



FERMENTED BEVERAGE MANUFACTURING

How FBM's affect your pipes, plant, and regulations.

FBM's – Fermented Beverage Manufacturers

Everyone knows that FBM's produce all our favorite tasty beverages, but what is the cost to the sewer and to the wastewater plant?

To understand this we need a basic knowledge of the process.



BREWERIES START WITH MALTED AND MILLED GRAINS, WHICH ARE PLACED IN A MASH TUN.

THIS IS WHERE THE GRAIN IS SOAKED IN HOT WATER TO REMOVE THE STARCHES AND SUGARS FROM THE GRAINS.

THIS STEP IS USUALLY FOLLOWED BY A LAUTER TUN TO SEPARATE THE GRAIN FROM THE "WORT".

SOME BREWERIES COMPLETE BOTH STEPS IN THE SAME VESSEL.





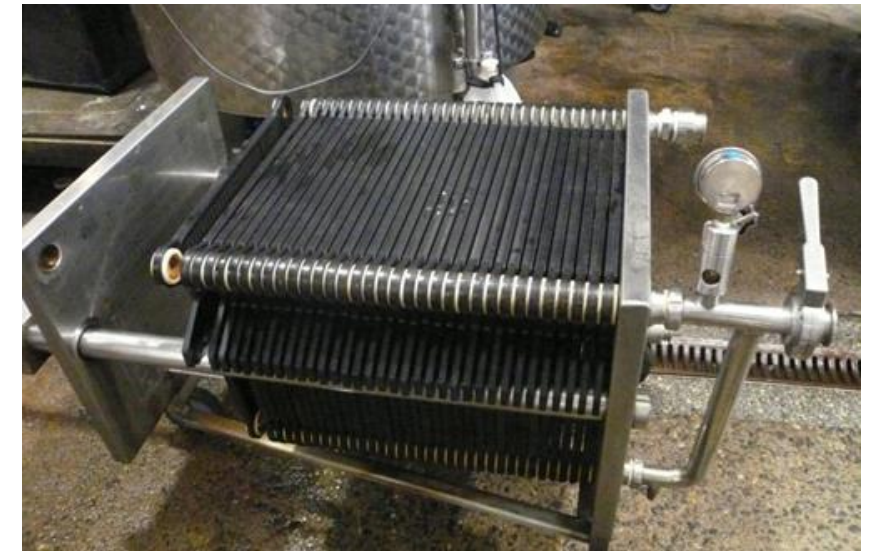
THE WORT IS THEN BROUGHT TO A BOIL IN THE KETTLE. HOPS CAN BE ADDED IN THE KETTLE AS WELL FOR FLAVOR AND AROMA. THE WORT AND SOLIDS CAN BE SEPARATED IN THE KETTLE OR IN A WHIRLPOOL. THE WORT MUST THEN BE COOLED PRIOR TO FERMENTATION.



THE WORT IS THEN
TRANSFERRED TO
A FERMENTER
AND YEAST IS
ADDED TO TURN
THE WORT INTO
BEER.



THE BEER IS THEN FILTERED
(OR NOT- DEPENDING ON
THE BREWER),
CARBONATED, AND
PACKAGED.





CIDER IS PRODUCED
MUCH THE SAME
WAY AS BEER
EXCEPT FRUIT JUICE
IS FERMENTED
INSTEAD OF GRAINS.
SOME CIDERS EVEN
USE HOPS.

The Basic Process of Whiskey Making



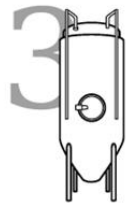
Preparation

Various grains are ground and cooked. Barley is malted, a process of soaking the barley and spreading it for about three weeks, allowing it to sprout, and drying and heating it.



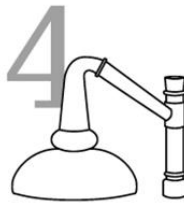
Mashing

The cooked grain and malted barley are added to warm water, which converts into a liquid known as mash.



