NYS Department of Agriculture & Markets

AEM

AGRICULTURAL ENVIRONMENTAL MANAGEMENT INFORMATION SHEET

Process Wash Water

Introduction

Many agricultural facilities utilize clean water to assist with the on-farm processing or clean-up of organic materials in areas such as milking centers, horse washing stations, and egg or produce washing facilities. The effluent or waste water at the end of these processing facilities may contain high levels of nutrients, sediments, chemicals, and even pathogens. In order to help protect nearby water sources from contamination, a system should be installed to collect and treat any process wash water that poses a resource concern. There are several Best Management Practices that can be implemented together which offers a systematic approach to reducing, collecting and treating process wash water.

Environmental Concerns

Depending on the type of agricultural operation, process wash water may contain high concentrations of biodegradable organics, phosphorous, especially soluble P, nitrogen as ammonia or nitrates, pesticides, and pathogens. These nutrients may stimulate the growth of algae. The effluent process wash water, especially from milking centers, has a high Biochemical Oxygen Demand (BOD) which may stimulate the growth of bacteria in surface waters. The effects of depleted oxygen levels and eutrophication include the alteration and destruction of aquatic habitats, fish kills, and the death of other aquatic species. In addition to degrading aquatic habitats, process wash water can also cause potential health concerns for humans and other animals if the contaminated water is used as a drinking water supply.

Potential Economic Benefits

Proper collection and treatment of process wash water can yield significant economic benefits. Successful onsite collection and treatment systems will help preserve water resources and protect drinking water supplies from becoming contaminated. Large scale water treatment systems may be avoided as well as the potential for the contributing landowner to be assessed fines. In many cases, installed systems include equipment and management techniques which reduce water usage, as well as, decrease quantity and improve quality of system effluent. Collected solids and liquids from the process wash water can also be land applied according to the facilities' Comprehensive Nutrient Management Plan, thus potentially reducing imported fertilizer costs. Clean, functioning milking centers, livestock washing facilities, and egg and produce washing facilities may also improve overall facility aesthetics, neighbor relations and value of property.

Summary of Best Management Practices

Reduce the Quantity of Water Needed for Processing/Washing.

Reuse or Recycle Process Wash Water on the Farm.

- Feed first rinse water from milking centers to livestock.
- Collect rinse water for irrigation on fruit or vegetable operations.

Decrease Contaminants to Wash Water and Improve Quality of Effluent.

Store and/or Treat Process Wash Water.

Locate Treatment Systems Away From Wells and Waterbodies.

Use Natural Resources Conservation Services Approved Best Management Practices.

- Best Management Practices (BMP's) are designed to minimize water contamination and treat process wash waters, especially milking center wastes.

Summary of Regulations

State Regulations

NYS Department of Environmental Conservation CAFO Permit

Federal Regulations

EPA General Information on CAFOs

Background Information for Worksheets

What sources of processed wash water are present?

Processed wash water may be present throughout many sectors of the agricultural community. Milking centers, horse washing stations, and washing facilities for eggs, vegetables, and fruits are all common sources of processed wash water. For the purposes of this worksheet, commercial processed wash waters derived from cheese production, vegetable or fruit processing (like vineyard waste) will require a separate evaluation and likely a treatment system designed by a Professional Engineer to meet DEC requirements.

Background Information for Worksheets

To what level is the process wash water managed (excluding wash water directed to storage for land application)?There are still producers and facilities around that may have no system installed to collect and treat process wash water. Facilities such as this are certainly a priority and may be operating in an environmentally risky fashion. Other facilities, however, will most likely have an identifiable source and stream of process wash water that will have varying levels of existing management and treatment. Most if not all organic material should be separated or removed from the process wash water before effluent enters the treatment system. Organic materials and debris will decrease the effectiveness and increase the maintenance needs of treatment systems such as vegetated treatment areas, organic or bark beds, sub-surface infiltrators, and settling tanks. Milk, manure, and waste feed contain high concentrations of nutrients, and increased BOD. There is always the likelihood of pathogens in raw milk and manure.

There are many different ways to control or manage the process wash water stream prior to any installed treatment systems. Decreasing the amount of clean wash water used during processing or washing is very important in controlling the amount of contaminated effluent that will need treatment. The following methods are just a few of the more generic options for decreasing volume and especially concentrations of process wash water.

Manure

- Clean alleys and holding areas adjacent to the milking parlor to decrease the amount of manure tracked in.
- Parlor floors should be sloped back to the holding areas so manure and urine can drain or be easily scraped away from the other process wash water sources.
- Any drains installed in the livestock milking platform should drain back to the alley, holding area, transfer system, or storage instead of contributing to the process wash water.
- Manure and other solids should be scraped, collected, and managed with manure at the facility instead of being hosed down any drains during cleaning. This includes scraping wash stations at horse facilities.

Waste Milk

- First rinse water from milking system may be fed to animals.
- Control mastitis to reduce the amount of waste treated milk.
- Collect any waste milk prior to drains or transfer pumps. The waste milk should be managed through the manure system to be recycled back to the land.

