



March 19, 2015

FILE REF: R-2015-0013
WPDES Permit WI-0059536-02-0

Lee Kinnard
Kinnard Farms, Inc.
E2675 County Rd S
Casco, WI 54205

Subject: Notice of Incompleteness for the Site 2 Groundwater Monitoring Plan, Kinnard Farms, Lincoln Township, Kewaunee County

Dear Mr. Kinnard:

The Water Division of the Wisconsin Department of Natural Resources (DNR) has reviewed the above referenced plan, submitted by Charles Andrews, S. S. Papadopoulos & Assoc., Inc., dated January 22, 2015, and received on January 27, 2015. In summary, the plan is incomplete due to the following:

- Insufficient production area site characterization and monitoring well construction information.
- No groundwater monitoring for a land application area, nor discussion of practicability to explain its absence.

Below is listed information that must be submitted to make the groundwater monitoring plan complete and approvable. The groundwater monitoring plan was submitted in response to the Order of Case No. IH-12-071 dated October 29, 2014 ("Order"). The attached memorandum from Chern, Phelps and Baeten, dated March 3, 2015, provides additional explanation, and documents review in accordance with s. 281.41, Wis. Stats., ch. NR 243, Wis. Adm. Code, and the Order.

Groundwater Monitoring Plan: The following information is needed to make your groundwater monitoring plan complete, and approvable, in accordance with the Order, and the applicable requirements in s. NR 243.15(7), Wis. Adm. Code, which also references chs. NR 140 and 141, and s. NR 214.21, Wis. Adm. Code.

1. **Land Application Areas:** An area where manure is land applied must be identified for groundwater monitoring; or an explanation of practicability considerations must be provided that justifies the absence of groundwater monitoring at a land application area, as required by the Order. If the production area and the land application area to be monitored are adjacent or very nearby each other, such that a single groundwater monitoring network will be proposed, a single plan may be submitted to address the groundwater monitoring of both the production area and the land application area, otherwise a separate plan should be submitted to address groundwater monitoring of a manure land application area.
2. **Site Characterization & Monitoring Well Installation:** The groundwater monitoring plan(s) for the production area and manure land application area must address site characterization, and installation of groundwater monitoring wells in two phases. Sufficient site characterization will require installation of groundwater monitoring wells, so the following are more accurately determined:
 - a. Depth to regional groundwater vs. perched groundwater, and depth to bedrock *
 - b. Groundwater flow direction (vertical and horizontal, and seasonal variations).
 - c. Hydraulic conductivity of the unconsolidated sediments.
 - d. Fracture flow in the upper Silurian Dolomite *
 - e. During installation of the monitoring wells, collect unconsolidated sediment samples and have the samples analyzed for grain size. Use the grain size data to better estimate porosity and hydraulic conductivity of the unconsolidated sediments.

* For items a. and d., consider alternative investigation methods, such as electrical resistance imaging (ERI) and video logging.

3. **Groundwater Monitoring Well Installation:** For each area to be monitored, monitoring wells need to be installed in at least two phases:
 - a. Phase 1 needs to include at least five wells around the perimeter of the area to be monitored.
 - b. Phase 2 needs to be prepared based on information gathered from the Phase 1 monitoring. Therefore, Phase 2 must be addressed in a subsequent work plan (separate from the Phase 1 work plan).
 - c. The specific well construction (design) should be determined based on the location of the water table. If the water table is in the unconsolidated sediments, monitoring wells must be constructed in accordance with ch. NR 141, Wis. Adm. Code, and the well screens must intersect the water table.
4. **Additional Requirements:** The groundwater monitoring plan(s) must include the following items which were omitted or insufficiently addressed:
 - a. Proposed methods for drilling and sample collection.
 - b. A detailed design for monitoring well construction that specifies the materials of construction and sealing methods, including a diagram.
 - c. Add turbidity and dissolved organic carbon (DOC, to replace COD) to the monitoring parameters.
 - d. A statement that the monitoring frequency and parameters will be as proposed or as required by the WPDES Permit.
 - e. Provide additional information to explain why limited communication is believed to exist between the horizontal fractures via the vertical fractures, and explain how this will be truth checked.

Nutrient Management Plan (NMP) Recommendations for Karst Areas: The attached memorandum also provides NMP recommendations intended to better protect groundwater quality in karst areas, including detailed mapping of karst features and identification of appropriate setbacks from the karst features. If these recommendations aren't already incorporated into your NMP, you may want to consider the recommendations at this time.

You may direct any questions to me. You may also contact Laura Chern for specific information about ch. NR 140, Wis. Adm. Code; Joe Baeten for specific questions about the NMP; and Jane Landretti for specific questions about the Order. Contact information is below. Thank you.

