Procedures for Sampling Water Supply Wells at Petroleum UST Facilities

Sampling Requirements

Water supply wells at UST facilities must be sampled for volatile organic compounds (VOCs) and semivolatile compounds (SVOCs). If a waste oil tank is present, the well should also be sampled for the metals: lead and chromium. The attached table outlines the specific sampling requirements.

Preparing to Sample

Always select a laboratory certified to perform the specific groundwater analyses required. After consultation with that laboratory, decide whether to do your own sampling or to negotiate a contract for sampling and analysis. The North Carolina Division of Water Quality (NCDWQ) Chemistry Laboratory has a list of laboratories that are certified to run particular analyses. (This list may be obtained from the NCDWQ Chemistry Laboratory at 4405 Reedy Creek Road, Raleigh, North Carolina 27607. The DWQ Lab phone number is (919) 733-3908.)

If doing your own sampling, consult with the selected laboratory about the specific sample handling procedures required by the analytical methods. Sample containers, volumes, procedures, and preservation methods vary. In addition, different laboratories may require different amounts of sample to conduct the analyses. The attached table lists the collection requirements for the specified methods of sampling.

Sampling kits for sample collection and transport may be purchased from some commercial laboratories and include all the items needed (sample containers, shipping cartons, etc.) for collection and shipment of samples. If you use these services, carefully follow the instructions provided and do not discard any preservative that may have been added to the containers. If you do not choose to use a customized kit provided by your laboratory, use only new containers of the appropriate type for the contaminants for which you are sampling. Check with the laboratory that will be running the analyses about appropriate sample containers and preservation requirements for each method. **If proper sampling and QA/QC protocols are not followed, the DWM may consider your results invalid.**

Label sample containers prior to sample collection. Each sample label should include the sample location, sample identification, the date and time of collection, the analysis to be performed, the preservative added (if any), the sampler's initials, and any other pertinent information for sample identification.

Prepare the storage and transport containers (ice chest, etc.) prior to taking any samples so that each collected sample can be placed in a chilled environment immediately after collection.

Selecting the Sampling Location

- You must choose the tap closest to the well, preferably at the wellhead. The tap must be before any holding or pressurization tank, water softener, ion exchange, disinfection process or before the water line enters the residence, office or building. If no tap fits the above conditions, a new tap that does must be installed.

- The well pump must not be lubricated with oil, as that may contaminate the samples.

- The sampling tap must be protected from exterior contamination associated with being too close to a sink bottom or to the ground. If the tap is too close to the ground for direct collection into the appropriate container, it is acceptable to use a smaller (clean) container to transfer the sample to a larger container.

- Leaking taps that allow water to discharge from around the valve stem handle and down the outside of the faucet, or taps in which water tends to run up on the outside of the lip, are to be avoided as sampling locations.

- Disconnect any hoses, filters, or aerators attached to the tap before sampling.

- Do not sample from a tap close to a gas pump. The gas fumes could contaminate the sample.

Other Considerations for Sampling

- ***Do not flame the tap prior to sampling.***
- ***Do not place chlorine (Clorox) into the system or well prior to sampling.***
- ***Do not smoke while collecting or handling samples.***
- ***Only use new sample containers; sample containers should never be reused.***
- ***Wear disposable gloves for each well sampled.***
- ***The term VOA (Volatile Organics Analysis) is often used in place of VOC.***
- ***VOC vials may contain acid*** to act as a preservative depending on your lab and availability. If the VOC vials do contain preservatives ***use caution*** while handling the vials. Try not to breathe any fumes that come from the vials during sampling. You may want to wear protective goggles to prevent contact with the eyes. If you spill acid on yourself be sure to wash it off immediately with plenty of water.

Collecting a VOC (Volatile Organic Compounds) Sample

Equipment Needed

- VOC sample vials [40 milliliters, glass, may contain 3 to 4 drops of hydrochloric acid (HCl) as preservative]
- Disposable gloves and protective goggles
- Ice Chest/Cooler
- Ice
- Packing materials (sealable plastic bags, bubble wrap, etc.)
- Lab forms

Sampling Procedure

1. Run the water from your well for at least 15 minutes. If you have a deep well you will need to run the water for longer (purging 3 well volumes is best). If your tap or spigot is located directly before a holding tank it is a good idea to open a tap after the holding tank to prevent any backflow into the tap that you take your sample from. This will ensure that the water you collect is water "fresh" from your well and not water from the holding tank.

