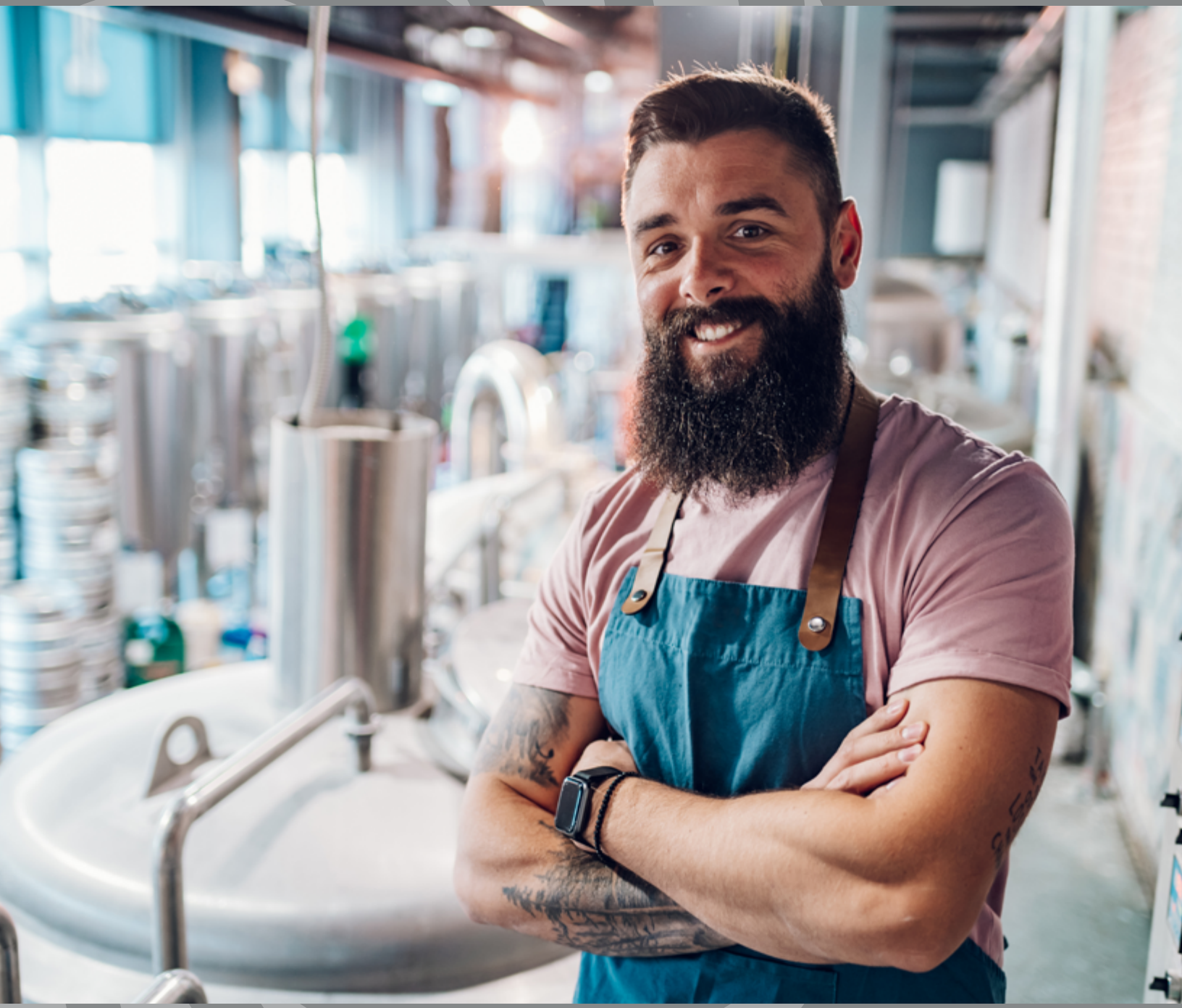
The Fermentation Guide



Source Control

Public Works Environmental Services

sylvanlake.ca/sourcecontrol

Sylvan Lake

Contents

Meeting Wastewater Standards

Alcohol and fermentation facilities operating in the Town of Sylvan Lake must meet wastewater standards. Facilities include micro-breweries, co-packers, wineries, cideries, distilleries, and kombucha producers.

