

**Nebraska Department of Environment and Energy
Standard Operating Procedure (SOP)**

**Water Quality Division
Water Quality Assessment Section – GW**

SOP Number: GW-170

Title: Personal Safety During Groundwater Sampling

Written Date: July 2024

Purpose: To ensure the safety of NDEE personnel while obtaining ground water samples for Ground Water Unit programs.

Equipment/Materials Needed:

- Appropriate ground water sampling equipment as per SOP # GW-030, Appendix A

Procedures:

1. Before visiting a site or beginning a study:
 - 1.1. Ensure that all equipment and materials are available as per SOP # GW-030, Appendix A.
 - 1.2. Ensure that all sampling equipment is in proper working order.
 - 1.3. Ensure that a completely stocked first-aid kit, working cellular telephone (agency and/or personal), and hospital map/phone numbers are available.
 - 1.4. Determine the level of personal protection necessary for the particular sampling event.
 - 1.4.1. The minimal level of personal protection (Level D) is normally adequate for normal ground water sampling performed by the Groundwater Section. This type of sampling includes existing wells or monitoring wells with contaminants of interest, and/or the concentrations of those contaminants, do not pose an immediate or severe health threat to the sampler. This level of protection consists of the following:
 - 1.4.1.1. Street clothing (no shorts)
 - 1.4.1.2. Safety boots/shoes (leather/chemical resistant)
 - 1.4.1.3. Gloves (optional)

- 1.4.1.4. Hard hat (in construction areas or if otherwise required)
- 1.4.1.5. Safety glasses or splash goggles (optional)
- 1.4.1.6. Ear protection (if required)
- 1.4.2. If the contaminants of concern or sampling conditions appear to require a higher level of personal protection, consult with NDEE's Petroleum Remediation Section to determine protection requirements and obtain further guidance.
- 1.5. Determine the location(s) of the nearest health care facility(-ies) to the sampling site or area and map out the quickest routes to get there.
- 1.6. Survey sampling personnel to determine any health conditions (e.g. allergies, diabetes, pregnancy, etc.) which may be of concern during a sampling event, and ensure that all sampling personnel are aware of these conditions.
- 2. When loading sampling equipment/materials and traveling to the sampling site or area:
 - 2.1. Ensure that all equipment and supplies are properly secured so as not to come loose during transport.
 - 2.2. Always wear your seatbelt during travel!
 - 2.3. Observe all posted speed limits and traffic laws.
- 3. While at the sampling site(s):
 - 3.1. Before approaching the well or immediate sampling area, look carefully at the general area to identify any possible hazards. Such hazards might consist of:
 - 3.1.1. Electrical lines or connections: avoid contact, especially if water or wet ground is present. If you must touch an object in contact with an electrical connection (e.g. pump switch box, center pivot tower, etc.), be sure to touch it first with the back of your hand.
 - 3.1.2. Fuel -driven pump motors, driveshafts, and drive belts: clothing, equipment, hair, or limbs can become entangled in operating pump equipment. Stay well away from all pump equipment and use extra caution when walking or sampling in the general vicinity of these items. Be especially careful not to lose your balance or slip on wet ground when in the vicinity of an operating pump. The engines, exhausts, and some pipes close to an operating pump can be extremely hot, so take care not to touch any surface which might cause a burn. Finally, gas or diesel power units can also be extremely loud. If you must approach one of these units while sampling, consider the use of earplugs or muffs to protect your hearing.

- 3.1.3. Chemigation equipment: chemigation sites contain pesticides and/or fertilizers which can range in effect from mild skin irritation to acute toxic effects. Look for any posted chemigation warning signs and stay away from any center pivot or other spray irrigation system which is posted as chemigating with a toxic material. If the chemigation system is running but it is still possible to sample the well, be sure to stay away from the injection pump, sample from a point “upstream” of the injection pump and be sure not to drink or sample from a water source “downstream” of an operating injection system.
- 3.1.4. Machinery/traffic: farms, construction sites, roads, landfills, and the like can all have considerable traffic, often involving heavy machinery. Be aware of such machinery operating in the area of your sampling activity and stay well away from it.
- 3.2. During sampling/field testing/preservation, etc.:
 - 3.2.1. Maintain an awareness of the above factors while performing the actual sampling.
 - 3.2.2. Be extremely careful with acid vials for sample preservation, particularly the glass vials.
 - 3.2.2.1. The acid itself is extremely caustic and must be washed off your skin or clothing immediately if you contact it.
 - 3.2.2.1.1. If acid contacts your skin, you will often experience a burning sensation and/or the skin may turn yellow. If this is the case, flush the affected area with plenty of fresh water.
 - 3.2.2.2. Open vials at arms’ length away from your face, downwind, and well away from any other people. If using glass vials, be especially careful with the open vial and the broken-off top of the vial as they have extremely sharp edges.
 - 3.2.2.3. If using screw-top acid vials, screw the top back on the acid vial and place the empty vial upside-down in the Styrofoam vial container after use. If glass acid vials are used, dispose of the broken-off vial top in the designated glass waste jar and place the empty, open vial upside-down in the Styrofoam vial container after use.
- 4. Miscellaneous concerns
 - 4.1. Use common sense and caution in all cases.
 - 4.2. Watch the weather!

- 4.2.1. Most sampling in Groundwater Section programs takes place during the summer, when temperatures can easily top 100° F. Be aware of the toll heat can take on your body. Carry and drink plenty of water, and rest frequently. If signs of heat stroke (dizziness or blurred vision, cold and clammy skin, headache or nausea, etc.) or other heat-related problems occur, take steps to cool off (e.g. sit in an air-conditioned vehicle, pour cool water over your head and body, etc.), and seek medical attention immediately.
- 4.2.2. Some sampling may occur during the winter when temperatures can easily drop below 0° F. Be sure to dress appropriately for winter activities. Avoid long-term exposure to extreme cold, especially in the presence of water from wells being sampled. If signs of frostbite (discolored skin, persistent lack of feeling in extremities, etc.) or other cold-related problems occur, take steps to warm up (e.g. sit in a heated vehicle, etc.), and seek medical attention immediately.
- 4.2.3. Be aware of other weather-related hazards. In the summer, thunderstorms with lightning, hail, tornados, and damaging winds can strike suddenly and present a real danger. In the winter, blizzards or ice storms can make traveling or sampling difficult or hazardous. If weather conditions present any threat to your safety, discontinue sampling operations and seek appropriate shelter immediately.
- 4.3. Know the limitations of the sampling vehicle, and don't try to drive into places which are inaccessible, even if you have a four-wheel-drive vehicle (remember, the most common function of four-wheel-drive is to get you stuck somewhere you shouldn't have gone in the first place!).
- 4.4. Look out for each other. In most cases, there will be at least two members of a sampling crew, so pay attention to your partner, their whereabouts, physical condition, etc., and be ready to help out if necessary.
- 4.5. Make sure that you have a charged and functional cell phone in the sampling vehicle at all times. Maintain an awareness of where you are in case you need to call for emergency assistance.
- 4.6. Make sure that the sampling vehicle is outfitted with a complete and functional first aid kit.
- 4.7. If an accident happens or if a situation develops where there is ANY doubt as to the safety/well-being of any member of the sampling crew, PLAY IT SAFE. Seek appropriate medical attention or assistance immediately.