Guideline for Ground Water Monitoring Plans
At Livestock Waste Control Facilities

Investigations into local geologic and ground water conditions at some livestock waste control facilities (LWCF) indicate that a potential for ground water impact exists. Some of the conditions found to be important include shallow depth to water, sandy or coarse-grained sediments, very permeable subsurface sediments, existing ground water quality, and use of the ground water as a drinking water source (domestic or municipal).

This Guideline is set up in a question and answer format for quick reference. The Guideline is intended for the owner/operator of the livestock operation, the consulting engineer, or other consultant to help them as they develop and implement a Ground Water Monitoring Plan (including the Sampling and Analysis Plan) for livestock waste control facilities. An attempt has been made to list applicable state regulations. Reasonable and well-defined plans will be considered, even if they do not correspond directly to this Guideline.

This Guideline builds on Chapter 13, Ground Water Monitoring, of Title 130, Rules and Regulations Pertaining to Livestock Waste Control. Please refer to Chapter 13 if you have more specific questions.

NOTE: Ground Water monitoring will not be required for Class I facilities, unless one or more of the following have occurred (Title 130, Chapter 13, Section 002):
1. A spill or non-permitted release,
2. Percolation from the LWCF exceeds the allowable rate, or
3. Any other circumstance that may impact ground water quality.

Ground Water Monitoring Plan

What is a Ground Water Monitoring Plan?
- A Ground Water Monitoring Plan (GWMP) includes a site map, proposed monitoring well locations and construction details, and information about how samples will be taken (Sampling and Analysis Plan).
- Suggestion: Contact your local Natural Resources District (NRD) office to see if they offer assistance in preparing monitoring plans and performing sampling. Most NRDs have certified personnel, sampling equipment and existing Quality Assurance Plans. An agreement (involving reimbursement) to conduct the sampling may be possible with the NRD, but do not automatically assume they will do this work. Each NRD may have developed a policy for sampling wells for livestock operations.
What do I include on the site map?
- A site map needs a north arrow, scale and the proposed monitoring well locations clearly identified. The map must be drawn to scale. Include locations of all existing and planned LWCF components (lagoons, ponds, piping, etc.) and the pens, roads and other feedlot components. Also include canals, streams, rivers and wells (with names and/or registration numbers).

What information is needed for the proposed wells?
- The Monitoring Plan should provide the approximate total depth, construction details and screen length and placement for each proposed monitoring well.
- Provide the ground level elevations (and how determined) and the as-built construction details of any existing wells you are proposing to use as monitoring wells (see “Can I use existing wells…?” below).

What is a Sampling and Analysis Plan?
- A Sampling and Analysis Plan (sometimes referred to as a Quality Assurance Plan) is a description of the methods or Standard Operating Procedures (SOPs) used to conduct the water quality sampling and analysis. These plans are required to ensure consistent sampling and analysis is done for each sampling event, and ensures long-term trends can be analyzed.
- The information needed in the plan includes information on the sampler (see below), purging methods (after water level measurement), sample preservation (if required), transportation of the water samples to the lab, lab methods to analyze the samples, documentation of the chain of custody, and blank and duplicate samples (also known as Quality Assurance/Quality Control [QA/QC] samples). Livestock operators can adopt or adapt NDEQ’s Standard Operating Procedures (see “What do I do when I collect the water sample?” below) for their Sampling and Analysis Plan.
- Indicate who will do the sampling (e.g. owner/operator, a consulting firm (name and address), the local NRD, etc.). If an NRD will do the sampling, include a letter from the NRD indicating the agreement.
- Suggestion: A summary of the site’s history included in the plan would be helpful (e.g. the site was formerly a cornfield, a pasture, etc.).

Wells, Placement and Construction

How many monitoring wells do I need and where do they go?
- A minimum of 3 monitoring wells is typically required, one upgradient and two downgradient for the livestock waste control facility (LWCF). Larger lagoons (holding ponds) or multiple LWCFs may need more upgradient or (more typically) downgradient wells.
- Ground water flow gradients do not always match with runoff direction, which is due to surface topography.
- Upgradient wells must be located far enough away from the LWCF to avoid any possible impact (at least 300 - 500 feet away may be adequate).
- Depending on local conditions, multi-level monitoring wells may need to be considered.
- Downgradient wells should be located very close to the LWCF (such as right next to the outside berm) to allow detection of any possible contamination before it moves far away.
Upgradient wells need to be located so there is no impact from any aspect of the operation on the water quality data collected in the well. The upgradient well cannot be placed inside an existing pen.

