Brewery Wastewater Best Management Practices

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Introduction to King County Wastewater Treatment Division (WTD) & Industrial Waste Program (IW)

Development of Permitting Guidelines and Best Management Practices for Breweries within KC WTD Service Area
King County Wastewater Treatment Division Facts

- 34 local sewer agencies (cities & sewer districts)
- 424 square miles service area
- 1.7 million people
- 3 Regional plants (West, South & Brightwater)
- 2 local plants (City of Carnation & Vashon Island)
- 47 Pump Stations & 26 Regulator Stations
- 391 miles of conveyance lines with diameters ranging from 2.5 inches to 14 feet 8 inches
- Average 180 million gallons per day (MGD) treated wastewater
KCIW Program Goals

- Protect worker health & safety
- Prevent interference with operation of treatment plants
- Prevent passthrough to the environment
- Recycle / Reclaim biosolids
- Support Regional Environmental Protection
~ 600 Active Individual Discharge Approvals
115 Significant Industrial Users (SIU’s)
Types of Industries Regulated

Categorical Industries:

Metal Finishing
(40 CFR Part 433)
### Other Categorical Industries:

- Pharmaceutical manufacturing
- Centralized waste treatment
- Porcelain enameling
- Coil Coating (can manufacturing)
- Electronic components
- Iron & steel manufacturing
- Transport Equipment Cleaning
- Battery Manufacturing
- Circuit board manufacturing
Types of Industries Regulated by King County

Examples of Non Categorical Industries

* Flexographic Printing
* Food / Beverage manufacturing
* Landfill leachate
* Hospitals
* Biotech
* Dental Offices
* Solid Waste Recycling Stations
* Vactor Truck Decant Facilities
* Contaminated Stormwater
* Construction dewatering
* Groundwater remediation
* Rendering
* Industrial laundries
* Cement / Ready mix
* Breweries & wineries
Breweries: A rapidly growing industry
Project Goals

- Establish Permitting Guidelines: What types / size of breweries need to be permitted by KCIW
- Develop Wastes Management Best Management Practices (BMPs) for Breweries
Step 1: Research & Data Gathering

- Internet search
- Talk to other POTWs
- Get Breweries Involved / Site Visits
- Get brewery info from WA Liquor & Cannabis Control Board
- Refine Brewery List / GIS
- Develop brewery-specific Questionnaire
- Send Surveys / Review Data
### Breweries within WTD service area (2015)

<table>
<thead>
<tr>
<th>City</th>
<th>Number of Breweries</th>
</tr>
</thead>
<tbody>
<tr>
<td>Auburn</td>
<td>1</td>
</tr>
<tr>
<td>Bellevue</td>
<td>3</td>
</tr>
<tr>
<td>Black Diamond</td>
<td>1</td>
</tr>
<tr>
<td>Bothell</td>
<td>3</td>
</tr>
<tr>
<td>Brier</td>
<td>1</td>
</tr>
<tr>
<td>Issaquah</td>
<td>1</td>
</tr>
<tr>
<td>Kenmore</td>
<td>3</td>
</tr>
<tr>
<td>Kent</td>
<td>1</td>
</tr>
<tr>
<td>Kirkland</td>
<td>2</td>
</tr>
<tr>
<td>Mountlake Terrace</td>
<td>1</td>
</tr>
<tr>
<td>Newcastle</td>
<td>1</td>
</tr>
<tr>
<td>Pacific</td>
<td>1</td>
</tr>
<tr>
<td>Redmond</td>
<td>5</td>
</tr>
<tr>
<td>Renton</td>
<td>2</td>
</tr>
<tr>
<td>Sammamish</td>
<td>2</td>
</tr>
<tr>
<td>Seattle</td>
<td>62</td>
</tr>
<tr>
<td>Shoreline</td>
<td>1</td>
</tr>
<tr>
<td>Tukwila</td>
<td>1</td>
</tr>
<tr>
<td>Woodinville</td>
<td>10</td>
</tr>
</tbody>
</table>

319 breweries in WA, second only to CA

102 breweries within KC WTD service area
The ten largest breweries contribute 90 percent of brewery wastewater.
Industry best practice goal: 3-5 Liters of wastewater generated per liter of beer sold *

KCIW permitted breweries generate on average 2.5 gallons of wastewater for each gallon of beer produced

Economy of Scale: Higher production volume = lower water use ratio

Packaging influence = Smaller packaging (12 oz cans/bottles) require more water use than larger packaging (keg)

* Source: Brewers Association Water and Wastewater: Treatment/Volume Reduction Manual
Wastewater Characteristics

pH

- Beer generally acidic (4-5 s.u.)
- Wastewater Highly variable pH (3 – 12 s.u.) depending on activities
- Caustic cleaners / Acidic Cleaners / Sanitizers
Wastewater Characteristics
High Strength

- BOD Average: 8,100 mg/L
- BOD Minimum: 1,440 mg/L
- BOD Maximum: 24,700 mg/L

- TSS Average: 1,600 mg/L
- TSS Minimum: 100 mg/L
- TSS Maximum: 8,110 mg/L
## Breweries Loadings to Treatment Plants