Fermenting

The mash is added to a fermentation tank, along with yeast. The yeast converts the sugar to alcohol. After three or four days, the resulting liquid is about 10% alcoholic and is known as distiller's beer, or wash.



Distilling

The wash is heated to the point where the alcohol turns to vapor, but the water remains liquid. The alcohol is then collected in a second container. This process is repeated to produce "high wine" or "new whiskey."



Aging

Water is added to the high wine, which is then aged in wooden barrels, usually made from charred white oak. Here the whiskey ages at least three or four years, and some are aged up to ten or fifteen years.



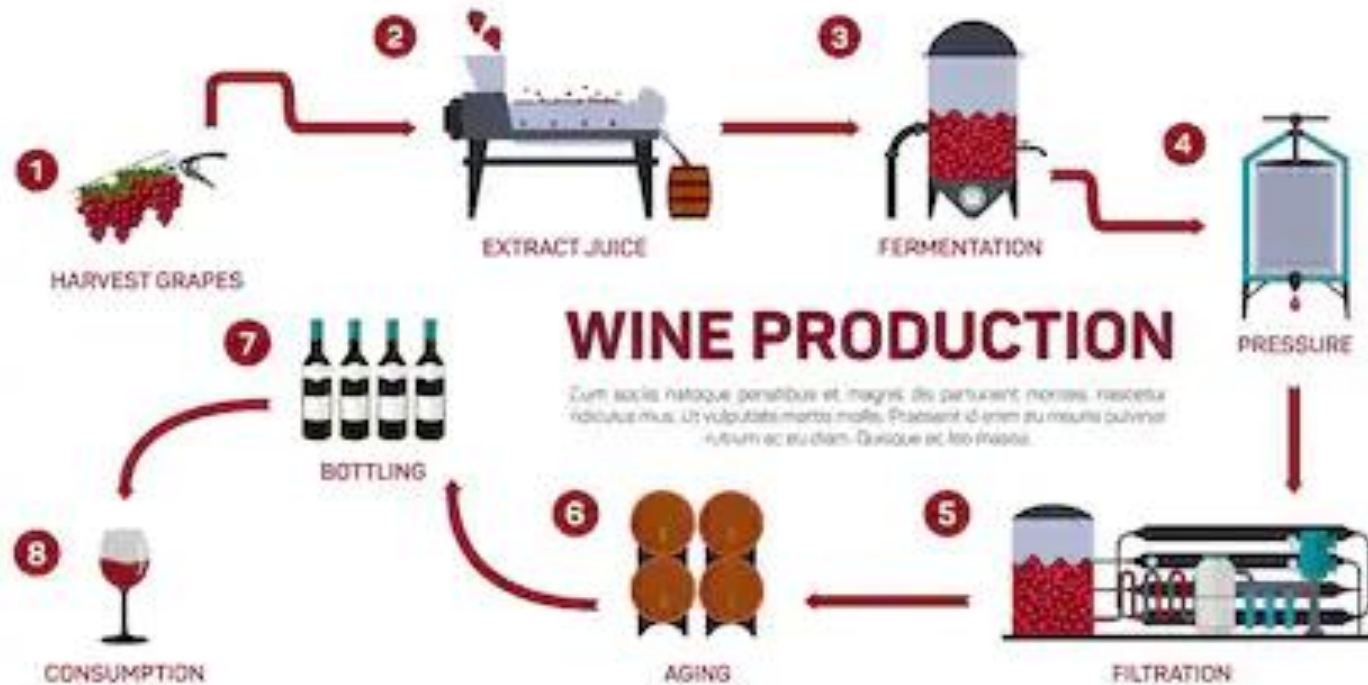
Bottling

The resulting whiskey is stored in glass bottles, which do not react with the whiskey's flavor.

DISTILLERIES
FERMENT
THE GRAINS
PRIOR TO
DISTILLING.



A FEW OF THE DISTILLERIES THAT DISCHARGE
TO MSD



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WINERIES HAVE MUCH THE SAME PROCESS AS BREWING AND CIDER MAKING. THE HULLS AND EXTRA SUGARS AS WELL AS COLOR AND PH CAN BE AN ISSUE.