**Why do I have to survey the wells?**
- Land surface elevation at a fixed reference point must be surveyed so an accurate ground water elevation (static water level) can be determined.
- Comparing the static water levels for the wells leads to determining the ground water flow direction. Properly placed monitoring wells have the water flowing from the upgradient well through the LWCF towards the downgradient wells (see figure above).
- Depth to water from the surface is measured before sampling and that value is subtracted from the surface elevation to give the ground water elevation.
- Additional and/or replacement wells may be required if ground water flow direction is different than initially assumed or is variable (by season).

**Can I use existing wells instead of drilling new wells?**
- The Department may consider the use of an existing domestic or production well as a monitoring well if the well is screened at the proper depth, is properly constructed, the depth to water can be measured and the well allows for collection of a water sample. If you would like to consider using an existing well as one of the monitoring wells, submit complete well construction details (including screen length and placement, and gravel pack and grout placement), geologic log, depth to water, land surface elevation at the well and exact location in your ground water monitoring plan. We will consider its use as a monitoring well.

**What are the regulations for wells and their construction?**
- The rules and regulations applied to well drilling, construction and registration are found in Title 178, Chapters 10 and 12 by the Nebraska Health and Human Services-Regulation and Licensure (NHHS-R&L).
- A licensed well driller must install the wells.
- Wells must be constructed according to state standards. Monitoring well construction details are found in Title 178, Chapter 12, Section 007.
- **Section 007.04** requires a bentonite seal (with a minimum thickness of one foot and recommended to be no more than 2-3 feet) placed on top of the gravel pack.
All monitoring wells shall be pressure grouted from immediately above the bentonite seal to the surface. Bentonite chips are not allowed as a grout material according to Title 178. Section 007.05 requires a mounded concrete pad constructed to slope away from the well. Flush mounted installation with a watertight cap may be used where traffic may endanger the well. Section 007.06 requires above ground steel casing to protect non-steel cased wells completed above ground.

Address specific well-construction questions to NHHS-R&L or your well driller.

The monitoring wells are required to be registered with the Nebraska Department of Natural Resources (NDNR) by the well driller within 60 days of well completion.

Monitoring wells for livestock facilities monitor the uppermost part of the water table (generally, the upper ten feet of the aquifer). “Straddling” (i.e. 5 feet above and 5 feet below) the water table is not necessary unless great water level changes are anticipated during the year.

Ten feet of screen is recommended and is usually adequate for all monitoring wells. Excessive screen length (greater than 10 feet) may lead to water quality problems related to the well construction and not provide a true representation of the ground water conditions.

Water Level Measurement, Sampling and Laboratories

When is sampling done and who does it?
- Sampling is typically done twice a year, in the spring and fall. The laboratory results must be submitted to NDEQ’s Agriculture Section within 45 days of the sampling event.
- An owner/operator is legally allowed to sample his/her own ground water monitoring wells without being certified. This does not mean a facility manager can sample the wells for his/her employer, the owner of the wells. We recommend that the owner/operator be confident he/she can always measure depth to water, purge the well, and take the samples according to his/her Sampling and Analysis Plan, so that reliable and consistent results are produced.
- All other individuals who sample wells (drillers or technicians) must be licensed or certified by NHHS-R&L. Many NRDs and consulting firms have certified technicians.

