United States
Environmental Protection
Agency

Swift Beef Company, Hyrum Plant
Site Visit Report

August 2022

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U.S. Environmental Protection Agency
Office of Water (4303T)
1200 Pennsylvania Avenue, NW
Washington, DC 20460

The report was prepared by ERG under Contract EP-C-17-041.

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1. Facility Information

The U.S. Environmental Protection Agency (EPA), with support from its contractor Eastern Research Group (ERG), conducted a site visit at Swift Beef Company Hyrum beef processing facility (SBC-Hyrum) on June 23, 2022. EPA is collecting data to support a review of the Meat and Poultry Products (MPP) Effluent Limitations Guidelines and Standards (ELGs). The purpose of this site visit was to characterize process and wastewater treatment operations used in the industry. EPA selected the SBC-Hyrum location due to its low nutrient concentrations (total nitrogen and phosphorus) in its final effluent as demonstrated in Discharge Monitoring Reports (DMR) data, types of meat and processing operations conducted, presence of chloride treatment, and willingness to host EPA and contractor staff. EPA and ERG staff discussed beef processing operations including planned upgrades, wastewater treatment and monitoring, water usage, and waste management. See Appendix Table A-1 for a list of attendees and Attachment 1 for a copy of the presentation prepared by SBC-Hyrum.

1.1 Facility Details

SBC-Hyrum is one of nine beef processing facilities owned by JBS USA Food Company operating in the U.S. The original plant was built in 1936; JBS USA Food Company acquired it in 2007. Cattle is harvested on site, producing fresh and frozen beef products. The facility also processes hides and renders tallow, blood meal, bone meal, and other byproducts. SBC-Hyrum has the capacity to slaughter 2,350 head per day but currently averages 2,200 head per day slaughtered and processed (roughly 2,938,300 pounds live weight killed (LWK) per day).

SBC-Hyrum employs nearly 1,500 staff and typically operates 5-6 days per week; operations on Saturdays occur generally every other week. Harvesting operations occur during the first eight-hour shift, while processing (referred to as "fabrication" by the facility) occurs for a 10-hour shift. Harvest and fabrication shifts run simultaneously, both starting at 6:00 AM. Harvesting ceases at 2:30 PM and fabrication at 4:30 PM. Cleaning of harvest and fabrication floors is done on a third shift, beginning at 10:00 PM and ending no later than 3:30 AM. Rendering operations typically occur throughout the day, across all shifts. Wastewater treatment is operated 24 hours per day, seven days per week.

1.2 Process Description

Cattle arrive at SBC-Hyrum via truck at least twice per day. Cattle are primarily sourced from concentrated animal feeding operations (CAFOs) from around the U.S. and Canada. The cattle pens are open-air concrete areas just outside the harvest building with a capacity of 1,100 head. Water is used in the cattle pens and holding area for wash down between lots, typically daily, and for drinking water and cooling cattle. Roughly 50,000 gallons per day (GPD) are used to wash pens and water. No trucks are washed onsite. Trucks are required to wash offsite. Runoff from the cattle pens is collected and combined with other manure-bearing wastewater (from the harvest floor).

Harvesting

As trucks arrive onsite with live cattle, they are weighed on a truck scale; the tractor-trailer weight is subtracted from this gross weight to determine the live weight killed (LWK) for that load. The harvest floor is divided into a dirty side, where animals still have their hide, and a clean side, where carcasses are without hides. After harvesting, cattle are mechanically lifted and hung to bleed out. Blood is collected in an area surrounded by a berm to facilitate collection for fabrication. Hides are removed from the carcasses and set aside for fabrication. Head, organs, and other non-edible parts (paunch, tails, nostrils, etc.) are also removed. Heads are fabricated. Any edible organs are sent to fabrication or edible rendering, with the distinction being products fit for consumption in the U.S. or in other countries, respectively. Intestines, for example, receive an internal and external water wash before being braided and packaged for consumption, primarily in Asia. All organs and nearly all parts (paunch and tails, for instance, are alternatively disposed) not fit for human consumption are transferred to inedible rendering

or packaged for sale as pet food. Condemned product, spleens, hearts, livers, and lungs are sold for pet food.