2. After running the water for at least 15 minutes, reduce the flow of water. The flow should be reduced to a trickle but not so slow that it begins to drip. A smooth flow of water will make collecting the samples easier and more accurate.

3. Remove the cap of a VOC vial and hold the vial under the stream of water to fill it. Be careful not to spill any acid that is in the vial.

4. For best results use a low flow of water and angle the vial slightly so that the water runs down the inside of the vial. (see Figure 1) This will help keep the sample from being agitated, aerated or splashed out of the vial. It will also increase the accuracy of the sample. As the vial fills and is almost full, you can turn the vial so that it is straight up and down so that the water won't spill out.

5. Fill the vial until the water is just about to spill over the lip of the vial. The surface of the water sample should become mounded. (see Figure 2) It is a good idea not to overfill the vial, especially if an acid preservative was present in the vial.

6. Carefully replace and screw the cap onto the vial. Some water may overflow as the cap is put on.

7. After the cap is secure, turn the vial upside down and gently tap the vial to see if any bubbles are present in the vial. If bubbles are present in the vial, remove the cap, add more water and check again to see if bubbles are present. (see Figure 3) Repeat as necessary.

8. After two samples without bubbles have been collected, the samples should be labeled and prepared for shipment. The sample will need to be kept at a temperature of 39° F (4° C).

Figure 1

Figure 2

Figure 3

Collecting a SVOC (Semi-Volatile Organic Compound) or Metals Sample

Equipment Needed

- SVOC sample bottle [1 liter, amber glass] or Metals sample bottle [0.5 liter, polyethylene or glass, 5 milliliters of nitric acid (HNO_3) preservative]
- Disposable gloves and protective goggles
- Ice Chest/Cooler
- Ice
- Packing materials (sealable plastic bags, bubble wrap, etc.)
- Lab forms

Sampling Procedure

1. Run the water from your well for at least 15 minutes. If you have a deep well you will need to run the water for longer (purging 3 well volumes is best). If your tap or spigot is located directly before a holding tank it is a good idea to leave a tap after the holding tank running to prevent any backflow into the tap that you take your sample from. This will ensure that the water you collect is water "fresh" from your well and not water from the holding tank.

2. After running the water for at least 15 minutes reduce the flow of water. A low flow of water will make collecting the samples easier and more accurate.

3. Remove the cap of a SVOC or Metals bottle and hold it under the stream of water to fill it.

4. The bottle does not have to be completely filled (i.e., you can leave an inch or so of headspace in the bottle).

5. After filling, screw on the cap, label the bottle and prepare for shipment. The sample will need to be kept at a temperature of 39° F (4° C).

Filling out a Sample Label (Figures 4 and 5)

- It is easier to fill out the label before you stick it on the vial/bottle
- Print legibly with indelible ink
- If you have more than one drinking water well at your facility, give each well a separate number. This number should be written on the sample label to differentiate the samples. It is also a good idea to write those numbers on a simple sketch of your facility for future reference.

Your sample labels may not look like Figure 5, but regardless what they look like they should contain the following information:

- Date of sampling
- Time of sampling
- Initials of sample collector
- Sampling site (name of the facility)
- Sample type (i.e., water)
- Tests required [i.e., VOCs (EPA 601/602), SVOCs (EPA 625), Metals (SM 3030C)]
- Preservative used, if any

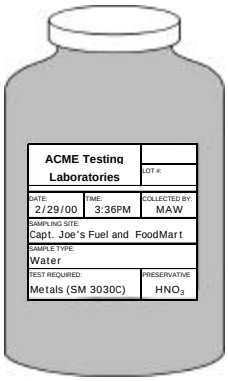

Figure 4

ACME Testing Laboratories		LOT #:
DATE: 2/29/00	TIME: 3:36PM	COLLECTED BY: MAW
SAMPLING SITE: Capt. Joe's Fuel and FoodMart		
SAMPLE TYPE: Water		
TEST REQUIRED: Metals (SM 3030C)		PRESERVATIVE HNO_3

Figure 5

Shipping the Samples

1. The two VOC vials and one SVOC bottle should be placed in sealable plastic bags and be packed carefully in a cooler in such a manner that they won't break. A rubber band may be used to keep your VOC samples together. Some labs will provide foam bags/containers to help keep your samples from breaking. If your lab does provide you with these foam bags/containers, place your samples in them before bagging them. If not, bubble wrap may be used to prevent the vials and bottles from breaking.

