STATEMENT OF BASIS
Ground Water Discharge Permit Renewal
Permit UGW210010

Holt Dairy, LLC
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P.O. Box 130
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Purpose

Ground Water Discharge Permit UGW210010 for Holt Dairy, LLC has been renewed for another 5-year term. Monitoring during the previous permit term has shown that the uppermost ground water underlying the site is still protected from contaminants introduced at the land surface by confining layers and an upward hydraulic gradient. In addition, the dairy facility and waste handling systems were constructed to minimize discharge of contaminants to the subsurface.

Facility Description

Holt Dairy operates a 5,415-cow dairy facility approximately 1.5 miles west of Newcastle, Utah in Iron County. The facility is located in the southwest quarter of Section 18, Township 36 South, Range 15 West, SLBM. The facility includes:

- Six Freestall Barns and Exercise Corrals, Flush Lanes, and connecting Cross Alleys;
- One Corral for dry cows;
- One Sick Pen;
- One 80 cow Carousel Parlor with Milking Equipment;
- One Hospital Parlor with Milking Equipment;
- One Calving Barn;
- Two Sand Lanes;
- One Biolink Flush Water System;
- One Reception Pit and Duplex Pump System;
- Composting and Mixing Areas;
- A site graded complete water and drainage system for all of the above items; and
- Two Anaerobic Lagoons with 60-mil HDPE Liner Systems.
- A Sedimentation Settling Cell
- A Pond Sump/Pump System

Construction was done according to the conditions of a construction permit issued by the Division of Water Quality on September 16, 2009.

The milking parlor utilizes an estimated 100,000 gallons of water daily. The water is used to pre-cool milk, cooling of milking equipment, for cow cleaning and for cleaning of equipment and facilities. The water is collected from the barn and is sent to a solids separator where the solids will be separated and the liquids are installed in the lagoon. Water used for cooling is recycled by collecting the warmed water in storage until it is used for cleaning of the parlor and cows. Water used for cleaning contains milk residues and manure as well as a small quantity of detergents and small amounts of disinfectants including iodine.

Wastewater that is collected from the milking parlor is piped to the solid separator. This equipment includes a series of gravity solid separating cells and a bio-link mechanical separator system. These facilities separate 70% of the solids from the liquid stream.

The freestalls are bedded with sand or composted manure and they are cleaned by flushing three times a day. The water from the freestall flush is conveyed over a concrete sand alley to remove as much of the sand as possible and the remaining effluent is run through the separator. Solids are composted at the site to be land applied at the appropriate time. The flush lanes are flushed with water taken from approximately 6 feet below the surface of the process tank of the Biolink separation system that has been used during the current days' wastewater production, for odor reduction by using cleaner and aerobic water for flushing.

The exercise lot and closeup lot are lined with compacted native soil and graded such that the runoff from the lots are collected and directed to the Biolink separator via the drainage system. The manure and bedding deposited in the exercise pens, closeup lot and calving barn are piled and hauled to the composting area as needed.

All the wastewater and runoff water containing manure flow through the gravity and mechanical separators. The mechanical separator is equipped with a bypass and overflow collection which is directed to the gravity separator and then to Lagoon #1. Runoff from other areas around the buildings will be diverted directly to Lagoon #2.

The liquids are stored in two anaerobic lagoons, lined with a 60-mil high-density polyethylene (HDPE) flexible membrane liner installed on top of a compacted soil base. Lagoon #1 is 412 feet by 218 feet with an approximate area of 2 acres and volume of 16 acre-feet. During normal operation all the effluent is conveyed from the Biolink to Lagoon #1 to allow for settling and eventual removal of solids. Lagoon #2 is used for evaporation and storage of wastewater prior to land application and is 412 feet by 1,002 feet with an area of approximately 9.4 acres and volume of 95 acre-feet. A transfer pipe at the normal high water level conveys water from Lagoon #1 to Lagoon #2. During normal operation, only overflow from Lagoon #1 and runoff from the site and composting area flow directly to Lagoon #2. In an abnormal event such as a large storm or power outage, effluent will be directed directly to Lagoon #2 from the reception pit. Operating depth of the lagoons is 10 feet with a maximum depth of 12 feet and 2 feet of freeboard.

The lagoons are sized based on 100,000 gallons per day of milking parlor process water, storage for the winter season when the effluent cannot be land-applied, and runoff from the 100-year, 24-hour storm event. During the growing season the liquids are mixed with clean water and applied to crops. A portion of the solids are composted and some of the compost may be exported to neighboring farms. Composted and non-composted solids are land applied to crop land owned by Holt Dairy with manure spreading equipment.

Hydrogeology

The facilities are located in Escalante Valley approximately two miles west of the point where Pinto Creek emerges from the mountain front. Sites where surface streams flow across coarse-grained deposits along mountain fronts are often important sources of recharge for aquifers in the alluvial valley deposits. Information obtained after drilling and installing three ground water monitoring wells revealed that materials under the site are predominantly silt and clay, with some minor lenses of sand and gravel.

While drilling the borings for the monitoring wells, uppermost ground water was encountered at approximately 250 feet below ground surface. After the wells were installed, static water levels in the wells were measured at 175 to 185 feet below ground surface (bgs). This indicates that the uppermost aquifer is under confined conditions and may be protected from contaminants introduced near the ground surface by nearly 300 feet of mostly fine-grained sediments and an upward (artesian) hydraulic gradient. Upgradient monitoring well MW-1 had a ground water temperature of 100 degrees F at 300 feet below ground surface, which suggests a geothermal source. The chemistry of ground water sampled at MW-1 is also different from that in downgradient monitor wells.