Sincerely,



Gretchen Wheat, P.E.
Water Resources Engineering
Bureau of Watershed Management

Attached: Memorandum from Chern, Phelps and Baeten, to Wheat, dated March 3, 2015, Subject: "Recommendations on Groundwater Mon. Plan – Kinnard Farms (dated Jan. 22, 2015)"

<p>Email cc: Charles Andrews – S. S. Papadopoulos & Assoc. candrews@sspa.com; 301-718-8900</p> <p>Patrick Kuehl – Robert E. Lee & Associates pkuehl@releeinc.com; (920) 662-9641</p> <p>Ronnie Williams – Williams Engineering Services wes@chipvalley.com; (715) 829-3231</p> <p>David Crass – Michael Best & Friedrich DACrass@michaelbest.com</p> <p>Paul Fredrich – Kewaunee County LWCD fredricp@kewaneeeco.org; (920) 845-1360 x 110</p> <p>Matthew Woodrow – DATCP matthew.woodrow@wisconsin.gov</p>	<p>Bradley Holtz – DNR Green Bay bradley.holtz@wisconsin.gov; (920) 662-5407</p> <p>Gretchen Wheat – DNR CO Madison gretchen.wheat@wisconsin.gov; (608) 264-6273</p> <p>Laura Chern – DNR CO Madison laura.chern@wisconsin.gov; (608) 266-0126</p> <p>William Phelps – DNR CO Madison william.phelps@wisconsin.gov; (608) 267-7619</p> <p>Joe Baeten – DNR CO Madison Joseph.Baeten@wisconsin.gov; (920) 662-5191</p> <p>Jane Landretti – DNR CO Madison jane.landretti@wisconsin.gov</p>
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CORRESPONDENCE/MEMORANDUM

DATE: March 3, 2015

TO: Gretchen Wheat – WT/3

FROM: Laura Chern – DG/5
William Phelps – DG/5
Joe Baeten – WT/3

SUBJECT: Recommendations on the Groundwater Mon. Plan – Kinnard Farms (dated Jan. 22, 2015)

We have reviewed the Groundwater Monitoring Plan submitted by Charles Andrews of S. S. Papadopoulos & Assoc., Inc. developed in response to Holding 3 of the Wisconsin DNR's October 29, 2014 decision regarding the WPDES permit issued to Kinnard Farms. The October 29, 2014 decision ordered:

- 1) Production area discharges to waters of the state authorized under this permit shall comply with surface water quality standards, groundwater standards and may not impair wetland functional values.
- 2) That the Department should review and approve a plan for groundwater monitoring for pollutants of concern at or near the site because it has been demonstrated to be "susceptible to groundwater contamination" within the meaning of Wis. Admin. Code NR 243.15(3)(2)(a). The plan should be submitted to the Department within 90 days of this Order and shall include no less than six groundwater monitoring wells, and if practicable, at least two of which monitor groundwater impacts from off-site landspreading.

To meet the requirements of the decision, the groundwater monitoring workplan should state the following purposes:

- Establish existing groundwater quality conditions upgradient and downgradient from the production site.
- Determine that engineered structures at the production site meet performance standards as per the permit.
- Determine that landspreading practices under the approved Nutrient Management Plan meet performance standards as per the permit.

Background

The geology of the area consists of glacially deposited, unconsolidated, discontinuous layers of clay, silt, sand and gravel overlying weathered, fractured dolomite. Most private wells are constructed in the dolomite aquifer. There are two pathways for contamination from landspread manure or structures at the production site to reach groundwater: 1) nitrogen compounds, and to a limited extent pathogens, can leach to groundwater through the unconsolidated sediments to fractured bedrock, where pollutants can move rapidly to groundwater and wells; and 2) manure can enter the dolomite aquifer directly through karst "direct conduit" features and areas of focused infiltration, then move quickly to groundwater and wells. The first pathway can be a long term threat to public health; the risk from the second pathway may be an immediate and acute threat to public health. Because the site is complex, DG recommends some flexibility in approving plans and specifications if possible. Site characterization can be carried out concurrently with installation of the initial phase of groundwater monitoring well construction.

General Recommendations

- An additional plan should be submitted for groundwater monitoring of landspreading sites.
- The groundwater monitoring plans for both the production site and landspreading sites should have the following components at a minimum: site characterization; construction of initial monitoring wells and construction of additional monitoring wells as required to meet the purposes of the groundwater monitoring plan as stated above. These components are described below for the production site only because the workplan submitted didn't address groundwater monitoring of landspreading sites.