Fermentation facility wastewater that enters the sewer must meet standards set by the Town of Sylvan Lake's Water and Sewage Bylaw 1805/2020, Sylvan Lake Regional Water/Wastewater Commission, and the City of Red Deer.

This brochure explains how to meet wastewater standards by addressing these common wastewater issues:

- pH levels
- Biochemical Oxygen Demand (BOD)
- Total Suspended Solids (TSS)
- Temperature
- High water usage
- Spoiled batches or off-spec product

*Water and Sewage Bylaw 1805/2020

pH

WHAT IS pH?

The pH is a scale used to describe if a solution is acidic or basic. A pH below 7 is acidic, a pH over 7 is basic. A pH of 7 is neutral (e.g., pure water).

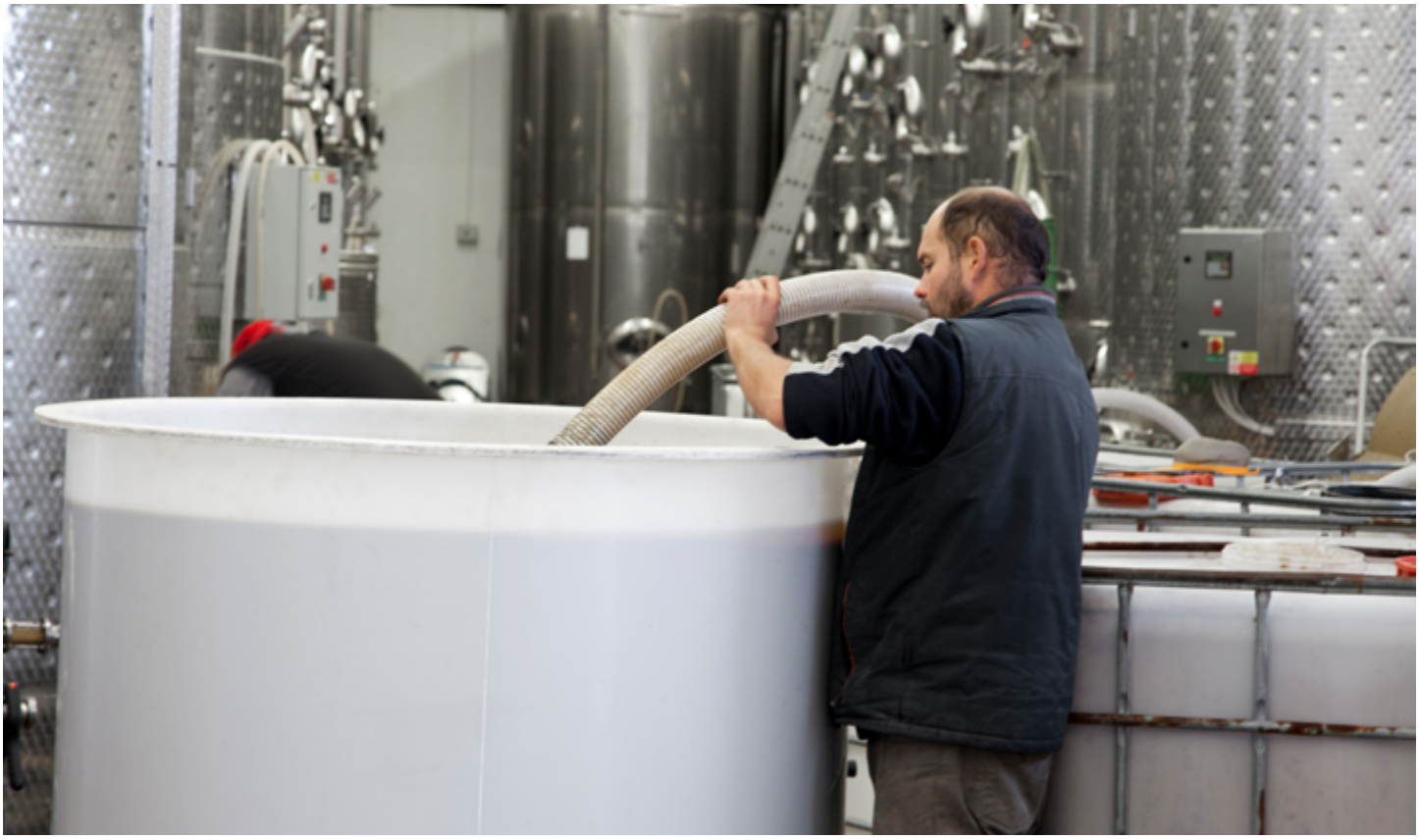
Large variations in pH are common in the fermentation industry. On brew and packaging days, the pH will tend to be low, around 5. On clean-in-place days (CIP), the pH will tend to be high, around 12. Large variations in pH can be harmful to aquatic life and can disrupt the ecological balance. It is essential to adjust the pH of treated wastewater to be within the acceptable range of 5.5 and 10 before discharge to minimize environmental impacts.

