

Tortilla Industry Association Convention 2024

Successfully Navigating Wastewater Treatment and Permitting Issues

What to Expect and Why

Industrial Wastewater

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Tortilla Industry Association Convention 2024

Presentation Topics

- Regulations
- Wastewater Terms, Definitions, and Acronyms
- Potential Wastewater Treatment Processes
- Potential Treatment System Equipment
- Effluent Flow Monitoring and Sampling

Regulations

Why do we do this?

Control Authorities and Regulators

- US Environmental Protection Agency (EPA)
- State Environmental Agencies
- Local Governments
 - ❖ Cities
 - ❖ Counties
 - ❖ Authorities

Industrial WW Permits: What to Expect

- May be required to apply for a process wastewater permit
 - ❖ City, county or State
 - ❖ Where the plant is located
- Permitting authority may issue an industrial discharge permit
 - ❖ “This is a separate wastewater discharge from sanitary or other non-process wastewater”
- This permit may also require sampling or reporting
 - ❖ Some contaminants for testing include pH, flow, biochemical oxygen demand (BOD), fats oils & greases (FOG), total suspended solids (TSS), and total phosphorus (TP); etc.
 - ❖ Monthly Discharge Monitoring Reports (DMRs)
- Almost always will be required to discharge the wastewater within certain limits; e.g., $6 < \text{pH} < 9$, $\text{FOG} < 100 \text{ mg/L}$

Why We Have to Treat

NPDES Discharge to Creek

- ❖ Human and Wildlife Health
 - Toxins
 - Oxygen Depletion
 - Sludge Deposits
 - Thermal and Radioactive

Discharge to Sewer

- ❖ POTW Health
 - Interference and/or Die-off
 - Blockage
 - Explosions
 - Corrosion
 - Pass Through

Example Pretreatment Permit Limits

➤ Permit Limits

- BOD: 300 mg/L
- COD: 600 mg/L
- TSS: 300 mg/L
- NH₃N: 20 mg/L
- TP: 15 mg/L
- FOG: 100 mg/L
- Zinc: 0.493 mg/L
- Chlorides: 100 mg/L
- pH: 6>; <9 SU

Wastewater Terms, Definitions and Acronyms

What does it mean?

Common Wastewater Terms

➤ Flow Rate

- ❖ GPM: Gallons per Minute
- ❖ GPD: Gallons per Day
- ❖ MGD: Million Gallons per Day

➤ Concentration

- ❖ mg/L: Milligrams per Liter
- ❖ ppm: Parts per million
- ❖ $\mu\text{g/L}$: Micrograms per Liter
- ❖ ppb: Parts per billion

Applicable Wastewater Constituents for Tortilla Manufacturers

- Loading Parameters (How strength of wastewater is measured)
 - ❖ 5-Day Biochemical Oxygen Demand [BOD₅]
 - The rate at which microorganisms (microbes) use oxygen to stabilize biodegradable organic matter under aerobic conditions
 - The organic matter in wastewater serves a food for the microorganisms
 - It takes 5 days to run a 5-day BOD, which is the standard BOD test
 - ❖ Example: Pounds of BOD per 1,000 gallons wastewater
 - Sewage: 2 lbs BOD
 - Sugar: 8,340 lbs BOD
 - Fats, Oils & Greases: 15,012 lbs BOD
 - Ketchup: 1,668 lbs BOD

Applicable Wastewater Constituents for Tortilla Manufacturers

- Loading Parameters (How strength of wastewater is measured)
 - ❖ Chemical Oxygen Demand [COD]
 - A measurement of the oxygen-consuming capacity of organic matter in wastewater
 - The COD test uses chemical oxidants instead of microbes to degrade the organics
 - Takes less than 4-hours to run test
 - In some cases, COD can be correlated with BOD

Applicable Constituents, Cont.

- Loading Parameters (How strength of wastewater is measured)
 - ❖ Solids
 - Total Suspended Solids (TSS) is the dry-weight of particles trapped by a filter
 - Total Dissolved Solids (TDS) are solids that are dissolved in a liquid, such as sugar or salt
 - ❖ Phosphorus
 - Total Phosphorus (TP): Includes dissolved and particulate phosphorus; organic and inorganic phosphorus

Applicable Constituents, Cont.