Carcasses proceed through the harvest area via an overhead conveyor, with each carcass hanging from above. With hides removed, carcasses on the clean side of the harvest floor are washed in cabinets with hot water and treated for *Salmonella* and *E. coli* using a mixture of water, peracetic acid (PAA), antimicrobial containing lactic acid and citric acid, and bleach. From harvest to the hot boxes takes roughly 30 minutes.

Harvesting is the largest water user at the facility, typically using approximately 1.7 million gallons per day (MGD). All wastewater from the dirty side of the harvesting floor is collected with other manure-bearing wastewaters. Non-manure-bearing wastewater from the clean side of the harvesting floor is collected and transferred to a dissolved air flotation (DAF) unit.

Fabrication

Carcasses are weighed to determine hot carcass weight and transferred to hot boxes for cooling. Hanging carcasses remain in the hot boxes for 24-48 hours to allow for complete cooling and chilling. A bromine-based disinfectant is sprayed in the hot boxes to disinfect and help with cooling. Each hot box can contain 2,440 head, using 200,000 GPD of water. SBC-Hyrum operates several hot boxes operated in parallel, as one hot box is in use, with carcasses hanging to cool, others are either being filled, or cleaned. Use of each box is rotated daily to allow carcasses appropriate cooling time and to always have material on the processing floor.

From the hot boxes, carcasses are graded, weighed again, and moved to the processing floor. Carcasses remaining suspended from conveyors are first cut into large pieces, with larger cuts removed from the hanging carcass, then smaller and smaller cuts, until the entire carcass is on one of several production conveyors. Each production conveyor, or line, focuses on different muscle groups or areas of the carcass. Meat cuts are packaged and boxed fresh or frozen and stored in a cooler prior to shipping. Any bone or fat cut from the production lines is transferred to edible rendering or used in grinding other products, such as ground beef. Material that is inedible, contacts the floor, or is otherwise inedible is transferred to inedible rendering.

Wastewater generation from fabrication is much less than that generated by harvesting, typically accounting for 220,000 GPD (including both fabrication and sanitation). Water is used to clean knives, occasionally sanitize specific areas, and sanitize carcasses or cuts. Sanitizing on the fabrication floor for *Salmonella* and *E. coli* uses a mixture of water, PAA, and antimicrobial containing lactic acid and citric acid (identical to harvesting mixture but without bleach). Wastewater from the fabrication area is collected and transferred to the DAF.

Packaging

SBC-Hyrum operates a highly automated refrigerated warehouse where all products are stored before being loaded on trucks to their final destinations. The warehouse is periodically cleaned using air to remove cardboard dust. No wastewater is generated from the packaging and warehouse areas.

Blood Processing

All blood collected from the harvest floor is transferred via gravity to the basement area where it is sparged, separated, and dried into blood meal. Wastewater from this area is considered manure-bearing wastewater.

Rendering

SBC-Hyrum operates two separate rendering operations, one for edible products and one for inedible products. SBC-Hyrum is slightly unique in that the inedible rendering process uses a low temperature rendering processes, wherein rotary drum dryers are used instead of traditional cookers. The edible

rendering process is commonplace, heating up the raw product with steam then centrifuging it to separate out the animal fat, and the solids ultimately being dried in a rotary drum dryer. All vapor from the dryers is treated through a scrubber prior to emission to the atmosphere.

Edible rendering products include tallow and gel bone. Tallow is stored in tanks before being hauled offsite via truck or rail car. Other rending products from edible rendering and inedible rendering (e.g., pet food) are packaged for shipment offsite.

Wastewater is generated continuously from rendering, including blood stick water, scrubber makeup water, centrifuge stick water, condensate, and area wash down water, is combined with other manure-bearing wastewaters. These flows are not independently metered.

Hide Processing

Hides from the harvest floor are collected and hauled to a separate building onsite for processing. First, hides are rinsed and washed in a freshwater raceway to remove any mud, manure, and other debris. Fresh water is continually exchanged in this process. Next, hides pass through a flesher to remove excess fat and flesh from the skin before being transferred to a brine raceway, where each hide spends 16-24 hours soaking to preserve the skin. Hides are then sent through a wringer and pressed to remove excess brine and moisture. After the press, hides are folded and stacked on pallets. Pallets sit for several days to allow continued drying before being put on trucks and shipped to Asia.