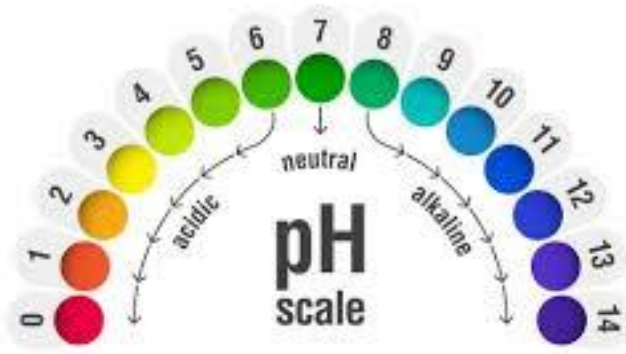


WINERIES



KOMBUCHA AND SAKE – RIGHT NOW WE ONLY HAVE ONE SAKE MAKER, OUR KOMBUCHA MAKER MOVED. I AM NOT AS WELL VERSED IN THESE AS THE BREWERIES, CIDERIES, AND DISTILLERIES.

So What's the problem?



- pH is a major issue!
- Barley Beer ranges from 4 - 5 s.u.
- Ales vary from 3 - 6 s.u.
- Sour beer is as low as 3.3 s.u.
- Cider ranges from below 3 to 3.8 s.u. (considered microbially safe below 3.0 s.u.)
- White wine ranges from 3 - 3.4 s.u.
- Red wine ranges from 3.3 – 3.6 s.u.
- Kombucha ranges from 2.5 – 3.5 s.u.
- The pH of Sake ranges from 1 – 2 s.u., typically average 1.3 s.u.
- The pH of the cleaning chemicals can spike the wastewater to a pH of 12 or higher or below 2!



So What's the problem?

- Solids and Yeast are a major concern!
- A typical brewery has an average TSS of 1,000 mg/l to 8,000 mg/l
- Yeast not only increases the solids but has a great impact on the BOD and can cause issues in the treatment plant.



Half of the studies show yeast can survive in the sewer the other half say it can't

- In 2017 yeast from a brewery survived in the sewer line, made it to the plant, and concentrated in the sludge thickener.
- MSD spent \$6,000 per month for 3 months in polymer to get it to settle out.
- The yeast caused the solids and yeast to rise to the top of the thickener.
- It was not pretty and smelled worse.

So what's the problem?

- BOD/COD
- A typical Brewery has a BOD of 1,500 mg/L to 10,200 mg/L for a composite sample
- I have had a brewery composite sample with a BOD result of 45,000 mg/L (They discharged over 150,000 gallons that day)
- Typical COD ranges from 2,000 mg/L to 17,000 mg/L



This is the effluent of a brewery after a solids retention tank!





MSD SERVES JUST OVER 100 BREWERIES, CIDERIES, WINERIES, DISTILLERIES AND A SAKE MAKER. WE COUNT EACH LOCATION SEPARATELY. SOME COMPANIES HAVE MULTIPLE LOCATIONS.



FUNNY PICTURES ON KULFOTO.COM

IT IS ESTIMATED THAT 20% OF CRAFT BREWERS THAT DO NOT HAVE THEIR PRODUCTS IN STORES WILL FAIL BECAUSE OF THE COVID SHUTDOWNS. HOWEVER, THOSE WITH PRODUCTS IN GROCERY STORES HAVE SEEN AN INCREASE AND HAVE INCREASED PRODUCTION.



WE HAD TO
DO
SOMETHING,
BUT WHAT?





WE ALREADY PERMIT 2 AS SIU'S,
AND THE MIDDLE TIER FBM'S AS
LOCAL PERMITS. WE SPOKE TO
OTHER AREAS THAT IMPLEMENTED A
TIERED FEE SYSTEM. THEY SAID IT
WAS A DISASTER. PEOPLE DECIDED
THAT IF THEY WERE GOING TO BE
CHARGED, THEY COULD DUMP
WHATEVER THEY WANTED!



