

OWNER AND OPERATIONS MANUAL

ELBERTA VALLEY AG WASTEWATER MANAGEMENT SYSTEM

Revised August, 2020

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I. Project Summary

Ownership - Contact List

Elberta Valley Ag is owned and operated by The Church of Jesus Christ of Latter-day Saints, a Utah corporation sole. The facility is located at 16100 So. 12800 West in Elberta, Utah 84626 Telephone: (801) 667-3500 Administrative Office.

Managers to Contact:

Brandon Anderson	General Manager	(385) 312-2181
Kip Rhees	Nutrient Manager	(801)-360-5158

Purpose/objectives:

The Elberta Valley Ag has two purposes: (1) to provide milk and other dairy products for the church welfare system, and (2) the sale of excess milk on the open market, with the profits generated being used by the church for humanitarian needs worldwide.

The dairy facility includes items that are required to be able to properly utilize the animal waste produced by the dairy in an environmentally friendly way and in accordance with all government regulations. The following general list includes the major items to be addressed in this Manual:

- Training of personnel
- Operation of each waste management element
 - Flush system
 - Lagoon system
 - Pumping system
 - Compost development facility
 - Lagoon water for irrigation
 - Solids separation system
- Storm drainage
- Test wells monitoring schedules
- Permit violation response
- Maintenance of waste management system/equipment
- Operating and maintenance schedules

II. Executive Summary

Purpose: To have a manual that expressly explains the operation and maintenance of the waste management system for Elberta Valley Ag.

Discussion: Elberta Valley Ag's dairy is a 5,000 cow dairy. The facility currently has one milking building with various rooms, milking equipment room, restrooms, offices and supply rooms and two double 40 herringbone parlors.

The waste management system consists of several components:

- A five-cell aerobic lagoon system (76 million gallons)
- Pumps, underground piping, and automatic flush valves
- A recycle lagoon water system for flushing
- A flush water receiving area with concrete pits where the manure can be processed through a solids separation system
- A solids separation system that consists of an agitation pump, two liquid pumps and two solids separators
- Biologics are added from time to time to assure minimum odors and an aerobic system that functions as designed
- One 100,000 gallon tank for recycled water to flush alleys and lanes
- A compost area where the solids are stored and composted for use on the farm and dairy
- An irrigation system for the lagoon water to be applied to the farmland

The waste lagoons are lined according to DWQ regulations and it is the intent of Elberta Valley Ag management to be in compliance with all rules and conditions associated with the Ground Water Discharge Permit. Test wells are installed and samples will be taken in accordance with the rules.

This manual includes the information necessary to maintain the wastewater management system and the procedures associated with training and actions to be taken in the case of a malfunction.

III. Waste Management

Flush System

Freestall Barns

The flush system for the freestall barns consists of 39 automatic flush valves. There is a panel by each barn with buttons to activate the valves. Pumps are located in pump house #1 with a 100,000 gallon metal reservoir to hold recycled flush water, a pipe system to transfer lagoon water to the 100,000 gallon tank to the flush valves in the freestall barns and from the drains in the freestall barns to the solids separator receiving pits. Each valve can be activated automatically or manually as needed. The HMI controls for the flush valves in the freestall barn are located in the NW corner between the milking parlor and pen 8. The valves in the freestall barns are activated by an employee whose job title is cow pusher. Each time the pusher takes cows from one of the 18 pens to the milking parlor he goes to the panel next to the pen he is moving and pushes the button associated with that pen. There are two alleys in each pen. When the button is activated the first alley flushes the prescribed amount of time, normally about 90 seconds. When that alley is finished that valve closes and the flush valve for the second alley

pops up and it is flushed. When the sequence is completed the valves shut off and recede into the concrete floor.

If for some reason the separator pumps are not working these buttons cannot be activated and there is an alarm that will notify those that have responsibility for the separator pumps that the system needs attention. If the flush valves do not activate the HMI panel identifies possible causes so the technician can rapidly diagnose the problem. Each employee that has responsibility for the flushing system is trained how to trouble shoot a problem and who to contact if a more skilled technician is needed.

Flush water recycling outlets from lagoon Cells 4 and 5 provide water to the flush water recycling pumps located in pump house #1 near Cell 4. Either Cell or both Cells can deliver water to the pump house via manual control valves in the Cell outlet piping. The planned detention volume will be basically held in Cells 1, 2 and 3. Transfer of water to Cells 4 and 5 shall be as required to provide water for recycling during the required detention months of the year.