Roughly 40,000 GPD of non-brine wastewater from washing hides is pumped to the green water clarifier. The brine solution, salt and water, is recharged daily with additional salt. The raceway is a water positive environment as the brine causes the hides to leach water. Brine is purged daily to maintain the levels in the raceway. Purge from the raceway is sent to brine reclamation where a salt save system uses heat to evaporate water and generate a salt slurry. The salt slurry is then used to recharge the brine. About 3.5 gallons of brine per hide are recovered. Before the salt save system, total dissolved solids (TDS) concentrations can measure around 311,817 mg/L and drop to around 2,825 mg/L after.

SBC-Hyrum is in the process of replacing the salt save system with a larger system. The system design will be similar to the current system. Facility staff noted that the current system is notoriously difficult and expensive to operate due to the highly corrosive nature of the stream. JBS estimated that the yearly cost was approximately $500,000, as the salt save requires an operator per shift and frequent part replacement. SBC also noted that the energy requirements of the evaporator contribute to the plant's greenhouse gas (GHG) emissions. JBS provided the following approximate ranges for chloride concentrations in wastewaters where beef hides are treated onsite: 1,100-1,200 mg/L without a salt save, 250-750 mg/L with a salt save.

Cleaning

Regular cleaning of the harvest floor, processing areas, and edible rendering areas occurs every night on third shift by a subcontractor. Inedible rendering areas are also cleaned regularly, typically with a caustic solution, but use less cleaning chemicals; this area's flow is not metered independently. Hot boxes are used in rotation and cleaned during the first shift when not in use.

Wastewater generated from cleaning operations is commingled with process wastewater from the location (e.g., wastewater generated from cleaning the harvest floor is combined with the manure-bearing wastewater just like process wastewater from this area).

SBC-Hyrum does deep cleaning twice per year according to a master sanitation schedule and occurs on non-production days. The same chemicals used in regular cleaning are used during deep cleaning, but procedures may be modified to remove equipment instead of cleaning in place. Specific areas are cleaned monthly, with each area rotating through the schedule. Because these larger cleaning events are scheduled, the wastewater treatment (WWT) operators can anticipate the increased flow of cleaning wastewater, typically 3x that of a normal sanitation shift. A smaller anaerobic lagoon is used as a holding

area. Wastewater can be diverted to the holding pond as needed during cleaning events and mixed in as capacity is available.

Source water

Source water at SBC-Hyrum comes from the City of Hyrum, which is thought to be primarily surface water. SBC-Hyrum is in the process of installing a replacement water softening system. In both the old and new systems, water is softened using a brine soak system for hot water applications. Sulfuric acid is used to minimize scale buildup; the new system will eliminate the need for sulfuric acid. Staff anticipate the new system will go online in September 2022.

2. Wastewater Treatment

SBC-Hyrum is a direct discharge facility, discharging to an irrigation ditch that flows to Spring Creek. SBC-Hyrum transfers 1.7 MGD of wastewater to the treatment system. All manure-containing wastewaters are separate from non-manure bearing wastewaters. Table 1 includes a description of each of these primary wastewater streams.

Table 1. Wastewater Contributions

Stream Name	Average Flow (MGD)	Wastewater Details
Non-manure Wastewaters	1.25	Wastewater from clean side of harvest floor and processing area
Manure Wastewaters	0.45	Wastewater from cattle holding area, dirty side of harvest floor, hide processing, rendering (edible and in-edible), and sanitary wastewater

Figure 1 includes a diagram of the SBC-Hyrum WWT system. Each influent wastewater stream is collected in separate pits. Non-manure bearing wastewaters are pumped to a rotary screen and then pumped to a DAF. Manure-bearing wastewaters are pumped to the green water clarifier. SBC-Hyrum considers the DAF and green water clarifier as pretreatment.

The DAF has a capacity of 2,000 gallons per minute (GPM), a hydraulic residence time of 1.4 hours, is circular, and is not covered. SBC-Hyrum is in the process of enclosing the DAF in a building to help winterize the system and prevent lines from freezing and to help control the smell. WWT operators monitor the DAF influent and effluent for total suspended solids (TSS) at least daily; staff noted on average the influent is 10,000 mg/L and effluent is 3,500 mg/L. DAF float is sent to a series of three melt tanks to separate the oil from the grease (see Section 4). DAF bottoms are transferred to the manure-bearing wastewater pump station. Wastewater effluent from the DAF is combined with overflow from the green water clarifier and sent to the facility's WWT system, also known as water reclamation.

