STATEMENT OF BASIS

GROUND WATER DISCHARGE PERMIT UGW270011

Christensen Sow Farm
7.6 miles Northwest of Fillmore
Millard County, Utah

September 2018

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 mining 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, Christensen Finishing Farm has requested a ground water discharge permit (Permit). 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 Issuance

Under Rule 317-6-6.4A, DWQ may issue a ground water discharge permit if:

1) The applicant demonstrates that the applicable class TDS limits, ground water quality standards protection levels and permit limits established under R317-6-6.4E will be met;
2) The monitoring plan, sampling and reporting requirements are adequate to determine compliance with applicable requirements;
3) The applicant is using best available technology to minimize the discharge of any pollutant; and
4) There is no impairment of present and future beneficial uses of ground water.

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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

Christensen Finisher Farm will construct and operate one farm site comprised of three barns with up to 6,840 total hogs piped to a 34-million gallon containment basin and an 8.5-million gallon evaporative basin. The farm is located approximately 7.6 miles northwest of Fillmore in Millard County, UT. The primary 34-million gallon containment basin is a total containment anaerobic digester and will receive waste water from the swine production operations and is sized to hold accumulated sludge from barn operations for up to 20 years. After the design accumulation period, the sludge will be pumped to a State-certified dying pad. During the 20-year operational period, the fluid portion will be transferred to an 8.5-million gallon evaporative basin designed to maintain a consistent fluid depth based on the annual average evaporative rate.

Concurrent with the ground water discharge permit for operation of the containment basin, a construction permit is being issued as described in Part I of the discharge permit. The Ground Water Discharge Permit will require compliance monitoring of process water and leakage from the primary liner into a perforated pipe tile-drain system that encompasses a gravel/pipe trench leak detection system. Fluids collected from the tile-drain system will be pumped back into the lagoon. A lower liner consisting of compacted native materials with a permeability of 1×10^{-5} cm/sec will minimize a release of any fluids from the lagoon containment system. The containment basins are sloped at a minimum of 0.25% to a riser access pipe for leak detection sump monitoring.

Hydrogeology

The site is located in the Pahvant Valley with the Pahvant Range forming the eastern boundary of the valley. The Pahvant Range is generally considered to be part of the eastern edge of the Basin and Range physiographic province, and consists of consolidated rocks of Paleozoic to Cenozoic age. The stratigraphy of the Canyon Mountains, forming the northeastern part of the valley, are similar to that of the Pahvant Range but includes rocks of Precambrian age. In the local vicinity of the proposed farm site the geologic conditions consist of alluvium or colluvium (Quaternary) overlying basalt flows. The basalt flow is underlain valley fill which could be up to thousands of feet thick. Alluvial fans which developed along the mountain fronts, predominantly during Quaternary time, were deposited synchronously with sediments laid down by intermittent lakes. The fans extended into the basin where they interfingered with lakebed deposits consisting of gravel, sand, silt, and clay. These deposits are unconsolidated and form one of the principal aquifers in the Pahvant Valley.

Ground Water Quality

The site is likely situated over Class II Drinking Water Quality Ground Water or Class III Limited Use Ground Water. Class II ground water has total dissolved solids between 500 and 3000 mg/L and Class III ground water has total dissolved solids between 3000 and 10,000 mg/L. Class IA Pristine Ground Water has been observed east of the farm site and may be present at the farm site. Class IA Pristine Ground Water has the following characteristics: 1) total dissolved solids concentrations less than 500 mg/L; and 2) No contaminants that exceed Utah ground water quality standards outlined in UAC R317-6-2. Since there is no ground water quality data at the farm site, characteristics for Class IA Pristine Ground Water will be implemented for ground water quality monitoring.

Class IA ground water will be protected to the maximum extent feasible from degradation due to facilities that discharge or would probably discharge to ground water. The construction design requires 60-mil HDPE flexible membrane liner for each of the containment basins. A secondary containment system underlies each basin and includes a perforated pipe tile-drain system that collects any leachate that may pass the liner system to alleviate ground water impacts. The tile-drain system is

installed in trenches in compacted sub-basin material, which will inhibit downward vertical flow and route liquid in the perforated pipe and accumulate in a sump. Any fluid or waste material collected in the tile-drain system will be pumped to each of the containment basins based on a maximum allowable head (MAH) threshold.

