

**STATEMENT OF BASIS**

**GROUND WATER DISCHARGE PERMIT UGW010016**

**Smithfield Hog Production**  
Milford, Utah

**June 2017**

**Purpose**

Smithfield Hog Production has submitted a ground water discharge permit application for new hog farms in Beaver and Millard Counties. Groundwater discharge permit No.UGW010016, which authorizes construction and operation of wastewater containment basins, is being issued for a five year permit term. Smithfield also operates hog production facilities in Beaver and Iron Counties southwest of Milford, Utah. Manure from each of the swine production facilities is drained into an associated waste containment system for treatment and storage. The basin systems at the farm sites consist of one primary digestion basin and one secondary evaporative basin. The primary and secondary basins are lined with a 60-mil flexible membrane liner (FML). Alternatively, Smithfield may choose to install digester technology with an evaporative lagoon that would at a minimum meet the above requirements. Table 1 below provides a summary of the Smithfield permitted facilities.

**Table 1: Location of Smithfield Hog Production Facilities for UGW010016**

Section	Township	Range	County
29,30,31,32,33	25S	9W	Millard
7,17,18,19,20,30,31	26S	9W	Beaver
13,15,23,26,27,33,34,35	26S	10W	Beaver
5	27S	9W	Beaver
3	27S	10W	Beaver

North Area: 38.57167 -112.9069    South Area: 38.5167 -112.9405

**Hydrogeology**

The Escalante Valley lies in southwestern Utah, and comprises a 3,004 km<sup>2</sup> area in the Basin and Range physiographic province.<sup>1</sup> 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. The principal water-yielding aquifer is a basin-fill aquifer. The saturated basin-fill deposits are estimated to be 100 to 300 feet thick under the proposed facility.

**Ground Water Quality**

Ground Water Class and Protection Levels. Based on ground water quality data from Utah Geological Survey groundwater investigations the ground water quality beneath farm sites ranges from Class 1A Pristine Ground Water to Class III Drinking Water Quality.

As required in Part II.F.2.(c) of the permit, a background monitoring program will be completed by the permittee to collect data for calculating farm-specific background ground water quality statistics. This includes background ground water concentrations for total dissolved solids, chloride, bicarbonate, nitrate + nitrite as nitrogen, and pH, all of which have been defined for the purposes of determining the applicable protection levels.

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.

Class II Protection Levels. In accordance with UAC R317-6-4.5, Class II ground water will be protected for use as drinking water or other similar beneficial use with conventional treatment prior to use. Class II protection levels are established in accordance with the following criteria in UAC R317-6-4.5B.

Class III Protection Levels. In accordance with UAC R317-6-4.6, Class III ground water will be protected as a potential source of drinking water after substantial treatment, and as a source of water for industry and agriculture. Class III protection levels are established in accordance with the following criteria in UAC R317-6-4.6B.

Class IV Protection Levels. In accordance with UAC R317-6-4.5, Protection levels for Class IV ground water will be established to protect human health and the environment.

### **Compliance Monitoring Program**

A ground water monitoring well system has been installed at each of the 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 containment basin. 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 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 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.

Smithfield will construct 52 farm sites for this permit, and each site has a digestion basin where manure solids are collected. These farm sites each have at least one digestion basin and a containment basin for evaporation. Primary containment basins and evaporative basins are lined with a 60-mil synthetic high-density polyethylene (HDPE) FML. 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.

The primary containment basin is sized to accept up to 1.8 cubic feet of volume per live animal weight (LAW) in the digestion basin for finisher farms and provide enough surface area for evaporation of water in the secondary basin. The digestion basins at each farm site are designed to operate as anaerobic waste treatment basins in which liquid and solid swine waste flushed from the pits under the animal containment barns is digested primarily by anaerobic bacteria in the treatment volume of the basin and sludge accumulates in the underlying sludge volume. These design specifications require the establishment and maintenance of a properly balanced bacterial population, which is realized through the proper operation, and management of the containment basins. Proper operation and management of anaerobic lagoons will also optimize volatile solids digestion and prevent excessive sludge build up extending the effective life of the basin before sludge removal is required. Only wastes from the hog-raising operations may be treated in the containment basins. The design, operational, and contingency requirements detailed above represent Best Available Technology since the implementation of these requirements is expected to be protective of ground water resources in the area surrounding the facility.

It is necessary to periodically remove accumulated solids from the bottom of each digestion basin at the farm sites. Smithfield has implemented a program to remove the solids from the containment basins and dry the manure on a constructed drying pad. Drying pad construction will follow the engineering design approved by the Utah Division of Water Quality. The manure is a nutrient source and the drying of the manure will allow the nutrients to be sold and applied to local cropland at agronomic rates.

Smithfield may also choose to install a digester with an evaporation basin. The exact design of this system is not finalized yet, but construction drawings will be submitted and approved prior to construction. The design of the system will meet all of the minimum design criteria as stated above to protect groundwater quality.

## **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 containment basin. BAT performance monitoring, treatment technology, and compliance monitoring wells will 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.

If any degradation of ground water from probable failure of BAT is observed, additional source assessment or corrective action may be required.

Accelerated Background Ground Water Monitoring Report for new or replacement wells. The Permittee shall submit a background ground water monitoring report for Director approval 60 days after the accelerated background monitoring program has been completed in accordance with the following requirements:

- a) At least eight (8) samples will be collected for each compliance monitoring well and parameter over a two year period at a quarterly sampling frequency utilizing the procedures outlined in the approved Water Quality Sampling Plan and Quality Assurance Project Plan.
- b) Each sampling event will include independent grab samples for each compliance monitoring well.
- c) Samples will be analyzed for all parameters listed in Table 2 of the permit plus the major ions bicarbonate, calcium, magnesium, potassium, sodium, and sulfate.
- d) All data for each well and parameter will be validated and the following statistical calculations will be performed and reported:
  - Mean concentration
  - Standard deviation
  - Mean concentration plus 2 standard deviations
  - Mean concentration times 1.25 for Class II ground water wells
  - Mean concentration times 1.5 for Class III ground water wells.

Ground water protection levels may be adjusted when the accelerated background monitoring program has been completed by the permittee and approved by the Director.

### **Permit Application Documents**

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

Smithfield Sampling and Analysis Plan

Anaerobic Basin Systems Operation and Maintenance Manual

Spill Prevention and Response Manual

Sludge Disposal and Farm Closure Plan

Manure Drying Program Plan

### **Reference:**

<sup>1</sup> 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