The WWT system is located a distance away from the main processing facility on 11 acres and is referred to as water reclamation. The combined effluent from pretreatment is pumped underground to the anaerobic lagoon, which has a capacity of 12.6 million gallon (MG), a hydraulic residence time of 7.9 days, and an HPDE liner. The anaerobic holding basin is used only as needed for extra capacity. The pond is covered, and biogas is collected; moisture and sediment are removed and the gas is reused in the facility for boilers. The pond generates 2,000 to 3,000 million British thermal units (MM BTUs) per week.

Adjacent to the anaerobic lagoon is a second smaller anaerobic holding pond, used for overflow from the lagoon and during major cleaning events. This smaller pond also has an HPDE liner.

Effluent from the anaerobic lagoon is sent to a set of two parallel anoxic basins; these basins have a combined capacity of 500,000 gallons. SBC-Hyrum has the ability to bypass the anaerobic lagoons as needed based on nitrogen concentrations. Nitrogen concentrations are measured at a splitter box located at the headworks of water reclamation, just before wastewater enters the anaerobic lagoon. If nitrate concentrations exceed 70 mg/L for three consecutive days, then flow bypasses directly to the anoxic zones.

Effluent from the anoxic basins is routed to the aeration basin, which has a capacity of 1.2 MG, where magnesium hydroxide (MgOH) is added to control alkalinity. Nitrate is recycled via return pumps back to the anoxic basin. Within in the aeration basin, staff target a dissolved oxygen (DO) concentration between 2.2 and 2.8 mg/L and a pH level between 6.9 and 9.0. Effluent from the aeration basin is sent to a set of four parallel clarifiers. Flow is equalized between the clarifiers as all four are slightly different sizes. The facility targets a sludge depth in each clarifier of less than three feet. Alum is added in the clarifiers for phosphorus control. Return activated sludge (RAS) from the clarifiers is mixed with effluent from the anaerobic lagoon as it enters the anoxic basins. Waste sludge is sent to a coagulant tank and then dewatered using a screw press. SBC-Hyrum monitors the solids in the mixed liquor off the clarifier; above 7,500 mg/L, sludge is wasted.

Wastewater overflow from the clarifiers is combined and sent to tertiary drum filters. The drum filters have a cloth filter that is replaced every six to seven years and filters are removed for annual cleaning; waste from cleaning goes back to process (Cell #3). Wastewater is chlorinated at the filter effluent and allowed 11 minutes of contact time before reaching the final discharge point. At the final discharge, sodium bisulfite is added to dechlorinate. This process requires approximately one minute. For discharge point R001, wastewater is dechlorinated in the holding basin before being used as irrigation water on a local farm. SBC-Hyrum noted that the farmer has reported that the chlorination level of the water has been high enough to burn his crops on application. Hyrum staff noted that they are trying to avoid using this outfall as the *E. coli* limits cannot be met if chlorine is reduced. Hyrum had previously used ultraviolet (UV) for disinfection but had issues with interference from ferric and TSS in the effluent.