Historically, ground water levels in Escalante Valley have been falling due to overpumping. Ground water withdrawals and overpumping in the Beryl Junction area has resulted in land subsidence and earth fissures that were documented by the Utah Geological Survey. Additionally, overpumping may affect water levels in monitoring wells, vertical hydraulic gradients, and ground water flow directions during the lifetime of this facility.

Monitoring since this permit was first issued shows that while ground water levels in the monitor wells fluctuate over time, they have not dropped below 199 feet bgs. (Well MW-3, July 2012 measurement).

Best Available Technology (BAT)

For the various facilities and operations at the Holt Dairy BAT consists of the following:

1) Wastewater lagoons are lined with 60-mil HDPE flexible membrane liners over a one-foot subbase of compacted soil;
2) All facilities with sustained hydrostatic conditions, including reception pits and the milking parlor, are constructed with concrete and have water stops in all joints;

3) All open lots have a minimum of 12 inches of native soil compacted to 95% proctor, and this soil has a clay content greater than 18%;

4) Land application of solids and liquids will be done under a Comprehensive Nutrient Management Plan developed by a certified nutrient management planner.

Background Ground Water Quality, Ground Water Class, and Protection Levels

In order to better understand variability of ground water quality and pressure head in the ground water flow system, eight sets of water quality samples and water level measurements were collected from each monitoring well over a one-year period. Based on the accelerated water quality monitoring data, background water quality for key parameters has been established as summarized in Table 1.

Table 1: Background Ground Water Quality (mg/L)

Monitoring Well	TDS	Nitrate + Nitrite	Ammonia
MW-1 (upgradient)	1,090	1.6	0.06
MW-2	604	0.5	0.05
MW-3	829	0.2	0.05

Based on laboratory analytical results of eight samples collected in 2010 and 2011 from the three monitoring wells installed at the dairy site, the uppermost ground water is classified as Class II Drinking Water Quality with total dissolved solids (TDS) ranging from 600 to 1,100 mg/L.

Table 2 summarizes well-specific ground water protection levels, which were derived from background water quality data in accordance with UAC R317-6-4.

Table 2: Ground Water Protection Levels (mg/L)

Monitoring Well	TDS	Nitrate + Nitrite	Ammonia[c]
MW-2	1,007 [a]	2.5 [b]	7.5 [b]
MW-3	1,127 [a]	2.5 [b]	7.5 [b]

(a) Based on mean concentration X 1.25 (UAC R317-6-4).
(b) Based on 0.25 X ground water quality standard (UAC R317-6-4).
(c) Ammonia standard based on EPA Lifetime Health Advisory of 30 mg/L.

Ground water protection levels will only apply to changes in ground water quality due to contaminants introduced into the uppermost aquifer by the dairy facility (i.e., not from naturally-occurring geothermal effects).

Ground water from the monitor wells was sampled on June 3, 2015 as a permit condition. Results of this sampling are shown in Table 3. Protection levels were not exceeded in downgradient wells. While well MW-1 exceeded background concentrations for Nitrate + Nitrite in this sample event, it is an up-gradient well that samples ground water from a geothermal source, and its static water levels have not dropped below the confining layers.

Table 3: Ground Water Chemistry, Sampled June 3, 2015. (mg/L)

Monitoring Well	TDS	Nitrate + Nitrite	Ammonia
MW-1	1010	3.5	0.06
MW-2	560	0.3	<0.05
MW-3	844	0.1	0.05

Compliance Ground Water Monitoring

Ground water conditions at the site were unknown during the permit application process. Based on the assumption that hydrogeologic conditions would be similar to most valley and bench locations in Utah, Holt Dairy was required to drill one upgradient monitoring well (MW-1) and two downgradient monitoring wells (MW-2 and MW-3) located along the presumed direction of ground water flow. When the wells were drilled, it was discovered that the upper 300 feet of the subsurface was predominantly silt and clay, and the uppermost ground water was encountered beneath these layers under confined (artesian) conditions. Under these confined conditions, contaminants introduced near the ground surface at the dairy site are not likely to affect the uppermost ground water.

Based on the presence of confined conditions, sampling and analysis of ground water quality from the site monitoring wells would not be useful to evaluate compliance with permit conditions. Instead of ground water quality monitoring, compliance monitoring will be based on measurement of depth to water and ground water elevations in the monitoring wells. The depth to ground water data will be used to evaluate whether static ground water levels in the confined aquifer are dropping during the operation of the dairy facility, which could change the existing upward hydraulic gradient and make downward contaminant migration possible.

If static ground water elevations measured in the monitoring wells drop to or below the initial elevation where ground water was first encountered during drilling (250 feet below ground surface), water quality monitoring of the wells will be resumed. Ground water quality monitoring may also be resumed at any time upon notification by the Executive Secretary. The Permittee shall also sample all three monitoring wells six months before the expiration date of this permit term, as part of the permit renewal application.

Compliance with permit conditions will be demonstrated by monitoring static water levels in the confined aquifer as described above, water quality monitoring if necessary, maintaining best available technology of containment facilities appropriate for the site conditions, and following the approved Comprehensive Nutrient Management Plan for land application.