

**Livestock Waste Management Section
Groundwater Monitoring Plan Update
Technical Guidance Document**

Last revised October 23, 2019

Groundwater Monitoring Plan (GWMP) Update Procedure

Submit GWMP Update

The GWMP Update is a comprehensive five-year plan (*corresponding to the facility's permit cycle*) describing the as-built groundwater monitoring system and includes the proposal for sampling, analysis, and reporting protocol that shall be updated to reflect evolving characteristics for each facility. These characteristics include varying groundwater levels, groundwater flow pathways, recent or historical nutrient concentrations trends, facility operation changes, and changes in rainfall expectations. The GWMP Update should include the information described by the **General Facility Information, Well Survey, Sampling Documentation, Sampling Procedure, Laboratory Analysis, and Reporting of Results** sections. Please read the entirety of this Guidance Document prior to submitting a GWMP Update to the KDHE for your facility. If you have questions that this Guidance Document does not answer, please contact Levi Crooke at Levi.Crooke@ks.gov or at (785) 296-4049.

GWMP Update Approval

The KDHE will review the facility's GWMP Update and either provide comments for revisions to the GWMP Update or provide written approval of the described as-built groundwater monitoring system and the facility's protocol for sampling, analysis, and reporting of nutrient concentrations. The GWMP Final Approval will serve as the current and established GWMP for a period of five years, or at the time of permit renewal.

GENERAL FACILITY INFORMATION

An essential part of the GWMP is a description of the existing groundwater monitoring well network. A discussion of the characteristics of the uppermost groundwater is also needed, including the expected seasonal and long-term fluctuations in the water table and groundwater flow direction. Groundwater flow direction information should be submitted indicating whether the monitoring wells are up-gradient or down-gradient in relation to retention structures and other potential contaminant sources such as land application sites. For existing facilities with a groundwater monitoring system already in place, well lithology and/or construction logs (including completed WWC-5 forms) for each monitoring well should be included as an appendix.

Existing groundwater monitoring wells may be used in the system if they have adequate well placement and well construction to provide representative groundwater samples and adequately monitor potential contaminants from retention structures or other potential sources for the facility.

The GWMP should contain a map identifying property lines; groundwater monitoring wells; water wells; oil & gas wells; abandoned water well locations; plugged wells; on-site buildings; wastewater pipelines; closed, active, and planned retention structure cell boundaries; other potential contaminant sources; and all other pertinent facility features. The map should have a north arrow, be to scale, clear, and legible. A second map should also be prepared showing the most recent groundwater elevations posted near each monitoring point and with contour intervals appropriate for the measured data. A third map should also be provided that provides posted chemical concentrations and appropriate isoconcentration contours. The GWMP should identify the frequency of sampling, who has, and who will perform the sampling, and in what months the sampling will take place. KDHE shall be notified at least two working days prior to conducting any groundwater sampling to provide KDHE an opportunity to witness the testing procedure.

WELL SURVEY

All monitoring wells must be surveyed by a Kansas Licensed Land Surveyor. An elevation survey for the top of casing and well pad of the monitoring wells should include elevation references relative to a facility permanent datum control point (benchmark). The site benchmark should be referenced to mean sea level based on US Geological Survey (USGS) or National Geodetic Survey (NGS) values within an accuracy determined by the following formula: degree of accuracy (in feet) = 0.1 x the square root of the distance (in miles) from the nearest vertical datum control point to be used.

Identify and document all benchmarks used in determining the site benchmark, waste retention structures, and surface water benchmarks. Install a permanent datum control point for each monitoring well (i.e. a surveyor's bolt mounted flush within the concrete pad or permanent mark on the flush mount rim). A second mark should be placed at the surveyed datum point on the top of casing (TOC). The permanent mark should be placed at the location from which the water levels will be measured. The datum point for each monitoring well should be recorded within 0.01 vertical feet accuracy relative to the site benchmark. The location of the monitoring wells should be determined in feet north and west from the southeast corner of the section containing each monitoring well (do not use State Plane Coordinates). Survey report will include the section, township, and range location to four quarters for each monitoring well. Determine the latitude and longitude to 5 decimals using a GPS instrument. The survey must be performed by a Kansas Licensed Land Surveyor.

SAMPLING DOCUMENTATION

Proper field documentation of each sampling event is vital to data interpretation and the success of the groundwater monitoring program. The GWMP should include provisions to properly record all applicable information while performing the field activities. Data can be recorded in a field logbook or in data sheets prepared prior to the sampling event. If data sheets are used, GWMP should include an example of the data sheet. All samples should be handled in a manner consistent with the KDHE-BER Standard Operating Procedures – BER-19: Chain of Custody. Chain-of-custody records must be used to record the custody and transfer of samples. These forms must be entirely completed (N/A if not applicable).

