STATEMENT OF BASIS

GROUND WATER DISCHARGE PERMIT UGW010012

Smithfield Hog Production – Skyline BioEnergy Plant
Milford, Utah

September 2020

Introduction

The Division of Water Quality (DWQ) under the authority of the Utah Ground Water Quality Protection Rules[1] (Ground Water Rules) issues ground water discharge permits to facilities which have a potential to discharge contaminants to ground water[2]. As defined by the Ground Water Rules, such facilities include Agricultural operations.[3] The Ground Water Rules are based on an anti-degradation strategy for ground water protection as opposed to non-degradation; therefore, discharge of contaminants to ground water may be allowed provided that current and future beneficial uses of the ground water are not impaired and the other requirements of Rule 317-6-6.4.A are met.[4] Following this strategy, ground water is divided into classes based on its quality[5]; and higher-quality ground water is given greater protection[6] due to the greater potential for beneficial uses.

Under Rule 317-6, Smithfield Foods, Inc. has requested a ground water discharge permit renewal (Permit) for the Skyline BioEnergy Plant. DWQ has developed permit conditions consistent with R317-6 and appropriate to the nature of the operations, maintenance, best available technology[7] (BAT), and the hydrogeologic and climatic conditions of the site, to insure that the operation would not contaminate ground water.

Basis for Permit Renewal

This Permit is being renewed in accordance with R317-6-6.7. However, a permit may be terminated or a renewal denied if any one of the four items in R317-6-6.8 applies:

A. Noncompliance by the permittee with any condition of the Permit where the permittee has failed to take appropriate action in a timely manner to remedy the Permit violation;

B. The permittee's failure in the application or during the Permit approval process to disclose fully all significant relevant facts at any time;

C. A determination that the permitted facility endangers human health or the environment and can only be regulated to acceptable levels by plan modification or termination; or

D. The permittee requests termination of the Permit.

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[1] Utah Admin. Code Rule 317-6
[2] https://deq.utah.gov/ProgramsServices/programs/water/groundwater/docs/2008/08Aug/GWQP_PermitInfo.pdf
[3] Utah Admin Code Rule 317-6-6.1A
[4] Preamble to the Ground Water Quality Protection Regulations of the State of Utah, sec. 2.1, August, 1989
[5] Utah Admin. Code Rule 317-6-3
[6] Utah Admin. Code Rule 317-6-4
[7] Utah Admin. Code Rule 317-6-1(1.3)

Purpose

Groundwater discharge permit No.UGW010012 for the operation of the Smithfield BioEnergy (SBE) Plant is being renewed for a five year permit term. The BioEnergy Plant and a Collection System are located approximately ten miles west of Minersville, Utah, in the SW ¼ of the SE ¼ of Section 4, Township 30 South, Range 11 West, Salt Lake Base & Meridian. Smithfield Hog Production monitors the BioEnergy Plants and operates the swine production facilities in Beaver County southwest of Milford, Utah. Manure from each of the swine production facilities is drained into an associated anaerobic lagoon system for treatment and storage. The lagoon systems at the farm sites consist of one primary lagoon and one containment basin for evaporation. The primary lagoons and the containment basins are each compacted to at least 90 percent of maximum dry density and lined with a 40-mil high density polyethylene (HDPE) flexible membrane liner (FML). The Smithfield BioEnergy Plant is no longer in operation, but the Collection System for twenty-three existing finisher farm sites is being used to transfer manure to the Blue Mountain Biogas Plant. Hog waste can be collected from all of the finisher farms and conveyed through the Collection System to either the BioEnergy Plant or diverted to a different facility (Blue Mountain Biogas Plant). To increase biogas production at the Plants, supplemental organic feedstock can be added to the digesters. The additional steam requirement for heating the supplemental feedstock combined with the associated utilities for steam production can result in a significant amount of additional wastewater. To address this need for additional evaporative capacity, Smithfield Hog Production constructed a containment basin located directly east of the plant.

Table 1 provides a summary of the Farm and BioEnergy Plant Collection System.