Milking Barn

The flush system for the milking parlors and holding pens consist of 12 automatic flush valves, a pipe and drainage system, a recycle pump that transfers water from the milk cooling system (chillers & plate coolers) to a 300,000 gallon metal reservoir.

The 300,000 gallon reservoir is located adjacent to the 100,000 gallon reservoir mentioned in the freestall section. The water from this 300,000 gallon tank is used for stock watering and to flush the milking parlors and holding pens. The flush valves in the milking parlors are automatically activated eighteen times per day. The water from the milking parlors drain into the same line that drains the rest of the facility. The holding pen flush water flows to the center cow alley at the rear of the milking building and follows the alley to the main drain at the very south of the freestall barns where it then flows into the solid separator receiving pit.

The same override that is on the freestall flush valves is on the milking parlor flush valves. Therefore, it would be nearly impossible for overflow from the drains or the separator receiving pit to spill effluent onto the ground.

Lagoon System

Lagoons

This facility has a five (5) Cell interconnected lagoon system with 76 million gallons of wastewater storage at one time. Each of the five Cells is 26 ft. deep from the top of freeboard to the bottom of the Cell. The Cells all have 3:1 side slopes. Each Cell is 219 ft. wide at the edge of the freeboard, the maximum high water level in each Cell is 2 ft. below the freeboard.

Cell # 1	1000 ft. long
Cell # 2	800 ft. long

Cell # 3	650 ft. long
Cell # 4	500 ft. long
Cell # 5	350 ft. long

The volume designed into the lagoons provides wastewater treatment for 5,000 cows generating some 330,000 gallons of waste water per day, 365 days per year. Five-month detention (150 days) is planned at 50,000,000 gallons. The total five Cell storage volume is approximately 76,000,000 gallons.

The lagoon system is to be monitored three times a day by personnel trained to transfer water from Cell to Cell to maintain the desired level to accommodate the current inflow and cow flush water inflow. The inflow will be different depending on the number of cows in the freestall barns, evaporation and time of year.

Recycled lagoon water is used to flush freestall alleys in the freestall barns and the cow lanes from the freestall barn to the milking parlors. There is a grid of 15-inch underground piping that conveys the flush water from the dairy facility to a solid separation location where the liquid drops in the 15-inch pipe and is gravity fed to the #1 Cell on the lagoon system. Measurement is required of all water use in the dairy system. The fresh water has totalizing water meters installed on the water well, the chiller pump inlet and the process water pump inlet. Each lagoon Cell is equipped with a water level indicator measuring water depth in the Cell at 1 foot intervals.

Lagoon water surface elevations are physically visible from the measuring points on the surface water indicator located on the freshwater make-up concrete apron found in each Cell of the lagoon system.

The lagoon Cells are all lined with a 20 ml. PVC liner and 12-inch clay ballast. The lagoons transfer water from Cell to Cell via manually operated transfer piping and/or overflow piping. Overflow piping is only from Cell 1 to 2 and Cell 3 to 4, because of difference in elevation. The transfer piping from Cell 2 to 3 and Cell 4 to 5 will be locked open to serve as overflow because these Cells are the same elevation. There will be no over-flow out of Cell 5, the lagoons are monitored three times daily and there is the capability to pump out of Cell 5 to three separate pumping systems. The transfer pipes are set to be 6 feet above the bottom of each Cell. The planned dead storage is to keep the aerobic microbes working in all Cells in all conditions.

Each Cell has a freshwater make-up supply with an air gap discharge onto a concrete apron. The freshwater inlet is manually controlled. Each freshwater apron has a lagoon water depth measuring device attached to the apron for visual observation of water depth. The lagoon Cells are totally enclosed in a 6 ft. high barb wire fence. The berms between Cells are 30 ft. and 24 ft. wide to accommodate light truck traffic. All berms are finish graded with a gravel wearing surface.

There are also three ponds located at the old dairy parlor that is still used to milk hospital cows. This parlor is flushed twice a day with approximately 1,000 gallons of water. All three ponds are lined with polypropylene vinyl and have a combined storage capacity of 3.9 million

gallons. This waste water goes through a solids separation system and then the waste water is sent into the first lagoon and can serpentine to lagoons 2 and 3 where it is then pumped over to Cell 5 of the upper lagoons where it can then be utilized as flush water or applied to the fields.

