Leak Detection Groundwater Sampling

Purpose

- Provide guidance on how to collect groundwater samples from leakage detection monitoring wells at confined feeding operations
- Ensure that groundwater samples are correctly and consistently collected, to provide accurate data and support sound technical decisions

Audience

- Consultants or contractors who collect groundwater samples for leakage detection monitoring at confined feeding operations
- Confined feeding operators who are required to have leakage detection monitoring programs at their facilities

Relevant Legislation

- *Agricultural Operation Practices Act* (AOPA)

Introduction

Groundwater samples from monitoring wells at liquid manure storage facilities must be collected correctly and consistently to ensure accurate data and monitoring results.

Please consult this guideline in conjunction with the information about required analytical parameters and sampling frequency provided in the Technical Guideline Agdex 096-52, Leak Detection Groundwater Monitoring Parameters.

Samples must be collected by a qualified professional.

Procedure

The procedures outlined in this guideline should be followed in most circumstances. For unusual or site-specific circumstances, consult the NRCB before groundwater samples are collected and analyzed.

1. **Depth of groundwater level**
   The depth of the groundwater level (the static water level) should be recorded for each monitoring well before the well is purged and sampled. The static water level should be measured from a fixed reference point, typically the top of the well casing, using an electric sounding tape that is rinsed with distilled or deionized water before and after each measurement. The reference point should be noted.

2. **Purging**
   Before sampling, purge the monitoring wells by bailing or pumping to ensure that samples accurately represent ambient groundwater quality. The volume of water that must be purged will depend on the well's yield. Removing the equivalent volume of one well casing may be sufficient for low yielding wells. Monitoring wells that produce groundwater at a reasonable rate may require removing the equivalent of at least three well casings.

   After purging, samples should not be taken until the water level has recovered to at least 80 per cent of the static water level. Typically, it will recover within a day, minutes or hours after purging. In low-yielding monitoring wells, recovery will take several weeks. When the recovery is slow, the contractor will need to return at a later date to collect the groundwater samples.

3. **Sampling**
   Monitoring wells at a site should be sampled in the order of those least likely to those most likely to be contaminated. The least contaminated wells are

usually located up gradient of the facility.

Bailers, inertial and peristaltic pumps or other tools can be used for groundwater sampling. Bailers are most common because they are relatively inexpensive and easy to use.

Regardless of the method used, foreign and cross-contamination between wells is best prevented by using properly cleaned sampling equipment. If bailers are used, ideally, a new bailer should be used for each sampling event at each well. This will significantly reduce the potential for cross-contamination and minimize uncertainties about the accuracy of the data. Alternatively, a different bailer can be dedicated to each well to reduce the potential of cross-contamination.

a) Collecting samples
- Document the name of the individual conducting the sampling, the well identification, and the date and time of sampling.
- Ensure the sampler has clean hands or wears new nitrile or latex gloves for each well, to prevent contamination.
- Use new or properly cleaned sampling equipment.
- Use pre-cleaned sample bottles provided by an accredited laboratory.
- Do not touch the inside of the cap or bottle.
- Follow the laboratory's protocol for filling the bottles and for required preservatives.
- After sampling, store filled bottles in a cool, dark environment, e.g. an ice-packed cooler.
- Promptly deliver the samples within the holding times specified by the laboratory.

b) Preparing samples for specific parameters
- Collect the samples in bottles provided by the laboratory.
- For **calcium, magnesium, sodium, potassium, sulphate, chloride, bicarbonate, nitrate and nitrite, total dissolved solids, pH and electrical conductivity**:
  - Do not rinse the bottles with groundwater before collecting samples.
  - Samples for these parameters normally do not need a preservative. Confirm the requirement for a preservative with the laboratory before sampling.
  - Deliver the samples within 12 hours.

- For **dissolved ammonium-nitrogen and total dissolved phosphorus**:
  - Do not rinse the bottles with groundwater before filling the bottle. Some laboratories provide bottles with the preservative added (diluted sulphuric acid - H_2SO_4). If the laboratory provides the preservative separately, add it before filling the bottle.
  - Deliver the sample within 12 hours.

- For ***Escherichia coli*** **(E. coli)**:
  - Use sterilized sample bottles provided by an accredited environmental laboratory. Do not rinse the bottles with groundwater before they are filled.
  - Follow the laboratory's protocol for filling the bottles. Most laboratories provide bottles with the preservative added.
  - Do not fill sample to the top of the bottle. The level is specified and normally marked on the bottle by the laboratory.
  - Chill the samples to between 1°C to 10°C and deliver them within 12 hours.

Professional Qualifications

An independent and qualified third party professional must collect the samples and analyze and interpret the results. All chemical and microbiological analysis must be performed by a laboratory accredited by the Canadian Association for Laboratory Accreditation (CALA).

For more information

Contact your nearest NRCB field office or an ARD CFO extension specialist (dial 310-0000 to be connected toll free)

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www.agric.gov.ab.ca/aopa

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This guideline was developed by the Technical Advisory Group, a partnership between Agriculture and Rural Development, the Natural Resources Conservation Board and the agricultural industry.