Production Area Site Characterization Recommendations

Existing soil boring data collected for the purpose of designing production site structures, does not adequately characterize the geology and hydrogeology for the purpose of designing an effective and efficient groundwater monitoring network. DG recommends completing an investigation consistent with NR 243, NR 214, and NR 141 using groundwater monitoring wells to better determine:

- Depth to regional groundwater: Based on the geotechnical report and research in the area, the water table is presumed to be at the interface between the glacially deposited unconsolidated sediments and the Silurian Dolomite. Perched groundwater is also present in the area. This will require construction of wells with screens that intersect the water table.
- Depth to bedrock: The elevation of the top of the Silurian Dolomite is somewhat irregular in the area and may vary up to 10 feet based on previous borings and test pits constructed at the site. This may require use of electrical resistivity imaging (ERI) techniques, video logging of boreholes and/or construction of additional borings.
- Groundwater flow direction: Both vertical and horizontal groundwater flow as well as seasonal variations.
- Hydraulic conductivity of the unconsolidated sediments;
- Fracture flow in the upper Silurian Dolomite: the method proposed by the consultant for the applicant, for determining the location of fracture zones seems reasonable to DG. However, we recommend use of a down-hole video logging to verify fracture zones.
- Grain size analysis of the unconsolidated sediments is recommended to get a better idea of porosity and estimate hydraulic conductivity.

Production Area Groundwater Monitoring Recommendations

- Recommend that monitoring wells be constructed at the Kinnard Farms facility in at least two phases. An initial phase of monitoring well construction should be required to determine depth to the water table and groundwater flow direction variability. Because the depth of both the water table and bedrock surface are undocumented, determinations about well construction can be made after and/or during site characterization field work. Plans and specifications should be submitted for both phases as appropriate.
- Recommend that 5 monitoring wells be constructed around the perimeter of the production site for the initial phase of monitoring. Wells should be monitored monthly for up to 12 months to determine seasonal variation in groundwater flow. The DNR, in consultation with the applicant should review water table elevation data after 4-6 months to determine if there is enough information to design a second phase of groundwater monitoring well construction or if elevation monitoring should continue. Groundwater elevation data should be collected during both the growing season when high capacity pumps are being used and in early spring prior to planting or late fall after harvest.

- If the water table is in the fractured bedrock, use of borehole caliper logging, down-hole video logging, temperature and conductivity sensors and pressure transducer devices (to collect information on bore hole diameter irregularities, water temperature, electrical conductivity and groundwater levels) should be used to identify the existence and depth of laterally extensive horizontal dissolution/fracture groundwater flow zones at the site (as proposed by the applicant's consultant) and well construction should be consistent with NR 141. If the water table is in the unconsolidated sediments, monitoring well screens should intersect the water table and be constructed as per NR 141.
- A separate work plan should be submitted to the DNR for approval for a second phase of groundwater monitoring well construction the purpose of which will be to monitor groundwater quality at the property boundary and upgradient and down gradient of specific regulated structures at the production site and, if necessary to set alternate concentration levels.
- Monitoring well construction should be documented as per NR 141 and the work plan should include grain size analysis and hydraulic conductivity determination. Water quality samples can be collected but should not be used to determine alternate concentration limits during initial phase monitoring, as the purpose of the initial phase is to better define groundwater flow direction, depth to regional groundwater and design of the next phase of monitoring well installation.

Specific Recommendations on the GW Monitoring Plan as Submitted

- Construction Plans and Specifications are missing - submittal does not include detailed monitoring well construction plans and specifications as required per s. NR 243.15(1) and s. NR 243.15(7). Monitoring well plans and specifications should include: proposed drilling methods, well construction material specifications, well sealing methods and materials, soil/geologic sample collection methods, diagrams of proposed well/piezometer construction, etc. This is with the understanding that field conditions may require changes to the approved plans and specifications.
- Monitoring Frequency – proposal should include language indicating that site monitoring wells will be monitored at the frequency proposed “or as directed by facility WPDES Permit”.
- Monitoring Parameters - proposal should include language indicating that site monitoring wells will be monitored and sampled for the parameters proposed “or as directed by the facility WPDES Permit”.
- Recommend that turbidity be added, and dissolved organic carbon (DOC) be substituted for chemical oxygen demand (COD), on the list of proposed monitoring parameters. Turbidity is very useful as an indicator of the existence of rapid, minimally treated groundwater recharge at a monitoring point.
- Recommend that the applicant provide information that supports the statement that there is limited communication between the horizontal fractures via vertical fracturing.

Recommendations on Facility Nutrient Management Plan

- The Nutrient Management Plan (NMP) should include detailed mapping of direct conduits to groundwater, concentrated surface water flow paths to direct conduits to groundwater, and focused infiltration areas within closed depressions.
- The NMP plan should include additional nutrient management practices, including at least 100 feet of separation to the features listed above, to protect groundwater and private wells as determined by Runoff Management staff.