Sewer Use Ordinance

METROPOLITAN SEWERAGE DISTRICT OF BUNCOMBE COUNTY, NORTH CAROLINA

WE DECIDED TO ADD A SECTION IN THE SEWER
USE ORDINANCE JUST FOR FBM'S!

We drafted the Rule and had multiple meetings with breweries/wineries/cideries/distilleries. We met with anyone who had a stake in the rule.

- We did presentations on the proposed rule and received feedback. Most of the feedback was positive and helped us to develop the final rule.
- We compromised on some things.
- The Brewers Alliance (ABA) had literature that showed breweries have a 5:1 ratio for wastewater vs. beer produced, we have literature that shows 7:1. We compromised and now use a 6:1 ratio unless the individual brewery has their own study/documentation.
- We also compromised to use a 5-day average when calculating flow. So if a brewery only operates once per week but produces a lot of wastewater on that one day, we divide it over 5 days for a 5-day average.

The new Rules! MSD SUO Section 2.16

- 2.16 Fermented Beverage Manufacturers
- Fermented Beverage Manufacturers (FBMs) must follow the guidelines below according to production rates. FBMs must implement and maintain appropriate Best Management Practices (BPMs). Average flows for FBMs will be determined from The Alcohol and Tobacco Tax and Trade Bureau records that will be submitted to MSD quarterly. FBMs with average flows greater than 2,000 gallons per day (GPD), based on a monthly average, must continuously monitor process flow as outlined in subsection b. MSD reserves the right to require flow monitoring equipment for FBMs less than 2,000 GPD. MSD reserves the right to impose discharge limits when necessary. Fermented Beverage Manufacturers may also be required to sample and/or meet NH₃ or TKN limits.

Section 2.16

a

- **(a) Less Than 2,000 GPD (average flow)**
- (1) Must implement and maintain appropriate Best Management Practices (BPMs).
- (2) No solids greater than 1/4 inch can be discharged to MSD.
- (3) Must meet the pH limits of 6.0 to 10.5 s.u.
- (4) Wastewater must not exceed 60°C (140 degrees F) at the discharge point to MSD.
- (5) Must fill out Brewery Survey and update with any changes not less than once every 5 years (completed with IWS).
- (6) Must create and maintain a slug/spill plan
- (7) Must request and receive prior authorization from MSD prior to disposal of any off spec product over 500 gallons.

Section 2.16

b

- **(b) Greater Than 2,000 GPD (average flow)**
- (1) No solids greater than ¼ inch can be discharged to MSD.
- (2) Must not exceed TSS limit of 4,000mg/L, unless otherwise specified on an Industrial User Permit.
- (3) Must meet the pH limits of 6.0 to 10.5 s.u.
- (4) Wastewater must not exceed 60°C (140 degrees F) at the discharge point to MSD.
- (5) Must fill out Brewery Survey and update with any changes not less than once every 5 years (completed with IWS).
- (6) Must submit an Industrial User Permit Application not less than once every 5 years.
- (7) Must create and maintain a slug/spill plan.
- (8) Must request and receive prior authorization from MSD prior to disposal of any off spec product over 500 gallons.
- (9) Must complete and submit composite sampling for BOD and TSS at a minimum monthly.
- (10) Must continuously monitor effluent process flow and pH. Must have an accessible sampling point where the wastewater is well mixed and representative of all process wastewater.
- (11) Must report monthly flow readings and pH meter readings.



ANY FERMENTED
BEVERAGE
MANUFACTURER ABOVE
25,000 GPD WILL BE
ISSUED A PERMIT WITH
SPECIFIC DISCHARGE
LIMITATIONS.
INSTALLATION OF
PRETREATMENT
EQUIPMENT MUST NOT
OCCUR UNTIL AN
AUTHORIZATION TO
CONSTRUCT HAS BEEN
RECEIVED FROM MSD.