HOW TO MANAGE pH

Good pH neutralization includes proper mixing, tank configuration, chemical adjustment and instrument control. Settling/equalization tanks are some of the options used to neutralize the concentration of pH in fermentation facilities.

Dilution is not the solution. For example, to reduce the pH of an alkaline solution from pH 13 to pH 12 will require 10 times the volume of water as the acid. To reduce the pH from 13 to pH 11 will require 100 times the volume of water as the acid. Dilution of sewage in order to enable its discharge is prohibited under the Water and Sewage Bylaw.

ACCEPTED RANGE
pH 5.5 - 10



*Water and Sewage Bylaw 1805/2020

Biochemical Oxygen Demand (BOD)

WHAT IS BOD?

The organic content of wastewater is expressed and measured as BOD. When fermenting, spent yeast and trub are liquid byproducts that contain high levels of BOD and Total Suspended Solids (TSS).

HOW TO REDUCE BOD

Side streaming, settling/equalization, biological treatment and ensuring spilled products do not enter the floor drain, are some of the options used to reduce the concentration of BOD in fermentation facilities.

STANDARDS FOR BOD*

Discharged wastewater must not exceed a BOD concentration of 3,000mg/L. The typical industry average for untreated BOD is 10000mg/L[1]. BOD above 300mg/L but below 3,000mg/L is subject to an overstrength surcharge fee. For more information visit Sylvanlake.ca/Overstrength

Total Suspended Solids (TSS)

WHY IS TSS A PROBLEM?

Fermentation operations produce waste that, when discharged or discarded into sewers or drains, may obstruct the flow of, or interfere with, the operation and performance of sewer and sewage facilities.

The bylaw* requires

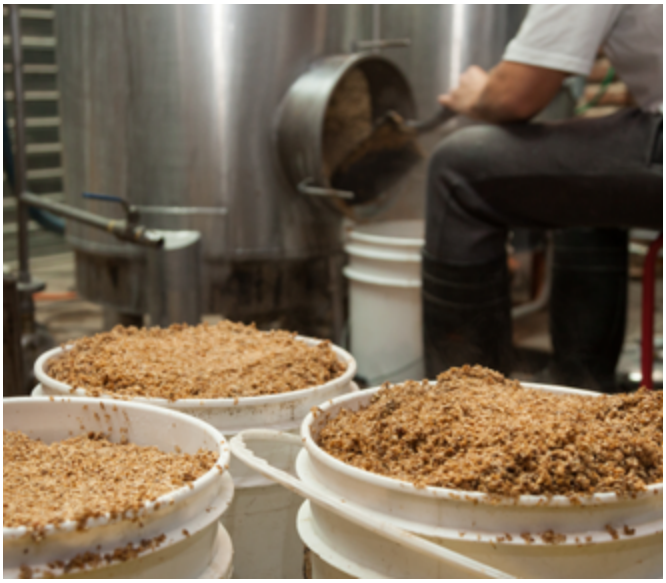
- Removal of solids (spent grains, or fruit pulp) from wastewater
- Monitoring and control of the pH of cleaning and sterilization water

