

What can you do to help protect water quality?



Maple Syrup is deeply rooted both economically and culturally in Vermont's working landscape. Maple producers have been working Vermont's sugar bushes since operations relied on horse drawn wagons and individually collecting buckets.

In these modern days, the technology has been improving with reverse osmosis (RO) technology that can significantly increase the amount of sap that can be processed into syrup, in addition to the amount of taps each producer manages. As Vermont becomes home to more commercial maple operations, producers need to be mindful of the potential impact that maple operations can have on water quality through excessive contributions of nutrients including phosphorus, and elevated erosion rates.

Various effluent streams are produced from sugar houses and must not be discharged directly into surface water, such as a lake, pond, stream, or any conveyance to a surface water. The Agency of Agriculture, Food & Markets (VAAFAM) recommends installation and utilization of a wash water discharge system to manage this process wash water and avoid a discharge directly to a surface water.

Byproducts of Maple Production

Although there are currently not specific regulations directed exclusively at process wash water, regulations exist that prohibit the discharge of materials into any waters of the State. These regulations fall under the Agency of Natural Resources Rules for any direct discharges that may occur. VAAFAM regulates nonpoint source discharges that may occur, per the Required Agricultural Practices (RAP) Rule intended to protect water quality. As maple syrup is considered an agricultural product and maple production is considered an agricultural operation, regulation of maple operations falls mainly with VAAFAM.

Evaporator pan wash water is the most important material for producers to manage, despite its relatively low volume compared to other byproducts – the concentrations of nutrients and levels of Biological Oxygen Demand (BOD) can be extremely elevated. As BOD increases, the amount of oxygen in the water decreases, thereby negatively impacting aquatic organisms. **Permeate** is the byproduct of the RO, consisting of little to no nutrients, but substantial volumes. **RO wash water** is created when rinsing the RO, is produced in much larger volumes than evaporator pan wash water, and can contain sugars, acids, and other organic materials that can impact BOD for waters of the State.

The options for managing these materials are being researched currently; the collection and storage of these materials until they can be responsibly land applied per the RAPs is highly recommended by VAAFAM.

It is also important for maple producers to keep in mind that discharge of sap to any surface water or ground water must be avoided.

Byproducts of Maple Syrup Production

The table below describes the byproducts of maple operations and the varying impacts from each material:

Evaporator Pan Wash Water	Created when phosphoric acid is used to clean the evaporator pan and remove niter.	Low Volume/High Nutrient & BOD Concentration
Permeate	The effluent of the RO.	High Volume/Negligible Nutrient & BOD Concentration
Reverse Osmosis (RO) Wash Water	Created when rinsing the RO, can contain sugar, organic materials, and various acids that can impact BOD for waters of the State.	High Volume/Low Nutrient & BOD Concentration

Wash Water Discharge Systems for Maple Producers

A wash water system is designed to prevent a direct flow of process wash water into surface water or ground water, and often allows for nutrient uptake by vegetation and possible separation of sediment for removal.

Considerations for Designing a Wash Water Discharge System:

1. Neutralize the evaporator wash water after use and before land application.
2. Avoid evaporator wash water reaching any sort of surface water or mixing with the permeate.
3. Provide storage, either a tank or holding pond, for evaporator wash water, and if possible - other byproducts, during the winter months until the ground has thawed and the byproducts can be effectively land applied with minimal run off.
4. Avoid locating the grass/sod spreading area where bedrock or shallow groundwater may be present. Ideal areas for a grass/sod spreading area have sufficiently deep soils to facilitate absorption and eventual nutrient uptake by vegetation prior to contact with surface water or ground water.



Wash Water Sanitizers

- Wash water sanitizers must be used according to their labels with regard to rate and disposal.
- Neutralizing the acids with baking soda post cleaning does **not** get rid of the phosphorous or other nutrients contained in the effluent.
- Some sanitizers may not include instructions regarding disposal - if this is the case, discharge sanitizers in a manner that avoids entry into surface water or ground water.
- Alternative solutions for disposing of or reducing the risk of the evaporator pan wash water can be investigated or utilized, such as systems using pressurized permeate instead of acid cleaner to reduce the potential for impacts to water quality.

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