<table>
<thead>
<tr>
<th>Treatment Plant</th>
<th>Flow from Breweries</th>
<th>BOD Loading from Breweries</th>
<th>TSS Loading from Breweries</th>
</tr>
</thead>
<tbody>
<tr>
<td>Brightwater</td>
<td>0.08 %</td>
<td>4.79 %</td>
<td>0.82 %</td>
</tr>
<tr>
<td>South</td>
<td>0.00 %</td>
<td>0.04 %</td>
<td>0.01 %</td>
</tr>
<tr>
<td>West Point</td>
<td>0.02 %</td>
<td>1.87 %</td>
<td>0.27 %</td>
</tr>
</tbody>
</table>
Potential problems with brewery wastewater

- High concentrations of solids could clog pipes or cost more to treat
- Too acidic or too alkaline could corrode the sewer system
- Hot wastewater could harm small treatment plants
Step 2: Implementation of Permitting guidelines and BMPs for all Breweries

- Sent draft permitting guidelines & BMPs out for comments
- Presented draft guidelines & BMPs to MWPAAC & Washington Brewers Guild
- Sent final BMPs:
  - To breweries
  - To local sewer agencies
  - Other interested parties
- Created New webpage
Breweries Requirements

- Apply for individual Discharge approval, if needed
- Comply with Local Limits (primarily pH & Settleable Solids)
- Install a monitoring point, if needed
Permitting Guidelines: Decide which breweries need permits

- Produce 3000 or more barrels of beer per year
- Or
- Send 1000 or more gallons of wastewater to the sewer each day
- Or
- Are located in the Carnation or Vashon Treatment Plant Service Area
All Breweries must comply with Local Limits

- pH Limits: 5.5 s.u. – 12.0 s.u.
- Settleable Solids (Vol.) – 7 ml/L
Breweries BMPs
Considerations when planning for new or remodeled brewery

- Hire an engineer experienced in design of brewery wastewater treatment systems
- Plumb all drains from brewing operations to a common drain, sump or wastewater tank
- Control of pH is often necessary, and batch treatment to meet pH limits is best option for many small breweries.
- Set aside sufficient floor space for a wastewater pH equalization / treatment tank, treatment chemical containers, and solids handling equipment and storage.
- Provide an easily accessible sample site that is representative of the discharge from the brewing operation, separate from sanitary and restaurant drains.
Prevent solids (spent yeast, grains, hops, etc.) from entering the sewer

- Control solids at the source
- Don’t let the solids hit the ground
- Install end-of-pipe solids separation
- Consider beneficial reuse: Seek opportunities to turn solids into compost, fertilizer, animal feed, energy, or reuse
Install screens, baskets and filters on all floor drains & trenches
Use appropriate gauge screens
Make sure screens are easy to access and service
Dewater collected solids and dispose off-site
Sweep up and collect solids spills
Avoid rinsing them down the drain.
Reuse yeast for multiple generations
Train employees on solids management practices
Install systems to manage pH

- Install tanks, totes or containers to adjust pH of individual waste streams
- Take advantage of acidic and caustic nature of various waste streams to facilitate self-neutralization and minimize use of chemicals
- Install end-of-pipe tank to collect all brewery wastewater for self-neutralization and if needed to adjust pH
- Use chemicals (acid and caustic solutions) to neutralize wastewater
- Use a mechanical mixer in tanks to blend in the chemicals
Brewery Wastewater BMP Guidance -
Example pH Neutralization Schematic - Flow-Through or Multiple Batch

1. Wastewater from production areas and floor drains (no sanitary wastewater)
2. Solids handling
3. Discharge to local public sewer system
4. Acid drum (e.g., sulfuric acid)
5. Alkaline drum (e.g., sodium hydroxide, caustic)
6. pH controller
7. pH/flow recorder and data logger
8. Scale: NTS
Install representative monitoring point

Monitoring point to be provided downstream of all process wastewater
Chemical storage and spill prevention

- Store chemical solutions in low traffic areas & within secondary containment
- Segregate and securely store non-compatible chemicals (for example acids and bases)
- Inspect all process solution tanks & piping on a regular basis and repair any leaks promptly.
- Label all chemical solution storage containers.
- Develop a spill response plan train employees.
King County Industrial Waste Program

Phone: 206-477-5300
Email: Info.KCIW@kingcounty.gov
Web: www.kingcounty.gov/IndustrialWaste

KCIW Brewery Web Page:

KCIW Brewery BMPs:
http://www.kingcounty.gov/~media/services/environment/wastewater/industrial-waste/docs/TechAssistance/1703_Brewery-BMPs.ashx?la=en

KCIW Brewery Supplementary Questionnaire:
http://www.kingcounty.gov/~media/services/environment/wastewater/industrial-waste/forms-logs/Other/1607_breweries-sup-questionnaire.ashx?la=en

Other Links:

Brewers Association Water and Wastewater: Treatment/Volume Reduction Manual
https://www.brewersassociation.org/attachments/0001/1517/Sustainability_-_Water_Wastewater.pdf

Pacific Northwest Pollution Prevention Resource Center: Topic Hub: Craft Brewing
Thank you!