HOW TO REDUCE TSS

Fermentation facility wastewater must be screened at minimum for large particles (like bottle caps, broken glass, and grains). Installing additional filters and screens, using sparging bags, sediment buckets, settling/equalization, biological treatment and ensuring spilled products do not enter the floor drain are some of the options used to reduce the concentration TSS in fermentation facilities.

STANDARDS FOR TSS*

Discharged wastewater must not exceed a Total Suspended Solids concentration of 3,500mg/L. *TSS above 300mg/L but below 3,500mg/L is subject to an overstrength surcharge fee. For more information visit Sylvanlake.ca/Overstrength



*Water and Sewage Bylaw 1805/2020

Temperature

TEMPERATURE IMPACTS

Hot water can damage the plumbing system of your facility and can be dangerous to maintenance personnel working in the collection system.

HOW TO REDUCE TEMPERATURE

Equalization or settling tanks are used to help temperature and pH to stabilize along with allowing heavier particles to settle to the bottom of the tank for side streaming. If possible, the Town of Sylvan Lake recommends the tank have a capacity of at least 24 hours of storage to allow for equalization to occur.

STANDARDS FOR TEMPERATURE

To meet the bylaw* limits, the discharged wastewater when measured at the sampling point, must not have a temperature higher than 75^{0}C (167^{0}F).

Off-Spec Notification

WHAT IS OFF-SPEC?

Off-spec product (spoil batches) are very high in Biochemical Oxygen Demand (BOD) which can negatively impact the wastewater treatment plant. Off-spec management depends on the volume produced.

UNDER 100 L

Notification is not required for off-spec discharges under 100 litres. Record the discharge details in the appropriate section of the Off-Spec Log and proceed with discharge.

NOTIFICATION 100 L - 2000 L

For off-spec discharges between 100 litres - 2000 litres per day, notify The Town of Sylvan Lake using the Discharge Notification Form. No response is required from The Town of Sylvan Lake. Record the discharge details in the appropriate section of the Off-Spec Log and proceed with discharge.

NOTIFICATION OVER 2000 L

Off-spec discharges over 2000 litres (L) per day require written approval before release:

- Use the Discharge Notification Form
- Wait for written approval
- The approval process can take 2 - 5 business days. The Town must notify and receive approval from the treatment facility
- Record the discharge details in the appropriate section of the Off-Spec Log and proceed with discharge

Discharge Notification

*Water and Sewage Bylaw 1805/2020

High Water Usage

HIGH WATER USE IMPACTS

Within a brewery, there are four main areas where water is used: brewhouse, cellars, packaging and utilities. Operations such as food service and restrooms also contribute to water usage. Most brewers discharge over 70% of their incoming water as wastewater effluent (Brewer's Association Water and Wastewater Treatment/Volume Reduction Manual[1]).

HOW TO REDUCE WATER USAGE

We recommend industry specific best management practices for reducing water usage such as:

- Installing water metering devices at different points in the process to create awareness of water usage
- Installing clean-in-place (CIP) systems where possible to reduce both chemical and water usage
- Using dry clean-up methods prior to wet cleaning
- Installing water-efficient equipment such as low-flow nozzles, and automatic shut-off valves where possible
- Performing regular maintenance and leak detection to prevent unnecessary water loss
- Training staff on water conservation. This ensures everyone understands the importance of saving water and knows how to do so in their daily tasks

This Alberta brewery is on the cutting edge of water reuse, using recycled wastewater to craft beer.