2. Pack ice around the samples in the cooler. The temperature of the samples must remain below 39° F (4° C) until they arrive at the laboratory. However, the samples must not freeze, so don't store them in a freezer. Some labs may not accept your samples if the temperature is not at or close to 39° F (4° C).

3. Fill out the paperwork for the samples including a chain of custody form (COC). This should be provided by the laboratory you are using. The COC form must accompany the samples to the laboratory. The COC must include the following:

   1) UST facility name, address and facility ID number (from the operating permit)
   2) each sample including the number of containers and sampling location;
   3) signature of the sample collector;
   4) the date and time of sample collection;
   5) the analytical method to be performed;
   6) the sample type (i.e., water);
   7) the regulatory agency (i.e., DENR/DWM – UST Section);
   8) signatures of all persons relinquishing and receiving custody of samples; and
   9) the dates and times of custody transfers.

4. Deliver the samples to the laboratory. Samples should be delivered to the laboratory as soon as possible after the sample is collected. This will minimize any breakdown of your samples and give your lab plenty of time to process the samples. The maximum time that can occur between collection and analysis is 7 days for VOC samples without acid preservation and 14 days for SVOC samples and VOC samples with acid preservation. For samples tested for metals, they need to be submitted within 48 hours of collection, so it is important to make sure that you are have time to deliver the samples to the lab in time. Also, you should make sure that the laboratory that you use will be able to receive the samples and analyze them in the necessary time. For example, some labs are not open on weekends and may not accept samples late on Friday or they may just be extremely busy, in which case they may charge you a higher rate for a "rush job". It is a good idea to call ahead to see how busy the lab is before you even begin sampling.

Submitting the Sample Results

The results submitted to the UST Section regional office must include a cover letter and the report received from the laboratory. The cover letter should include the name and address of the UST facility, the UST facility ID number (from the operating permit) and the owner or operator's name and address. The laboratory report should include the following:

1. Laboratory Certification Number
2. Facility Name and address
3. Date of Report Preparation
4. Chain-of-Custody
5. Analytical Result Summary sheets including QA/QC information
6. Laboratory Chronicle and Methodology including holding time checks
7. Calibration Information
8. Blank Results (method, field, trip, etc.)
9. Method Detection Limits

Sampling Water Supply Wells at Petroleum UST Facilities: Sampling Requirements

(Laboratories must be certified by the North Carolina DWQ to perform the following methods)

Contaminant Testing for:	Sample Type/Method	Container	Preservative	Holding Times
1. Low Boiling Point Fuels: gasoline, aviation gasoline, gasohol, etc.	EPA 601/602 **with MTBE, IPE and xylene or**	Duplicate 40-mL VOC vials with Teflon-lined septa screw cap	Add 3 to 4 drops of 1:1 HCl Cool to 4°C	14 days before lab analysis
	EPA 601/602 **with MTBE, IPE and xylene**	Duplicate 40-mL VOC vials with Teflon-lined septa screw cap	Cool to 4°C	7 days before lab analysis
2. Medium/High Boiling Point Fuels: kerosene, diesel, varsol, mineral spirits, naphtha, jet fuels, fuel oil #2, etc.	EPA 625	1-L amber glass with Teflon-lined screw cap	Cool to 4°C	Samples must be extracted at the lab within 14 days and extracts analyzed within 40 days.
3. Used/Waste Oil	EPA 625 and	1-L amber glass with Teflon-lined screw cap	Cool to 4°C	Samples must be extracted at the lab within 14 days and extracts analyzed within 40 days.
	Metals (Standard Methods 3030C prep.) lead and chromium	500-milliliter polyethylene or glass jar	Add 5 ml of 1:1 HNO_3 (to pH<2) Cool to 4°C Use 0.45 micron filter**	Submit to lab within 48 hours. 3030C prep by lab due by 72 hours. Analysis due within 6 months of prep.

* Check with the laboratory that will be doing the analysis for any other requirements.
** Filtering occurs at laboratory
MTBE – Methyl Tertiary Butyl Ether
IPE – Iso-propyl Ether