For each sampling event, it is necessary to identify the well number designation, record the measurements of static water level and total depth for each monitoring well in the system. The purge parameter measurements (if applicable) should be recorded in the field notes, as should be the sample

time and date. Any deviations from the normal approved well purge methods, purge volume, sample method, unusual observations such as high or low well recharge rates, deficiencies found during the well inspection, equipment malfunctions, and possible sample contamination sources should also be recorded.

SAMPLING PROCEDURES

Well Sampling

Adopt the protocol described by the KDHE-BER Standard Operating Procedures – BER-01: Collection of Groundwater Samples at Known or Suspected Groundwater Contamination Sites or propose a protocol to be approved by the KDHE.

Retention Structure Sampling

KDHE may require that the retention structure process waste be sampled and analyzed for each retention structure during the sampling event for the groundwater monitoring. In other instances, facilities may substitute with retention structure effluent analytical results that are used for land application practices. A representative retention structure effluent sample should be obtained using protocol provided in the MidWest Plan Service (MWPS) publication MWPS-18 Section 1 or propose a protocol to be approved by the KDHE. A staff gauge reading should be taken and recorded to indicate the depth of the retention structure effluent.

Surface Water Sampling

For facilities where the groundwater has a potential hydrologic connection to surface water, then surface water sampling may be required. Facilities should adopt the protocol described by the KDHE-BER Standard Operating Procedures – BER-02: Collection of Surface Water Samples at Suspected or Known Contaminated Sites or propose a protocol to be approved by the KDHE.

LABORATORY ANALYSIS

The GWMP should identify what laboratory and what laboratory analyses will be performed on the samples. All analyses must be performed by a laboratory certified by KDHE for the analytical methods used. The analytical methods must be provided, as well as the appropriate holding times. It is necessary to provide the method detection limit (MDL) and the reporting limit (RL) for the constituents of concern, which must be at or below the USEPA Maximum Contaminant Level (MCL) value. Generally, the baseline analysis performed prior to population for new facilities or initial monitoring event at or within two months of well installation for existing facilities will include all constituents listed under level 1 and level 2 analyses. Thereafter, testing may only be required for level 1 analyses. If the resulting analytical results show a significant increase in contaminant levels (rises above USEPA MCL or increases 25% from the baseline level or background level) KDHE may require the facility to test for all constituents listed under level 1 and level 2 analysis for confirmation sampling and to evaluate the contamination plume. KDHE may also require additional constituents to the level 1 and level 2 analyses to help evaluate potential contamination. *(level 1 and level 2 described on next page)*

Level 1 analyses:	MCL	Level 2 analyses:	MCL
1. Total Kjeldahl Nitrogen	N/A	1. Nitrite Nitrogen (as N)	1 mg/L
2. Ammonia-Nitrogen	N/A	2. Sulfate	250 mg/L*
3. Nitrate Nitrogen (as N)	10 mg/L	3. Phosphorus	N/A
4. Chloride	250 mg/L*	4. Manganese	0.05 mg/L*
		5. Potassium	N/A
		6. pH	6.5-8.5*

*= Secondary MCL

REPORTING OF RESULTS

The reports should be referenced by the permitted business name, address, legal location and Kansas Water Pollution Control Permit Number for the facility. The analytical results of each sampling event must be submitted to KDHE as part of a comprehensive report that summarizes the entire sampling history. The GWMP should explain what information would be presented in these reports. Reporting of the sample results should be submitted to KDHE within 45 days following the sampling event. The report should include excessive concentrations indicating the concentrations above background concentrations for all constituents including total nitrogen. The facility must identify and describe any analytical results that show a significant increase in contaminant levels (rises above USEPA MCL or increase 25% from the baseline level or background level). In these instances, facility may be required to install additional down gradient monitoring wells, perform a risk assessment, and perform corrective action. At a minimum, reports of sampling events should include the following:

- Base map with monitoring wells and groundwater gradient;
- Table compiling historic static water levels and elevations;
- Table compiling historic analytical results with excessive concentrations including total nitrogen;
- A copy of field notes and/or field data sheet;
- A copy of analytical laboratory reports for the sample results;
- Chain of custody records;
- A description of any deviation from the GWMP that occurred during the sampling event and reasons for the deviation.
- Proposed actions for any significant increase in nutrient concentrations or sustained elevated nutrient concentrations

REFERENCES

KDHE Bureau of Environmental Remediation (BER) Standard Operating Procedures
http://www.kdheks.gov/environment/gmp/download/BER_SOPs_Appendix_A.pdf

MidWest Plan Service (MWPS) publication MWPS-18 Section 1

If you have any questions, comments, concerns, or revision suggestions to this Guidance Document, please contact Levi Crooke at Levi.Crooke@ks.gov or at (785) 296-4049.