Please visit MSDBC.org for the following forms.

BREWERY SURVEY

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graph TD; A[BREWERY SURVEY] --> B[FERMENTED BEVERAGE MANUFACTURES – BEST MANAGEMENT PRACTICES]; B --> C[GUIDELINES FOR SLUG/SPILL PLAN]; C --> D[FULL SUO];
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FERMENTED BEVERAGE MANUFACTURES – BEST
MANAGEMENT PRACTICES

GUIDELINES FOR SLUG/SPILL PLAN

FULL SUO

WE ADDED
A FBM
SECTION
TO OUR
WEBSITE!

Metropolitan Sewerage District
of Buncombe County, North Carolina
2028 Riverside Drive, Asheville, NC 28804



Thursday, September 10, 2020, 11:28:11 am

FERMENTED BEVERAGE MANUFACTURERS

- Brewery Survey
- Fermented Beverage Manufacturers - Best Management Practices
- Guidelines for Slug Plan

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[Purchasing/Auctions](#)
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[Street Interruptions](#)
[Survey Standards](#)

If you dig, call 811 first.
[Click here](#) for more
information.



ALL FBM'S ARE
REQUIRED TO
HAVE A
SLUG/SPILL PLAN
AND COMPLETE
ANNUAL TRAINING
WITH EMPLOYEES
FOR SLUGS/SPILLS!
THANK YOU
STEPHANIE BRIXEY
OF DURHAM
COUNTY FOR THE
GUIDELINES!

**Guidelines for Slug/Spill Plan
Industrial Pretreatment Program
Metropolitan Sewer District (MSD) of Buncombe County**

1. **GENERAL INFORMATION:** Facility name & address; facility contact(s) & phone number(s); nature of business, operating schedule & number of employees; discharge practices; previous history of spills and/or slugs & corrective measures; and security provisions.
2. **FACILITY LAYOUT AND FLOW DIAGRAMS:**
 - 2.1 Facility Diagram – A general layout of the facility including location of manufacturing or commercial activities, property boundaries, floor drains & other connections to the sanitary sewer, chemical storage (raw, final & waste), loading & unloading areas, direction of drainage, etc.
 - 2.2 Flow Diagram – A diagram showing destinations of chemical & wastewater flow including treatment systems, tanks & capacities, piping & instrumentation, and flow rates.
3. **HAZARDOUS MATERIALS INVENTORY:** Types of chemicals used (both chemical & trade names must be listed); storage location of materials; maximum volume & container volume; description of containers chemicals are stored in; transfer & transport equipment used to move chemicals; and comments about the properties of the chemicals used.
4. **DESCRIPTION OF DISCHARGE PRACTICES:** Including routine and non-routine batch discharges.
5. **SLUG PREVENTION EQUIPMENT AND PROCEDURES:** Inventory of available equipment used to prevent and/or contain spills; plans to obtain necessary equipment; and operation & maintenance procedures designed to eliminate spills and leaks.

THE BMP'S FOR FERMENTED BEVERAGE MANUFACTURES WAS ADAPTED FROM KING COUNTY WASHINGTON.



Metropolitan Sewerage District of Buncombe County
Industrial Waste Program
Wastewater Best Management Practices - 2019

Fermented Beverage Manufacturers Best Management Practices (BMPs)

BMPs Protect the Sewer System – and your bottom line

MSD's Industrial Waste Department works with industries to make sure their wastewater is properly treated and meets requirements. This protects people, the environment, and the economy.

Wastewater from breweries contain higher concentrations of organic matter than typical household wastewater. Businesses that send concentrated waste to the sewer system pay an extra surcharge fee because it costs more to treat this water.

To help breweries meet requirements and manage costs, MSD has developed these BMPs for brewery wastewater. BMPs are activities, procedures, and features designed to minimize pollutants discharged to the sanitary sewer or released to the environment.