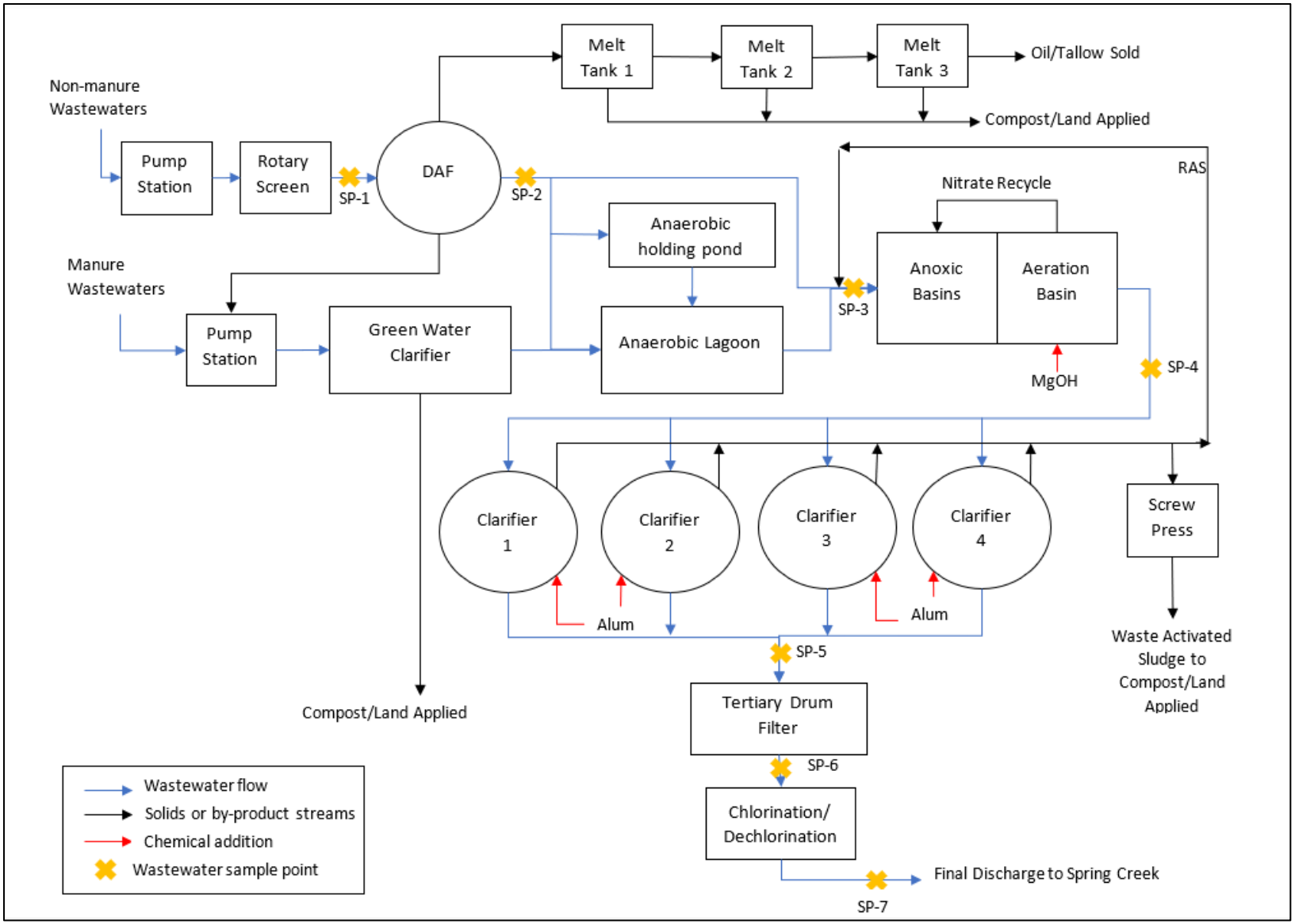

Figure 1. SBC-Hyrum Wastewater Treatment System

In addition to the direct discharge outfall, SBC-Hyrum's NPDES permit includes an irrigation outfall, where wastewater is supplied to a farm located adjacent to the water reclamation facility. SBC-Hyrum indicated this outfall is used infrequently and has not been used at all in the past year. SBC-Hyrum also noted having difficulty meeting the *E.coli* limitations without over chlorinating the wastewater, which results in burning the crops, so this discharge method is not mutually beneficial.

3. Wastewater Sampling

SBC-Hyrum has an onsite analytical laboratory where staff perform all in-house process control testing.

Table 2 lists effluent monitoring requirements at the facility's final discharge point, as required in its NPDES permit (NPDES permit: UT0000281). See Appendix Table A-2 for the facility's current permit limits. Table 3 summarizes the potential wastewater sampling locations. All sample points are identified in Figure 1.

Table 2. SBC-Hyrum Final Effluent Monitoring

Analyte	Frequency	Sample Type
BOD_5	1/week	Composite
TSS	1/week	Composite
Total Ammonia (as N)	2/week	Grab
Total Residual Chlorine	1/week	Grab
Nitrogen as N	1/month	Composite
E. Coli	1/week	Grab
Total Phosphorus	1/month	Composite
Whole Effluent Toxicity (WET)	1/quarter	Composite
Oil and Grease	1/week	Grab
pH	1/week	Grab
TDS	1/week	Grab
Dissolved Oxygen	1/week	Grab
TKN	1/month	Composite
Orthophosphate	1/month	Composite
Nitrite (NO_2)	1/month	Composite
Nitrate (NO_3)	1/month	Composite