What do I do when I collect the water sample?
- Note: NDEQ’s Standard Operating Procedures (SOPs) for water level measurement and well sampling are published on our Internet home page (www.deq.state.ne.us). Find the appropriate SOPs by navigating “Publications Forms”, to “Ground Water Program” or “Livestock Program”, to “Standard Operating Procedures”. These SOPs do not directly apply to sampling at livestock facilities (except SOP GW072). These SOPs may be used as a reference for a livestock operation’s ground water monitoring plan. If you do not have Internet access, NDEQ can send you the SOPs.
- The depth to water is measured and recorded (to an accuracy of 0.01 foot) before purging and sampling. See NDEQ’s SOP GW072 for measuring water levels in monitoring wells.
- The laboratory performing the work should provide the appropriate bottles and preservatives to collect the water samples.
- Duplicate and blank samples must be taken and reported for each sampling event.
- Water samples must be analyzed at a certified lab for ammonia, chloride and nitrate-nitrogen.

What do I report to NDEQ’s Agriculture Section for each sampling event?
- The results of the sampling event must be reported within 45 days.
- Include the chain of custody forms, the lab-produced sheets listing the results of the analyses, analysis method for each parameter, units of the results and method detection limits.
- The information reported for each well includes:
  - The well ID (e.g. MW-2),
  - Registration Number (e.g. G-123456),
- Sampling date,
- Surveyed well elevation, depth to water and the static water elevation,
- The results of the field parameters, if collected,
- The nitrate-nitrogen, ammonia and chloride concentrations, and
- The blank and duplicate sample (QA/QC) results (including which well).
- The first semi-annual report must include the as-built monitoring well construction details, surveyed elevations and geologic logs. Also, describe the static water level measuring point for each well. SOP GW072 covers measuring water levels in monitoring wells.
- See table at end of this Guideline for suggested reporting format.

### Avoiding Ground Water Monitoring

NDEQ reviews many sources of information to make a preliminary recommendation requiring ground water monitoring at a LWCF. These sources include available information from the permit application, nearby registered wells, University of Nebraska maps and geologic well logs, US Geological Survey maps, soil surveys, and other data.

The LWCF operation may submit information to NDEQ for consideration to support a contention that site-specific conditions exist where ground water is not at risk to contamination and that ground water monitoring may not be necessary.

The submittal requesting further review must be site-specific information and may include:
- ♦ Detailed geologic logs from onsite test holes/wells, drilled to ground water,
- ♦ Local ground water flow direction map, derived from local water well measurements,
- ♦ Local survey, showing ground water use in area, and/or
- ♦ Other appropriate information.

**NOTE:** The information submitted for review must be hydrogeologic in nature. Information about the financial capability of the owner, or the construction method or size of the LWCF is NOT taken into account when reviewing facilities for ground water monitoring.

### Submitting the Ground Water Monitoring Plan

Submit the complete Ground Water Monitoring Plan to NDEQ’s Agriculture Section. The Ground Water Unit reviews the plan to determine if it is adequate. You will be notified by letter when the plan is approved or denied. We will try to work with livestock operators to develop an acceptable plan if we find problems. However, an acceptable ground water monitoring plan is the responsibility of the operator.

### Contacts for Information on Ground Water Monitoring at Livestock Operations

**Water Well Standards and Contractor's Licensing**
- NHHS - Water Well Program
  - 402-471-2541
  - www.hhs.state.ne.us

**Well Registration**
- Nebraska Department of Natural Resources
  - 402-471-2363
  - www.dnr.state.ne.us

**Livestock Waste Control Facility Permitting**
- NDEQ - Agriculture Section
  - 402-471-4239
  - 308-535-8142 (North Platte Office)
  - www.deq.state.ne.us

**Ground Water Monitoring**
- NDEQ - Ground Water Unit
  - 402-471-0096
  - www.deq.state.ne.us
# Sample Livestock Facility Ground Water Monitoring Data Report

**Livestock Facility Name:** XYZ Livestock, Inc., Butler County  
**Sample Date:** 4/15/04  
**Analytical Lab:** ABC Environmental Laboratory  
**Sampler:** Joe Dirt, Consulting for Nebraska Co., License/Certificate No. 12345

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<th>Sample ID</th>
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<th>Well Elevation feet</th>
<th>Depth to Water feet</th>
<th>Static Water Elevation feet</th>
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<th>Conductivity µhmhos</th>
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## Parameter Table

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## Notes:
- Lagoon pumped 2 weeks prior to sampling event.
- Crazy Eight Canal not flowing at the time of sampling.
- 3 well volumes pumped from each well prior to sampling.