Pumping System

Pump House #1

The flush water is recycled through a pump house located east of the lagoons and west of the heifer raising unit. The pump house is an enclosed block building with a duplex booster pump set (identical pumps) each delivering 1,160 GPM at 170 ft. TDH to the flush water reservoir. The electrical control system for the pumps are located in the pump house. Only one (1) pump is normally operating at a time with the pumps alternating each time the pump control turns on the pumps. The pump is to maintain a set water level in the flush water reservoir. The inlet piping from lagoon Cells 4 and 5 is a 10-inch diameter. The discharge piping just outside the pump house to the recycle flush water reservoir is 10-inch diameter PVC. All piping and/or plumbing in the pump house is metal pipe. The pumps are radio controlled by a sensor mounted on the flush water reservoir. SEE DRAWING C-18

Compost Development

The solid waste that is generated from the flushing system and scrapings from the open lots is processed into compost. A commercial compost turner is used to convert raw dairy manure into high quality compost. The past practice had been to use some compost for bedding for the livestock and the remainder sold to retail customers. With the expansion of the dairy the compost will continue to be used for bedding but the remainder is applied to the crop land (approximately 9,500 acres). The manure from the solid separators is loaded onto dump trucks and hauled to the composting location near the dairy facility. Compost used for bedding will be turned enough times to elevate the temperature to over 130 degrees Fahrenheit to kill pathogens and allowed to dry down before placing into the freestalls as bedding. The material from open lots is turned fewer times and spread onto the crop land as fertilizer.

Irrigation System

The lagoons have a 150 days winter storage capacity for the winter months when land application through center irrigation pivots is difficult. It is the normal practice to irrigate until November and begin again in March. In a rare instance if it were necessary to discontinue irrigation in October and not be able to resume until April this system would accommodate such an incident. The lagoon system is linked through independent underground lines to provide irrigation water from the lagoons to accommodate 3,200 acres (30 center pivots). The lagoons are used throughout the summer irrigation season to irrigate growing crops. In the fall they are pumped down and the water is applied to the land to allow room for winter storage. In early spring (March) the water accumulated through the winter is applied to farmland in preparation for spring planting. Soil and lagoon water samples are taken to determine the needs of the soil and the nutrients in the water is metered onto the fields based on the need of the crop being grown.

Freshwater make-up supplies with manual shut-off valves are located in each lagoon Cell. Fresh water can be introduced to any lagoon with a 2 ft. minimum air gap discharging to a concrete apron running down the 3:1 slope to the operating water surface. The purpose of having an ability to provide make-up water to a given Cell is to insure that when large amounts of lagoon water are taken to the irrigation system that any required surface elevation can be maintained to continue to develop flush water without interruption. The introduction of fresh water is vital to the management of the lagoon system.

Separator System

The separator facility is located immediately south of Freestall barn 4 and receives waste water from free-stalls and milking barn. The waste water is discharged into a holding vault that is accessible for periodic cleaning with a front end-loader. This holding area discharges the waste water over a weir in the side wall to a deep separator holding basin and then pumped to the separator equipment and conveyor system that separates solids over a screen. It then discharges the remaining water to lagoon Cell 1. The conveyor separated material is stock-piled in piles to be picked up and delivered to the compost designated area by truck. Any time the holding basin is full and the separators are not keeping up with the demand or the two (2) separators are not working properly the total flush valve system is locked out from delivering additional waste water to the separator. The holding basin is provided with overflow ports in the side wall to safeguard for an emergency with the flow going to the large catch basin where the solids are collected to drain directly into the waste water outfall line to lagoon Cell 1.

Storm Drainage

Elberta Valley Ag's freestall barns and milking facility located west of the main office have covered roofs. The rainwater falls from the roofs onto an area that cattle do not have access to. The terrain is graded and sloped to the east where two small reservoirs are located to hold the storm water until it evaporates. The open corrals on the south end of the dairy facility the Elberta Heifer Center are sloped and graded to drain storm water to the South end of those corrals into a depression that is less than 100 X 300 X 2 feet deep where it can evaporate. The water is unable to leave the premises of the land owner and because the water table is near 200 feet there is not a concern for ground water contamination. There are only a few occasions in any given year where there would be standing water in this area and it only takes a short time for the water to dissipate.