Table 3. SBC-Hyrum Wastewater Sampling Locations

Sample Point	Sample Point Description	Parameters Monitored for Process Control	Sample Collection Methods
1	DAF Influent	TSS, Fats Oils and Grease (FOG)	Sample tap connected to a sampler from the header after the rotary screen.
2	DAF Effluent	TSS, FOG	Bottle dip from the overflow weir
3	Anaerobic Lagoon Influent	TKN, Nitrate	Bottle dip from splitter box

Table 3. SBC-Hyrum Wastewater Sampling Locations

Sample Point	Sample Point Description	Parameters Monitored for Process Control	Sample Collection Methods
4	Aeration Basin Effluent/Clarifier Influent	TSS	Bottle dip from the clarifier distribution box
5	Clarifier Effluent/Tertiary Filter Influent	TSS	Bottle dip from the pipe as it enters the open top filter well
6	Tertiary Filter Effluent	N/A	Bottle dip from the filter effluent chamber
7	Final Discharge	See Table 2.	Bottle dip from effluent flume. Compositor also at this sample location.

4. By-products and Waste Management

SBC-Hyrum produces the following by-products:

- Blood meal.
- Bone meal.
- Tallow.
- Gel bone.

Tallow from the DAF can be sold for $0.75 to $0.80 per pound. SBC staff noted that adding ferric chloride to the DAF can make this material unsellable, so several other JBS facilities that add chemicals to the DAF to aid in phosphorus removal have switched from ferric chloride to polymer. SBC-Hyrum does not add chemical to the DAF.

Solids generated from wastewater pretreatment (DAF or green water clarifier) or from the water reclamation system are collected and land applied on nearby farms. This includes solids from the green water clarifier, solids from screening of non-manure bearing wastewaters, solids from the melt tanks, and wasted RAS.

Oil and grease collected from the melt tanks are used to produce biofuel-grade grease, which is shipped out via rail multiple times a week. The profits from the grease pay for the entire WWT process.

5. Envionmental Impacts

JBS Corporate staff on the visit noted a company-wide initiative to achieve net zero GHG emissions by 2040. This initiative is being achieved by reducing generation of GHGs by capturing and reusing methane from the anaerobic lagoon.

SBC-Hyrum monitors hydrogen sulfide (H_2S) exposure of staff, specifically in the rendering areas and in water reclamation. While the release of H_2S is not managed, all staff working in these areas are required to wear monitors at all times.

Groundwater monitoring is conducted twice per year. The state of Utah does not require data to be submitted. Monitoring occurs around both lagoons.

6. Appendix

Table A-1. List of Site Visit Attendees

Attendee Name	Affiliation
Morgan Teachey	EPA
Danielle Stewart	ERG, EPA contractor
Damon Depew	JBS, Regional Environmental Manager
Paloma Hernandez	JBS, Environmental Manager Souderton, PA Facility
Fernando Meza	JBS, Corporate
Darren Olsen	SBC-Hyrum, Plant Manager
Derek Page	SBC-Hyrum
Brian Paulson	JBS/Pilgrims
Mark Ritsema	JBS, Corporate
Marvin Spidel	SBC-Hyrum
Chandler Whittier	SBC-Hyrum, Safety Manager

Table A-2. SBC-Hyrum Permit Limitations

Parameter	Monthly Average	Weekly Average	Daily Maximum
Total Flow	2.0 MGD		
BOD_5	25 mg/L 615 lbs./day	35 mg/L	 1230 lbs./day
TSS	25 mg/ L 732 lbs./day	35 mg/L	 1464 lbs./day
Total Ammonia (as N)	4 mg/L (Oct- Jun.) 3 mg/L (July-Sept.)		8 mg/L
Total Residual Chlorine			0.15 mg/L (Oct- Mar) 0.25 mg/L (Apr-Sept)
Nitrogen as N	134 mg/L		194 mg/L
E. Coli	126 cts/ 100 mL	156 cts/100 mL	
Total Phosphorus	1 mg/L		
WET Ceriodaphnia – Chronic Fathead Minnows - Chronic			Pass/Fail 73% (1st and 4th Quarter) 58.4% (2nd and 3rd Quarter)
Oil and Grease	 234 lbs./day		10 mg/L 469 lbs./day
pH			9 S.U.
TDS			3,000 mg/L
Dissolved Oxygen			Monitor
TKN	Monitor		
Orthophosphate	Monitor		
Nitrite (NO_2)	Monitor		
Nitrate (NO_3)	Monitor		