Table 1: Summary of BioEnergy Plant Collection System

	Layout	*Farm Sites*
Phase I	East Skyline Layout	41311 through 41314
	Central Skyline Layout	41306 through 41308 41315 & 41322
Phase II	West Skyline Layout	41316 through 41321
	North Skyline Layout	41301 through 41305

Hydrogeology

The Milford basin lies in southwestern Utah, and comprises a 3,004 km^2 area in the Basin and Range physiographic province. The mountain ranges adjacent to the basin are bounded by normal faults and have large coalescing alluvial fans extending into the valley. The principal water-yielding aquifer is a basin-fill aquifer. Sediments that make up the basin-fill aquifer are late Tertiary to Quaternary age and consist of multiple discontinuous layers of silt, sand, and gravel separated by less permeable layers of clay and silt. The basin-fill deposits are at least 270 m thick in the basin center and thin toward the margins (Van der Hoven, 2001).

Ground Water Quality

Ground Water Class and Protection Based on ground water quality data from site-specific

monitoring wells, the ground water quality beneath the SBE Plant is Class 1A, Pristine Ground Water. Protection levels have been established by monitoring wells installed upgradient of the anaerobic digesters and containment basin, and by existing monitoring wells at nearby farm sites. Protection Levels for plant storage basins are summarized in Appendix I of Permit UGW010012.

As required in Part I.E.5.(c) of the permit, a background monitoring program has been completed by the permittee to collect data for calculating well-specific background ground water quality statistics. This includes background ground water concentrations for total dissolved solids, chloride, bicarbonate, nitrate + nitrite as nitrogen, ammonia as nitrogen, and pH, all of which have been defined for the purposes of determining the applicable protection levels and compliance limits. Most wells have more than a 10-year monitoring history. Compliance limits for all farms were evaluated for this permit issuance.

Class I Protection Levels. In accordance with UAC R317-6-4.2, Class I ground water will be protected to the extent feasible from degradation due to facilities that discharge or would probably discharge to ground water. Class I protection levels are established in accordance with the following criteria in UAC R317-6-4.2B.

Compliance Monitoring Program

A ground water monitoring well system has been installed at each of the digester and basin systems for the purpose of establishing the ground water gradient at each farm site and to monitor the ground water quality both upgradient and downgradient in the uppermost water-bearing zone under the lagoons. Ground water is sampled and analyzed semi-annually for the term of the permit. The following key leakage parameters were selected for compliance monitoring based on their high concentrations in the process water compared to concentrations in shallow ground water:

- Bicarbonate
- Nitrate+ nitrite as N
- Chloride
- Total Dissolved Solids

Field parameters collected for each groundwater sampling event include: pH, specific conductance, and temperature. This list of ground water monitoring parameters may be updated in the most recently revised and approved version of the Smithfield Hog Production *Sampling and Analysis Plan*.

Regulatory decisions made as a result of ground water monitoring must take into account the background variability of ground water quality at the sites. Smithfield Hog Production will not be required to take corrective action if it can be verified that changes in ground water quality are a result of other factors not related to their operations.

Best Available Technology (BAT)

The administration of this permit is founded on the use of best available treatment technology, in accordance with the requirements of UAC R317-6-1.3. Compliance with the requirements for use of best available technology (BAT) is demonstrated by construction, maintenance and operation of the collection and the digester systems according to the construction permits issued

for this permit.

The containment basin capacity design is based on evaporating approximately 33,000 gallons of liquid input into the basin each day. To minimize basin leakage, a 40-mil high-density polyethylene (HDPE) flexible membrane liner is constructed over an 8-inch compacted subgrade. Compaction of the subgrade is to 90% of standard proctor maximum density (ASTM D698). Construction quality assurance and quality control testing consisted of compaction testing to obtain proper compaction density. Atterburg limits and sieve analysis tests were performed to assure subgrade and compaction quality. A Construction Permit was issued on March 8, 2006. Authorization to place the containment basin in service was issued on November 2, 2006.