Vegetable, fruit, egg and other organics

- Screen, scrape, or collect any large organic solids located at the produce washing stations. These materials should not enter the treatment systems; they should be managed in the waste storage, composted, and/or land applied according to a Nutrient Management Plan.

Background Information for Worksheets

How many gallons of water are used for process clean up? How was that amount determined? Can the volume and/or concentration be reduced?

Decreasing the amount of clean wash water used during processing or washing is very important in controlling the amount of contaminated effluent that will need treatment. Measuring or estimating the gallons of water used during clean up can be difficult. Reducing the total volume of fluids will lower maintenance expenses and increase the lifespan of treatment systems. Listed below are several ways to minimize water use:

- Use low-water cow/livestock prepping methods at milking facilities.
- Reuse pre-cooler water.
- Reuse acid rinse/sanitizer water to wash parlor walls and floors.
- Possibly feed animals first rinse water.
- Install fixtures with water conserving designs.
- Scrape parlor floors and livestock/produce washing stations before wash down.

For More Information Regarding Volume Estimation:
NRCS – Animal Waste Management Software

What is the method of storage and treatment of process wash water?

There should be some type of collection and/or treatment system that is designed to collect, store or treat process wash water. Listed below are several scenarios that may pose a high risk for surface and/or ground water contamination:

- Dry well or stone pit.
- Dumped on soil surface.
- Disposal in field tile, ditch, or surface waters.
- Septic system with water coming to the surface.
- Septic system in a high water table.
- Septic system in very permeable soils (sand or gravel).

Described below are several types of storage and treatment systems, some more effective than others at treating process wash water and reducing contamination risks.

Manure Transfer and Storage System – The best type of systems collect process wash waters and transfer them to a long term or short term storage where wastes will be land applied in accordance with a nutrient management plan. In some cases, transfer systems may deposit waste directly into a manure spreader at a facility operating under daily spreading management. Additions of process wash water to the manure storage may aid in manure/waste agitation and pumping. Manure storage systems should be sized to accommodate the volume of process wash water.

Settling Tanks – Although not a complete treatment system, settling tanks separate solids from liquid wastes and prevent floating organics and debris from passing to a vegetated treatment area. Filters may also accompany settling tanks, especially in milking operations where milk fats and grease should also be separated. Decreasing solids entering the settling tanks will increase the period between tank pump outs, improving overall operation and maintenance efforts. Separated solids may be applied to the land base under the nutrient management guidelines of the farm or properly disposed of off of the facility.

Background Information for Worksheets

Waste Treatment Lagoon – A waste treatment impoundment made by constructing an embankment and/ or excavating a pit or dugout; system uses biological processes to treat waste for a given time period and will be pumped and land applied according to a Nutrient Management Plan. Solid/Liquid separation prior to waste transfer to lagoon is recommended to reduce treatment demands in lagoon, reduce sludge which may be hard to clean out, and reduce gases/odors from the lagoon during treatment period. **Note – Not recommended in NY due to climate restrictions.**

Constructed Wetland – An artificial ecosystem with hydrophytic vegetation and media for bacteria for water treatment of wastewater from agricultural processing, used where the wetland effluent is not required to meet specific water quality discharge criteria. Inlet and outlet structures are important to collect debris from entering the wetland and control wetland water levels at their optimal treatment levels. Solid/Liquid separation prior to waste transfer to constructed wetland is recommend to reduce treatment demands in wetland, reduce sludge which may be hard to clean out, and reduce gases/odors from the wetland during treatment period. Site constraints and additional management skills of operator inhibit successful implementation of this practice at many facilities.

Vegetated Treatment Areas – A vegetated treatment area can be an effective practice to treat the liquid effluent from process wash water. A VTA is defined as an area of permanent vegetation used for agricultural wastewater treatment. If designed properly, it will help improve water quality by reducing the loading of contaminants from agricultural operations. To be designed properly, the VTA must be planned based on the type of nutrients to be treat, as well as, its ability to hold and take in nutrients. The system needs to be designed so the vegetation is not continually saturated, so either a rotational system or intermittent loading is needed. Proper operation and maintenance of the VTA is crucial to ensure its effectiveness over time.

A key component to a functioning VTA system is a settling facility that precedes the vegetative infiltration area. The purpose of the settling facility is to separate the solids from the liquids (described above).

For More Information on VTAs:

NRCS Vegetated Treatment Area (635) Standard

If yes, has Nitrate Leaching Index evaluation and soil phosphorus testing been completed on the VTA?

Nitrate Leaching Index evaluation is an indicator of the potential for nitrate to reach groundwater. Soil phosphorus testing is simply evaluating the soil for phosphorus loading and done using a method known as the Morgan P soil test or another equivalent. The Morgan P soil test involves shaking the soil sample with a chemical solution to extract the concentrated phosphorus. Both procedures (Nitrate Leaching Index and soil phosphorus test) need to be completed before the VTA is constructed to determine if the site is appropriate. Failure to complete the evaluations could result in a poorly located VTA that could have a high potential of contaminating water resources.