Check it out here[2]

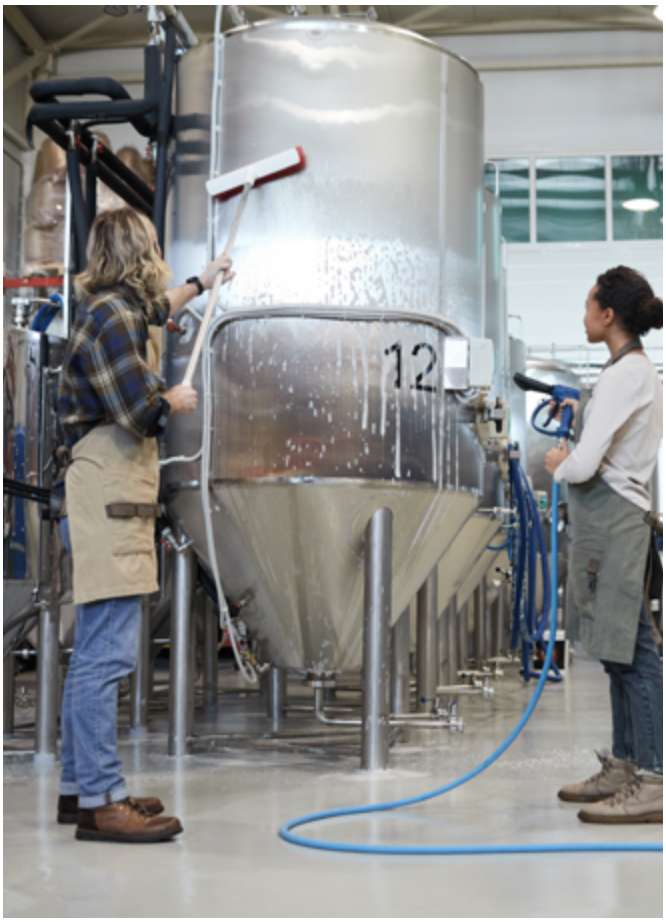
Water Reuse and Recycling

WATER RECYCLING SYSTEMS

Some fermentation facilities are reusing treated wastewater for non-fermentation purposes. This includes cleaning equipment, steam production, cooling systems, and landscaping. Advanced filtration and purification techniques make water safe for these applications. This saves fresh water and reduces overall water consumption.

Recycling water from one process to another is another effective strategy. For example, using rinse water from bottle washing to clean floors or vehicles. Or recovering post-rinse and using it as pre-rinse with a clean-in-place (CIP) system.

In Alberta, one fermentation facility is taking water reuse to a whole new level with beer manufactured from recycled wastewater. Learn more here.



*Water and Sewage Bylaw 1805/2020

Sampling & Record Keeping Requirements

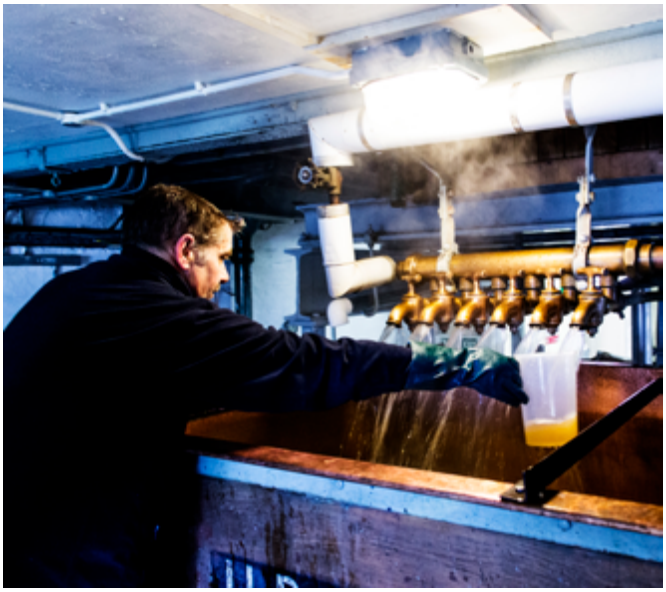
WHO COLLECTS SAMPLES?