Farm sites each have at least one primary lagoon and a containment basin for evaporation. Primary lagoons and containment basins will be lined with a 40-mil synthetic high-density polyethylene (HDPE) FML. The coefficient of permeability for 40-mil HDPE is 2.7×10^{-13} cm/sec (Haxo and Lahey, 1988). The constructed depth and maximum operating depth of the primary and containment basins at each farm site are included in the construction permits and construction permit applications.

Construction permits require that lagoon systems and the SBE Plant be properly maintained in a manner to prevent excessive odors. The operation and maintenance of these facilities may require more effort than is outlined in the Natural Resources Conservation Service (NRCS) standards for maintenance of anaerobic lagoons found in the NRCS's *Agricultural Waste Management Field Handbook*. Additional guidance for the proper maintenance of anaerobic lagoons is available from the Utah State University Extension Service, the American National Standards Institute/American Society of Agricultural Engineers (ANSI/ASAE) Engineering Practice EP403.3 (July 1999) entitled *Design of Anaerobic Lagoons for Animal Waste Management,* and ANSI/ASAE Standard EP379.5 (April 2012) entitled *Management of Manure Odors*. If the guidance in these references is not followed, Smithfield Hog Production will provide credible documentation supporting any deviation from the guidance contained in the above references.

Potential Impacts to Ground Water

Leakage from liners can cause degradation of the ground water at the permitted sites. Potential impacts to ground water can be minimized by employing best available technology and discharge minimization technology for the lagoons. BAT performance monitoring, treatment technology, and compliance monitoring wells are used to ensure that the facility is operated in accordance with design specifications and will also ensure that any early indications of facility problems will be detected.

Major Permit Changes

The BioEnergy Plant facility is in idle status and is not currently operating. The permit is being maintained for possible future Plant use and/or business opportunities. Ground water compliance monitoring requirements for the digesters and wastewater evaporation basins are still in effect.

The requirement for collection and analysis of ground water samples for ammonia nitrogen for routine samples has been discontinued. Collection and analysis of ammonia in ground water samples will continue for probable non-compliance, non-compliance sampling, and lagoon

samples. Routine sampling for ammonia in ground water has been demonstrated to be of limited use. While ammonia is quite high in lagoon wastewater, it does not appear in ground water at leakage sites. Ammonia is transformed in the unsaturated and vadose zone prior to entering ground water. In warm, well-drained soil, ammonium transforms rapidly to nitrate (NO_3^-) which leaches easily, since the nitrate is a negatively charged ion (anion) and is not attracted to soil clay. Several thousand ammonia analyses of ground water have been collected, and ammonia is detected in less than 1% of the samples, even at known non-compliant sites. Sample splits collected by the Division of Water Quality confirm this fact. Chloride and Nitrate + nitrite in groundwater are better indicators of lagoon wastewater contamination than ammonia at this site.

Compliance Schedule

No compliance schedule items required for Permit UGW010002 under this permit cycle.

Permit Application Documents

Applicable Smithfield Hog Production Operations Documents for this permit include but are not limited to:

Anaerobic Lagoon Systems Operation and Maintenance Manual (rev. 2015)

Spill Prevention and Response Manual (rev. 2015)

Sludge Disposal and Farm Closure Plan (rev. 2015)

Nutrient Management Plan for Land Application (rev. 2015)

Smithfield Hog Production Sampling and Analysis Plan (rev. 2015)

Manure Drying Program Plan (rev. 2013)

Reference:

ASAE, 1999. American National Standards Institute/American Society of Agricultural Engineers (ANSI/ASAE) Engineering Practice EP403.3 Jul99, *Design of Anaerobic Lagoons for Animal Waste Management* pp 6. Retrieved on January 30, 2019 from http://agrienvarchive.ca/bioenergy/download/anaerobic_lagoons_asae_ep403.3.pdf

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Van der Hoven, S.J. 2001. Determination of Groundwater Transport Rates, Annual Recharge, and Sources of Microbial Contamination in the Milford Basin, Utah. Department of Geography-Geology, Illinois State University

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