For More Information:

Cornell University Nutrient Management Spear Program

Cornell University Phosphorus Soil Testing Methods

Background Information for Worksheets

Organic Filter Bed (Bark Bed) – Organic filter beds are typically designed in areas with colder climates where Vegetated Treatment Areas are only effective for short periods of the year. Waste water is transferred to an area that is filled with carbon materials such as bark chips or sawdust. The carbon material acts as a biofilter and an insulator and aid in the decomposition of waste materials, especially in milking centers. The carbon material decomposes slowly and must be replaced often, typically once every three years depending on the system inputs. **Note – Bark Beds are no longer available as a New York NRCS Practice.**

Lime Flocculator – Lime flocculators serve the same purpose as a settling tank, however they utilize chemical processes to separate solids, milk fats and grease, and soaps from milking center wastes. Approximately 3 pounds of lime is added to every 400 gallons of wash water. Wash water must not contain manure, debris, or the first flush/rinse from the milking center. Solids flocculated or coagulated from the lime settle on the bottom and will be added to the waste system for land application under the Nutrient Management Plan. Liquids will be further transferred to a Vegetated Treatment Area.

Septic System- Septic systems are not recommended for the treatment of milkhouse wastes. These systems are anaerobic and are not capable of effectively treating the concentrated organic milk fats and grease. In many situations, the septic leach lines become "sealed up" with the milk fats, forcing water to pass through the system un-treated or push up to the ground surface. Contaminated surface flows or un-treated liquids passing through the system pose serious risks to surface and ground waters. **Note – Septic Systems are no longer available as a New York NRCS Practice.**

Is there a certified design and as-built for the treatment and transfer system on the farm?
Essentially a yes or no question providing insight that the system is or once was up to some form of standards and specifications. If possible, utilize the as-builts to locate the system and examine if the system is still functioning or requires adjustments or repairs. Many older systems may need significant alterations to meet present NRCS standards and specifications. In other cases, an improvement in operation and maintenance may be all that is required to make the system effective once again.

Is water tested/treated for hardness?
Hard water requires more or stronger detergents for cleaning, especially in milkhouse systems. Detergents are often highly concentrated in phosphorus, which greatly increases wastewater risks. Phosphorus in soaps and acids may result in eutrophication of water bodies. Installing water softeners may decrease the amount of detergents needed for cleaning. In addition, a CIP (clean in place) chemical representative can provide accurate guidelines for calibrating detergent use to match water hardiness.

Background Information for Worksheets

What chemicals are being used and are label recommendations being followed?
See above.

How often is the existing system inspected and maintained?
Evaluate the operator's management style of the existing process wash water collection and treatment system. The inspection and maintenance schedule and tasks should be included in the operation and maintenance section of the system's design package. Negligence in system inspection and maintenance may result in system failure, costly repairs, and contamination risks.

See the documents in Section 4 of the NRCS Field Office Technical Guide (eFOTG) under the specific practice standard being utilized for additional information on operation and maintenance needs.
NRCS eFOTG for NY: http://efotg.sc.egov.usda.gov/treemenuFS.aspx

What type and size milking system is present? (dumping station, pipeline, parlor, etc.)
The type and size of the milking system is very important when analyzing the inputs and outputs of process wash water. The size of the milking system, along with the overall size of the milking herd, will provide ball park estimates in process wash water generation. In addition to the size, various systems require different amounts of wash water, detergents, and other cleaning processes. Evaluate the type of system (dumping station, pipeline, parlor, robotic milking stations, etc...) to determine what the water quantities, chemicals, and other inputs are and estimate the overall effluent leaving the system.

Is first rinse water collected and fed?
What is done with waste milk?
See Process Water Management Question (second question on information sheet above).

Has milking herd size increased since the system was designed and installed? If yes, by how much?
This question assumes that there is an existing system already installed at the facility. In such a case, evaluate whether milking herd size has increased from the designed system, and whether this increase has stressed the system beyond its effective capabilities. Settling tanks and vegetated treatment areas are good areas of the system to inspect for negative effects from herd size increases.

SUMMARY

AEM Tier 2 Assessments document environmental stewardship and establish benchmark conditions on the farm. They also identify resource concerns and areas of opportunity. The AEM Tier 2 worksheets also help to further establish baseline data that can be used to prioritize issues for Tier 3 planning.

Tier 2 Assessments should be completed on-site with the farmer. When the initial assessment is completed, appropriate feedback in the form of an AEM Tier 2 Worksheet Summary should be provided to the farmer. The summary should include an overall level of concern for the worksheet, explanation of the overall ranking, a list and description of items of greatest concern, as well as, documentation of what is being done well and what areas need improvement. After the evaluation is complete, the farm should be given a ranking which will determine their priority to advance to the AEM Tier 3 planning phase. Appropriate ranking categories that could be used are: High, Medium, or Low Priority. A ranking procedure that has been approved by your local AEM Team should be used to make the ranking determinations.


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