Both facility operators and Town of Sylvan Lake staff must be able to sample wastewater to have accurate knowledge of wastewater quality.

WHERE ARE SUITABLE SAMPLING POINTS LOCATED?

Fermentation facilities must provide a suitable interior sampling point that can be accessed during operating hours. A suitable sampling point must be:

- Downstream from fermentation equipment
- Downstream from any equipment or device for treating wastewater
- Upstream from washrooms; and
- Easily accessible



The sampling point will be different based on the scale and type of operation. In addition to interior sampling points, an exterior sample manhole may also be required for compliance and regulatory sampling.

BEFORE INSTALLING SAMPLE POINTS

Contact the Environmental Services Department to confirm your plans before installing any sampling point(s). Our staff would be pleased to provide guidance and suggestions on the appropriate sampling point, type, and location.

WHAT SAMPLES ARE REQUIRED?

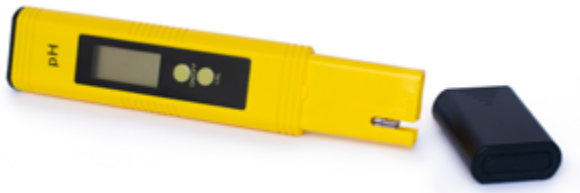
At minimum, on-site temperature and pH samples must be collected each day cleaning and sterilization activities of fermentation equipment are performed. Fermentation equipment includes any tank, barrel, container, hose, pump, valve, or other similar vessel, equipment, or device used in the process of brewing, distilling, blending, flavouring, or fermenting fruits, vegetables, or grains to produce beer, cider, wine, spirits, or any other similar liquor made from fermentation. The pH level must be measured immediately after sampling using an on-site pH meter. Bottles are not considered fermentation equipment and are excluded from the sampling requirement.

Cleaning and sterilizing activities for fermentation operations can impact the pH levels of wastewater which can damage pipes and cause chemical imbalances in the sewer that may be dangerous for workers. Sampling ensures wastewater is tested regularly and adjusted to meet appropriate temperature and pH levels before discharge.

*Water and Sewage Bylaw 1805/2020

WHAT TYPE OF pH METER DO I NEED?

In order to obtain a representative and accurate pH reading, fermentation operators should use a digital handheld pH meter. Meters can be obtained from a scientific supply retailer.



Operators should not use pH strips since they do not provide an accurate measurement of wastewater pH.

WHAT RECORDS ARE REQUIRED?

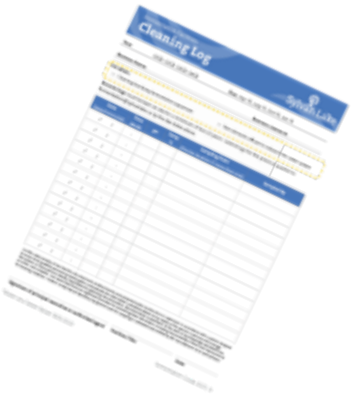
Records are required for regulatory staff to confirm compliance with the Water and Sewage Bylaw. Record keeping assists fermentation facility operators to understand the nature of their wastewater over time. All written records are required to be kept on-site for at least two (2) years after the year in which the record was first made.