Potential Impacts to Ground Water

The containment basin and evaporative basin will be constructed with an HDPE primary liner to minimize discharge to the subsurface. Below each of the containment basins, a tile-drain system will be employed which includes a series of perforated pipe overlying compacted sub-base material. Water quality monitoring of the leachate collected in the tile-drain below each of the basins will be conducted to determine if liner integrity has been compromised and has the potential to impact ground water. The design is to preclude ground water contamination by minimizing any release of wastewater from the containment system through regularly monitoring fluid accumulation volume. Any fluid in the tile-drain system will be regularly monitored and pumped into the containment basins based on an allowable maximum head (MAH) threshold.

Compliance Monitoring Program

A compliance monitoring program will commence when the containment basin begins accumulating fluid. Each of the tile-drain system sumps will be regularly monitored for the accumulation of fluid in the system and quality of collected fluid. The water level in each of the system sumps will be monitored on a 2 day frequency for the first month of operation and then weekly for the extent of the permit. Once the MAH of three feet is attained, the fluid material will be pumped into the containment system and the total return volume recorded. Even when the containment basin is properly constructed and the HDPE primary liner is properly installed, there is a permeability of 1×10^{-12} cm/sec and the potential for minor defects in the material. The permeability and potential allowable leakage rate (ALR) is set in accordance with industry construction standards (Giroud, J.P., 1997).

Should the installation of compliance monitoring wells be required, upgradient and downgradient monitoring wells will be installed at each containment basin. Background ground water quality conditions will be determined in accordance with R317-6-6.10 and compliance limits for the downgradient wells will be set according to R317-6-4.

Because the dual containment system is engineered to capture and return containment basin leakage prior to ground water contributions, laboratory water quality analyses are not required for this permit. Monitoring of all tile-drain sumps will include in-situ parameters, including specific conductance. Should the specific conductance monitoring indicate potential contributions from the basins, laboratory water quality analyses are required. The following key parameters are selected for compliance monitoring based on their concentrations in the containment basin compared to concentrations in shallow ground water:

- TDS
- Chloride
- Nitrate + Nitrite
- Ammonia as N
- Bicarbonate

Best Available Technology

The applicable TDS limits for the existing ground water class, ground water quality standards and protection levels established under R317-6-6.4E will be met with the incorporation of the HDPE and tile-drainage system because no leakage is expected to reach ground water. The containment basin and evaporation pond will each be lined with 60-mil HDPE flexible membrane liners installed and constructed in accordance with the concurrently issued ground water permit. A perforated pipe, tile-drain system underlays the containment basin liners and overlies State-certified compacted soil sub-base to prevent deeper infiltration to ground water aquifers.

The monitoring plan, sample analytes and frequency, and reporting requirements are adequate to determine compliance with applicable requirements because they can be used to determine if there is a potential impact to ground water because of the difference between source and background water quality concentrations. The compliance monitoring parameters are significantly higher in the containment basins than the ground water background concentrations. The monitoring frequency is consistent with typical ground water flow rates and therefore, any potential leakage or concerns can be addressed in a timely manner prior to impacting ground water quality.

The applicant is using the best available technology to minimize the discharge of any pollutant to ground water by incorporating a primary liner, a secondary liner in the form of a tile-drain system, and a compacted sub-base prior to approaching the ground water table. All containment basin leakage will be collected in the tile-drain sump and returned to the containment basin based on a maximum allowable head threshold. The tile-drain systems will be manually monitored for fluid accumulation on a weekly schedule after an initial period of every two days. The water level in each tile-drain sump will be monitored and when MAH is attained, the material will be pumped to the containment basins and the volume recorded. Any fluids collected in the leak detection sump will be pumped back to the containment basins so that the water level in the leak detection sump is always less than three feet. In the event that the leak detection system has flow or heads that exceed BAT performance standards of the permit, a BAT failure exists and the permittee will be required to regain BAT by a number of solutions, including repairing liner integrity.

With the proposed ground water application, there is no impairment of present and future beneficial uses of ground water as the water quality conditions at the site are not expected to be impacted.

DWQ-2018-008495