Test Wells

Three test wells have been drilled located in accordance with the recommendations for the Department of Water Quality. The water table depth is between 175 and 250 feet. The test wells are at the depth required to reach the water level. Samples will be taken as prescribed in the ground water permit.

Permit Violation Response

If, for any reason, there is a discharge to the waters of the state, oral notification will be made within 24-hours to the Division of Water Quality (DWQ) (801-538-6146); or the 24-hour answering service (801-536-4123) and notify the Executive Secretary in writing within 5 working days of the discharge from the facility. Copies will be kept of the notification which will include:

1. Description of the discharge: A description of the discharge and its cause, including a description of the flow path to the receiving water body and an estimate of the flow and volume discharged.
2. Time of the discharge: The period of discharge, including exact dates and times, and the anticipated time it is expected to continue, and steps taken or planned to reduce, eliminate and prevent recurrence of the discharge.

IV. Training

Operation

-Flush system. Each time the cow pusher takes cows from one of the 16 pens to the milking parlor he goes to the panel next to the pen he is moving and pushes the button associated with that pen. There are two alleys in each pen, when the button is activated the first alley flushes the prescribed amount of time normally about 90 seconds when that alley is finished that valve closes and the flush valve for the second alley pops up and it is flushed. When the sequence is completed the valves shut off and recede into the concrete floor. If the separator holding basin is full or for some reason the separator pumps are not working these buttons cannot be activated.

-Lagoon system. The lagoon system will be monitored three times a day and personnel trained to monitor transfer water from Cell to Cell by adjusting the valves between Cells 1 & 2 to maintain water levels. The valves between Cells 3 & 4 will be opened and closed to maintain volume needed to supply flush system, and farm irrigation. Overflow piping is only from Cell 1 to 2 and Cell 3 to 4, because of difference in elevation. The transfer piping from Cell 2 to 3 and Cell 4 to 5 will be locked open to serve as overflow because these Cells are the same elevation.

-Pumping system. The pumps are automatically controlled by a sensor mounted on the flush water reservoir. Flush tank level is monitored daily by inspecting the visual level indicator on the tank. All flush valves are inspected daily for leaks.

-Compost development. The manure from the solid separators is loaded onto dump trucks and hauled to the composting location near the dairy facility. A commercial compost turner is used to convert raw dairy manure into high quality compost. Compost will be turned enough times to elevate the temperature to over 130 degrees Fahrenheit to kill pathogens and allowed to dry down. Finished compost will be hauled to bedding area and farm crop land.

-Irrigation system. Soil samples from crop land and lagoon water samples are taken to determine the needs of the soil. The nutrients in the water are metered onto the fields based on the needs of the crop being grown.

-Solids separation system. The waste water is discharged into a holding vault and then over a weir in the side wall to a deep separator holding basin that is automatically controlled, pumping the waste water through the separator equipment and conveyor system and discharges the remaining water to lagoon Cell 1.

-Permit violation response. If, for any reason, there is a discharge to the waters of the state, oral notification will be made within 24-hours to the Division of Water Quality (DWQ) (801-538-6146); or the 24-hour answering service (801-536-4123) and notify the Executive Secretary in writing within 5 working days of the discharge from the facility. Copies will be kept of the notification which will include:

-Description of the discharge: A description of the discharge and its cause, including a description of the flow path to the receiving water body and an estimate of the flow and volume discharged.

-Time of the discharge: The period of discharge, including exact dates and times, and the anticipated time it is expected to continue, and steps taken or planned to reduce, eliminate and prevent recurrence of the discharge.

V. Permits

Permits required for this project include:

- Dairy building construction -- Utah County, Utah
- Electrical safety - Utah County, Utah
- DEQ wastewater lagoon construction/operation- Utah State
- Water tank- Utah County, Utah
- Fire Marshall approval - Utah County, Utah
- DWQ Ground Water Discharge Permit- Utah State DWQ
- Comprehensive Nutrient Management Plan – NRCS

VI. Attachments

- Aerial photo Elberta Valley Ag
- Aerial photo 5-Cell lagoon system
- Drawings
 - C-18





