before collecting a sample, check the faucet/sample port for any debris.

3.8.2 Open the faucet completely and let the water run for approximately one minute to flush out any remaining debris inside the faucet/sample port before collecting your sample. Use a fitting on the faucet, if needed.

3.9 Sampling From an Unpressurized Tank

If a sampling port is unavailable between the well and the unpressurized tank, sample from the inlet pipe that is located inside the unpressurized tank.

3.9.1 To sample from the inlet pipe inside an unpressurized tank, place the ladder on the tank. Follow FSM guidelines for ladder safety. Always maintain three points of contact while on the ladder and have a second staff member hold the ladder.

3.9.2 Climb ladder and unscrew cap of storage tank. Allow tank to air out for three minutes before breathing near tank opening in case gasses have accumulated in the tank.

3.9.3 Once tank has aired, inspect the inside wall of the tank to locate the float valve and the inlet pipe. Place the clean sampling tube or hose into the inlet pipe, using the appropriate fittings, if necessary.

3.9.4 Open faucets and pull up the float valve, if necessary, to get the pump to turn on.

3.9.5 While using a clean sampling tube or hose, hold it up into the flow of the water and collect the sample from the end where it discharges.

Figure 20. Left: inlet pipe inside an unpressurized tank. The black cable to the right of the inlet pipe is connected to the float valve. Right: Inlet pipe to unpressurized tank. Just in front of the pictured inlet pipe is a float valve (gray cylinder).

3.10 Collecting a Field Blank

3.10.1 While purging the well, collect a field blank sample following the instructions provided in the study protocol and in SOP QAQC011. If the study protocol does not specify the type of field blank water to use, ask the project leader or the Quality Assurance (QA) Officer for their advice. Typically, use deionized water. If you run out of field blank

water while in the field, use distilled water from a sealed container purchased from any store. This deviation from the normal procedure should be noted on the COC.

3.11 Preventing Sample Contamination

3.11.1 Every effort should be made to maintain a clean transport and sampling environment to prevent contamination of the sample. All equipment and containers referred to in this procedure should be clean prior to use and stored in a clean environment. Sample containers, polystyrene foam bottle holders, alligator valves, Schrader valves, and Schrader tubes should be transported in clean plastic bags. The sampling vehicle interior or truck bed must be clean prior to loading equipment and care taken to keep it clean during sampling. Try to keep vehicle interior clean by checking for leaks in the coolers, dusting shoes before going into vehicle, and set a designated bag for used gloves and plastic covers.

3.11.2 All equipment and sample containers are taken directly from the vehicle to plastic groundcovers and never allowed to touch anything at the sampling site. Nitrile gloves must be worn when handling any sampling equipment (e.g., sample bottles, Schrader valves/tubes).

3.11.3 Change nitrile gloves whenever there is a possibility that they have become contaminated. For example, change nitrile gloves between switching from sample collection to filling field blanks or after moving hoses. Gloves should always be changed between sampling sites and wells.

3.11.4 After sampling, reusable items such as garden hoses and Schrader tubes should be placed in separate plastic bags for later cleaning. Groundcovers, used nitrile gloves, and other items should be placed in trash bags to prevent contamination of the vehicle and will be disposed of offsite. Any equipment that may have been contaminated during sampling (tubing, adaptors) should be washed off with alcohol followed by de-ionized water for a final rinse, prior to being placed in the vehicle. Any items that may have had direct contact with pesticide materials or application equipment must be quarantined in plastic bags for decontamination or disposal.

3.12 Collecting the Sample

3.12.1 After completing the purging procedure, setting up the sampling port as in sections 3.7-3.9, and collecting the field blank, it is time to collect the groundwater samples. Nitrile gloves must be worn during sample collection.

3.12.2 The ideal sample team consists of three people: one person collecting well information from the well user (section 3.15), and two people following the sampling procedure.

3.12.3 Conduct a native rinse by rinsing out sample containers with groundwater before collecting the well sample. Do not conduct a native rinse if the sample containers are pre-packaged with a preservative. If the sample requires preservation see section 3.13.

3.12.4 Completely fill the appropriate number of bottles with groundwater to eliminate any airspace under the cap (unless the bottle is pre-acidified with preservatives). In cases

where the flow cannot be sufficiently restricted or is angled so that completely filling the bottle is impossible, it may be necessary to use the cap or a separate clean fill bottle to add the last few drops to completely fill the bottle. A small air bubble is not a problem if the analytes are nonvolatile. Place closed sample bottles back in the Styrofoam six-pack.

3.12.5 If the pump shuts off while collecting the sample, dump the sample and try again the next time the pump comes on. If you have an issue keeping the pump running, try opening more faucets.

3.12.6 If no sample preservation is required, determine the groundwater pH using either the single-read meter or the continuous-read meter. Record on the Chain of Custody form and the Well Information Sheet.

3.12.7 If pH adjustment is required using hydrochloric acid for sample preservation, see SOP FSWA007. (This is an uncommon step.)

3.12.8 Place the Styrofoam six-pack with the filled sample bottles without the plastic bag in the cooler on ice and cover the samples with ice bags.