The Requirements

1. **Meet discharge limits:** All breweries that send their wastewater to the MSD Sewer System must make sure their wastewater meets the local discharge limits and prohibitions, summarized here and listed in The MSD Sewer Use Ordinance.
 - ☐ **Solids:** Food waste, including food-grinder waste, must be capable of passing through a 1/4-inch sieve. Solids can restrict or block flow in sewer lines. A company or facility that discharges solids that causes a sewage backup is liable for any damages.
 - ☐ **pH:** The pH of wastewater must remain between 6.0 and 10.5 s.u. Wastewater that is too acidic or too alkaline can seriously corrode the sewer system, so the pH must be balanced.
 - ☐ **Temperature:** Wastewater must not exceed 60° Celsius (140° degrees Fahrenheit) at the point where it enters the MSD Sewer System. Brewery wastewater that is high in temperature can be a concern at MSD's Water Reclamation Facility.
2. **Apply for authorization, if needed:** Some businesses need permits or authorization to send their wastewater to the sewer. Breweries must apply for authorization if they meet the following criteria:

THE FBM SURVEY IS
USED FOR A LOCAL
PERMIT
APPLICATION AS
WELL. I AM
WORKING ON A
SPECIFIC
INSPECTION FORM
FOR FBM'S AS WELL.
THIS FORM WAS AN
ADAPTATION FROM
KING COUNTY
WASHINGTON.

Brewery/Winery/Cidery/Distilled Spirits Survey & Permit Application

MSD



Metropolitan Sewerage District of Buncombe County, North Carolina
Industrial & Commercial Waste Division
2028 Riverside Drive
Asheville, North Carolina 28804
(828) 254-9646

1. COMPANY BUSINESS NAME:

Site Location: _____ Phone : (____) _____

City: _____ State: _____ Zip: _____

Mailing Address: _____

City: _____ State: _____ Zip: _____

2. CHIEF EXECUTIVE OFFICER:

Name: _____ Title: _____

Mailing Address: _____

City: _____ State: _____ Zip: _____

3. PERSON ON SITE (Authorized to Represent this Firm in Official Dealings with MSD)

Name: _____ Title: _____

Phone : (____) _____ email: _____

The SUO Effective May 21, 2020.

- MSD gave the existing FBM's 18 months to comply. Therefore, they must meet the requirements by November 21, 2021.

Declaration of Intent to adopt this Sewer Use Ordinance was introduced to the District Board of the Metropolitan Sewerage District of Buncombe County, North Carolina and passed on Feb. 19, 2020

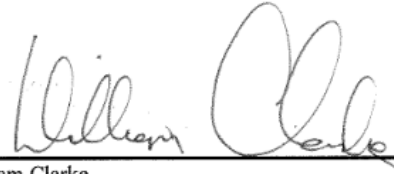
16.2 Consideration of Comments and Suggestions

Comments and suggestions from governing bodies within the District with respect to this Ordinance were considered by the District Board of the Metropolitan Sewerage District of Buncombe County, North Carolina on April 29, 2020

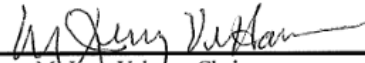
16.3 Adoption and Effective Date

- (a) Sewer Use Ordinance adopted on May 20, 2020
- (b) Effective Date: May 21, 2020

Approved as to form:

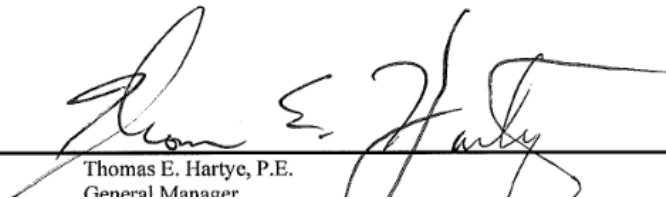


William Clarke
General Counsel



M. Jerry Veach, Chairman
Board of the Metropolitan Sewerage District
of Buncombe County, North Carolina

Attest:



Thomas E. Hartye, P.E.
General Manager



WE WILL ALL BE GLAD TO GET BACK TO NORMAL.

QUESTIONS?