The Cleaning, Off-Spec and Packaged Products Logs, must:

1. Remain on-site for a minimum of 2 years,
2. Be kept up to date, and
3. Be submitted quarterly via email to fermentation@sylvanlake.ca

THE CLEANING LOG

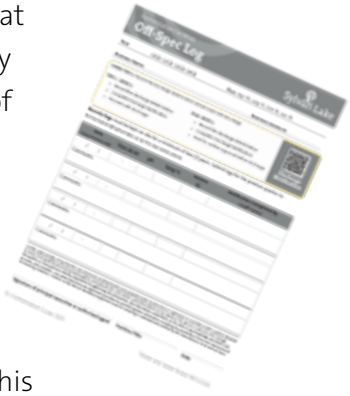
Records the pH and temperature on days that fermentation equipment is cleaned, sterilized or non-domestic effluent is discharged into the sanitary sewer system.



THE OFF-SPEC LOG

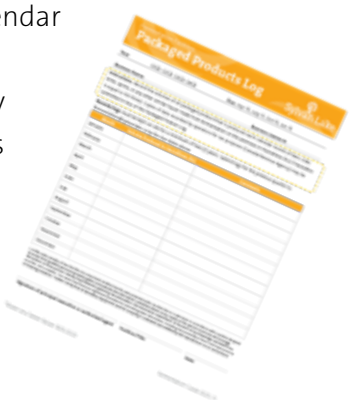
Records the volumes of off-spec (spoiled batch) product that is discarded to the sanitary sewer system regardless of the volume discarded.

Off-spec product that is transported off site or redirected to distillation is not required to be logged on this form.



THE PACKAGED PRODUCTS LOG

Record the volume of packaged product produced per calendar month in Hectolitres (hL) Copies of data recorded by operators for tax purposes (Canada Revenue Agency) are acceptable in lieu of the Packaged Product Log.



*Water and Sewage Bylaw 1805/2020

Fermentation Facilities

Cleaning Log

Sylvan Lake

Year Q1❑ Q2❑ Q3❑ Q4❑ **Due:** Apr 15, July 15, Oct 15, Jan 15

Business Name: **Business License #:**

Use when:

» Cleaning/sterilizing fermentation equipment

» Non-domestic effluent is released into sewer system

Records/logs must be kept on-site for a minimum of two (2) years. Submit logs for the previous quarter to fermentation@sylvanlake.ca by the due dates above.

Date (yyyy/mmm/dd)	Time 24:00	pH	Temp °C	Sampling Point (Precise location if more than one)	Sampled By
/ /	:				
/ /	:				
/ /	:				
/ /	:				
/ /	:				
/ /	:				
/ /	:				
/ /	:				
/ /	:				
/ /	:				
/ /	:				
/ /	:				
/ /	:				
/ /	:				

I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fines and imprisonment for knowing violations. I further certify that all laboratory equipment used for sampling is calibrated and certified by the manufacturer on an annual basis.

Signature of principal executive or authorized agent **Position/Title** **Date**

Fermentation Facilities

Off-Spec Log

Sylvan Lake

Year Q1❑ Q2❑ Q3❑ Q4❑ **Due:** Apr 15, July 15, Oct 15, Jan 15

Business Name: **Business License #:**

Under 100 L: Record the discharge details below and proceed with discharge

100 L - 2000 L

- » Record the discharge details below
- » Complete Discharge Notification
- » Proceed with discharge

Over 2000 L

- » Record the discharge details below
- » Complete Discharge Notification
- » Wait for written approval before discharge

Discharge Notification

Records/logs must be kept on-site for a minimum of two (2) years. Submit logs for the previous quarter to fermentation@sylvanlake.ca by the due dates above.

Date (yyyy/mmm/dd)	Time 24:00	pH	Temp °C	Volume (L)	Notification Completed By (staff name)
/ /	:				
Comments:					
/ /	:				
Comments:					
/ /	:				
Comments:					
/ /	:				
Comments:					

I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fines and imprisonment for knowing violations. I further certify that all laboratory equipment used for sampling is calibrated and certified by the manufacturer on an annual basis.