3.12.9 Turn off faucets.

3.12.10 Take off and rinse 90 degree adaptor with alcohol and DI water.

3.12.11 Put away sample packs, ice, tools, and any other supplies.

3.13 Sample Preservation

3.13.1 Refer to the study protocol for instructions on proper sample preservation. If there is no protocol, or the protocol does not adequately explain how to preserve the samples, ask the QA Officer what type of preservation materials are required for the study (i.e., acidification, ice type).

3.13.2 Acidification: SOP FSWA007 contains instructions for preserving samples by acidification using hydrochloric acid.

Note: Acidification is not typically needed for most well sampling. Refer to the study protocol or discuss with the project leader before acidifying samples.

3.14 Returning the Well to Its Original Condition

3.14.1 After completing sample collection, close all faucets. If the valve core has been removed, put valve core back in.

3.14.2 Detach the sampling tube and/or fitting if one was used.

3.14.3 Resume power to pump if it was turned off.

3.14.4 If the pump does not immediately restart, open faucets to reduce the pressure in the storage tank until the pump turns on, then close the faucet(s) and allow the pump to run through one complete cycle to check that it is turning on and off properly.

3.14.5 With the pump running, check that there are no leaks from the Schrader valve, if applicable, or any location where a fitting or faucet was used. If a Schrader valve leaks then turn off the system, tighten/replace the valve core, restart the system, and check for leaks again.

3.14.6 Make sure all faucets turned on for sampling are turned off, any hoses used are coiled, and all sampling equipment and waste materials put back in the vehicle prior to leaving the site.

3.15 Preparing Sample Documentation

3.15.1 Complete a Chain of Custody form (example in Appendix 4) to accompany each water sample and field blank as described in SOP ADMN006.

3.15.2 Take pictures:

3.15.2.1 The first picture taken should be a close-up of the filled-out permission form for that site or the site location written on a removable piece of tape on the well.

3.15.2.2 Take pictures of all paperwork.

3.15.2.3 Take close-up and vicinity photographs. Close-up pictures should include at least the well, the sample port, and any conditions of note (i.e., pad cracks, small casing holes, and pesticide containers). The vicinity picture should show the well, the tank (if any), and the general surroundings of the well from two different angles.

3.15.2.4 Picture files will be renamed to indicate the study and location number. All picture files will be kept on the shared drive after being combined with each well package.

3.15.3 Complete a Well Information Sheet (Appendix 2). DPR staff must receive permission from the well user prior to making changes to the well. Ensure and record that permission was obtained from the well user on the form.

3.15.4 Label the overview map and the hand drawn map with the well number: “county number – sample number in chronological order from 1,” e.g., “38-1.”

3.15.5 Label the COC bag in sharpie with the well number (above) and place the Well Information Sheet in the COC bag.

3.15.6 Well Driller’s Log

If possible, obtain the well driller’s log. Well driller’s logs are now available through the California Open Data portal. The quickest method for getting a Well Completion Report (WCR) is by knowing the WCR Number or the Legacy Log Number, searching this number and downloading the pdf of the report at https://data.ca.gov/dataset/well-completion-reports/ and clicking “Well Completion Report PDF Links”. If you do not know an identification number for the well, you can download or search a large CSV of all wells in the database with basic information by clicking “Well Completion Reports”. In some cases, the well user may have a copy of the log, or the well logs for a target area could be obtained from DWR’s Open Data Portal prior to conducting the study. Although the log is not normally required for sampling, it contains information such as the construction and dimensions of the well and well depths and screen locations. If obtained prior to final well selection, this information could be useful for targeting the wells most suited to a particular study. If obtained after sampling, this information could help staff analyze and understand the sampling

results. It also helps to confirm the official well number of the sampled well. Well driller's logs are no longer confidential information and are publicly available.

4.0 REPAIRING A BROKEN WELL

If you break a well during the sampling process, it is DPR's responsibility to assure that the well is fully repaired by a licensed vendor. If this happens, see Appendix 5.

5.0 REFERENCES

U.S. Geological Survey (USGS). 2006. *Collection of water samples (ver. 2.0, Revised September 2006).* National Field Manual for the Collection of Water-Quality Data U.S. Geological survey Techniques of Water-Resources Investigations, Book 9, Chapter A4. 166 p. Reston, VA. Available at: https://pubs.er.usgs.gov/publication/twri09A4.

6.0 APPENDICES

APPENDIX 1: DPR Permission Form for Request to Sample on a Property – English and Spanish Versions

APPENDIX 2: DPR Well Information Sheet (blank form)

APPENDIX 3: DPR Well Information Sheet (completed sample)

APPENDIX 4: DPR Chain of Custody Form

APPENDIX 5: Repairing Broken Wells: Procurement Procedures and DPR Business Services Unit Contact Information

APPENDIX 6: Information Pamphlet with Frequently Asked Questions (English and Spanish)

APPENDIX 7: Well Sampling Issues

APPENDIX 8: Replacing a Schrader Valve

Appendices are available upon request by email at GWPP@cdpr.ca.gov.