Signature of principal executive or authorized agent **Position/Title** **Date**

*Water and Sewage Bylaw 1805/2020

Fermentation Facilities

Packaged Products Log

Sylvan Lake

Year Q1❑ Q2❑ Q3❑ Q4❑ **Due:** Apr 15, July 15, Oct 15, Jan 15

Business Name: **Business License #:**

Instructions: Record the volumes of all packaged product that is produced each calendar month of beer, cider, wine, spirits, or any other similar liquor made from fermentation on the premises in Hectolitres (hL) (1 hectolitre is equal to 100 litres). Copies of data recorded by operators for tax purposes (Canada Revenue Agency) may be submitted in lieu of the Packaged Product Log.

Records/logs must be kept on-site for a minimum of two (2) years. Submit logs for the previous quarter to fermentation@sylvanlake.ca by the due dates above.

Month	Volume Produced in Hectolitrers (hL)	Comments
January		
February		
March		
April		
May		
June		
July		
August		
September		
October		
November		
December		

I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fines and imprisonment or knowing violations. I further certify that all laboratory equipment used for sampling is calibrated and certified by the manufacturer on an annual basis.

Signature of principal executive or authorized agent **Position/Title** **Date**

The Fermentation Guide

sylvanlake.ca/sourcecontrol

Environmental Services Department | 403-887-2800 | publicworks@sylvanlake.ca

Definitions

Fermentation equipment: means any tank, barrel, container, hose, pump, valve, or other similar vessel, equipment, or device used in the process of brewing, distilling, blending, flavouring, or fermenting fruits, vegetables, or grains to produce beer, cider, wine, spirits, or any other similar liquor made from fermentation.

Fermentation facility: means any premises, except residential premises, at which a person brews, distills, or ferments fruits, vegetables, or grains to produce beer, cider, wine, or spirits or any other similar liquor made from fermentation, including brew pubs, cottage breweries, micro-breweries, u-brews, u-vins, wineries, and distilleries.

Liquor: means any wine, beer, cider, spirits or other product that is intended for human consumption in which the percentage of alcohol by volume exceeds an amount prescribed by the regulations, unless the product is excluded from the definition of liquor by board regulations under section 130; of the GAMING, LIQUOR AND CANNABIS ACT.

Off-spec product: any product intended to be made into beer, cider, wine, spirits, or other similar liquor made from fermentation, which does not meet the owner or operator's quality standard for consumption.

Operator: any person who has management or control, directly or indirectly, of a fermentation facility.

Owner: any person who owns, is in possession of, has the right to control, or occupies and controls a fermentation facility.

Land Acknowledgement:

The Town of Sylvan Lake acknowledges that we are located on Treaty 6 territory, the traditional and ancestral territory of the Cree, Dene, Blackfoot, Saulteaux, and Nakota Sioux. We acknowledge that this territory is home to the Métis Settlements and the Métis Nation of Alberta, Region 3.

We are grateful for the Traditional Knowledge Keepers and Elders who are still with us today and those who have gone before us. We make this acknowledgment as an act of reconciliation and gratitude to those whose territory we reside on or are visiting.

Sylvan Lake
BRILLIANT ALL YEAR

Helpful Links

- » Discharge Notification Form
- » Cleaning Log: Page 9
- » Off-Spec Log:Page 10
- » Packaged Products Log: Page 11
- » Town of Sylvan Lake Water and Sewage Bylaw 1805/2020
- » Fisheries Act
- » Environmental Protection and Enhancement Act
- » Brewers Association
- » Alberta Craft Distillers Association

References

1. Industry average statistics provided by the Brewer's Association Wastewater Management Guidance Manual. https://www.brewersassociation.org/educational-publications/wastewater-management-guidance-manual/

2. Alberta brewery recycles wastewater for brewing. https://research.ucalgary.ca/sites/default/files/ACWA/200816-ACWA-Beer-Info.pdf