➤ Loading Parameters (How strength of wastewater is measured)

❖ pH

- A measurement of the acidity or basicity of a solution
- Ranges from 0 to 14 (referred to as standard units [SU])
- pH <7 SU is acidic and pH >7 SU is basic
- pH of 7 SU is neutral

❖ Fats, Oils & Greases (FOG)

- Oils: Liquid at room temperature
- Fats & Grease: Solid at room temperature
- Cause blockages in sewer lines; interferes with POTW operations
- Very high in BOD

Potential Treatment Processes

How do we reduce that?

Common Wastewater Treatment Processes Applicable to Tortilla Manufacturers

➤ Equalization

- ❖ Equalization (EQ) is a means of buffering or equalizing the characteristics of wastewater prior to entering the wastewater treatment system thereby minimizing the impact of fluctuations in loading on downstream processes
- ❖ Benefits of EQ include:
 - Substantially reduced chemical costs, especially associated with pH fluctuations, and coagulants and flocculants required for solids removal.
 - Smaller downstream treatment components. Downstream treatment components do not have to be sized to handle instantaneous flow peaks
 - Ease of operations. EQ substantially reduces process adjustments required in day-to-day operations

Treatment Processes cont.

➤ pH Adjustment (Neutralization)

- ❖ Neutralization of wastewater that is highly acidic (low pH) or highly basic (high pH) is required for discharge to municipal sewer systems
- ❖ Generally, the allowable pH range for discharge is 6 to 9 SU
 - Sulfuric acid has a pH of around 1 SU
 - Sodium hydroxide has a pH of around 13 SU
 - Both of these chemicals are used in industrial wastewater treatment to adjust pH

Treatment Processes cont.

➤ Dissolved Air Flotation

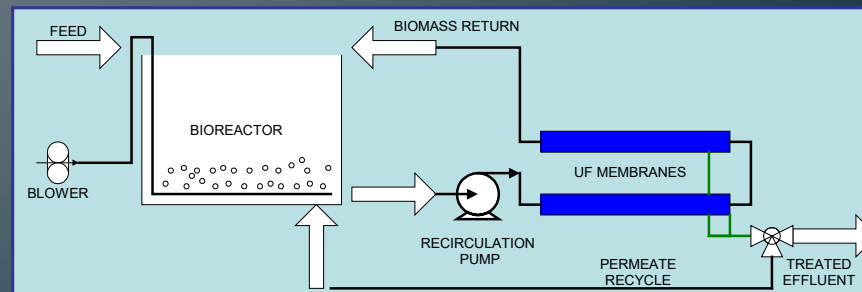
- ❖ DAF systems are designed to remove suspended solids (TSS) along with FOG from a waste stream by flotation, as opposed to gravity separation
- ❖ DAF systems work exceptionally well with waste streams that include solids that tend to remain in suspension or float such as food processing
- ❖ DAF systems are designed to remove the solid particles by using very small air bubbles that attach to the particles causing them to float to the surface for removal by skimming



Treatment Processes cont.

➤ Biological Treatment

- ❖ Biological treatment reduces dissolved BOD and solids
- ❖ BOD is degraded because the microbes use it as the food source
- ❖ Most common treatment uses activated sludge (AS); typically removes 85 to 95 percent of the solids and BOD
- ❖ AS is comprised of bacteria, protozoa, etc.
- ❖ Main difference in aerobic biological treatment processes is the separation of AS from the treated wastewater; i.e., using clarification (gravity separation), flotation or membranes



Potential Treatment System Equipment

What pieces may we need?

Potential Pretreatment Processes

❖ Preliminary Treatment

- Basket Strainers
- Rotary Screens

❖ Chemical Treatment

- pH Adjustment
- Coagulation
- Flocculation

❖ Primary Treatment

- Oil/Water Separator
- Dissolved Air Flotation
 - Skimmings Mgmt
 - Sludge Mgmt

❖ Secondary Treatment

- Biological Degradation
- Biological Solids Separation
- Sludge Management

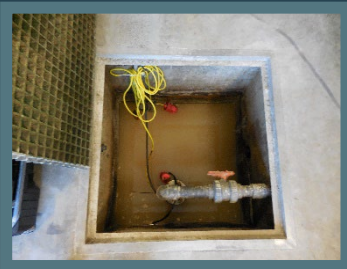
❖ Effluent Monitoring

- Flow Meter
 - pH probe
 - Temperature Probe
- Flume
- Automatic Sampler

Equipment

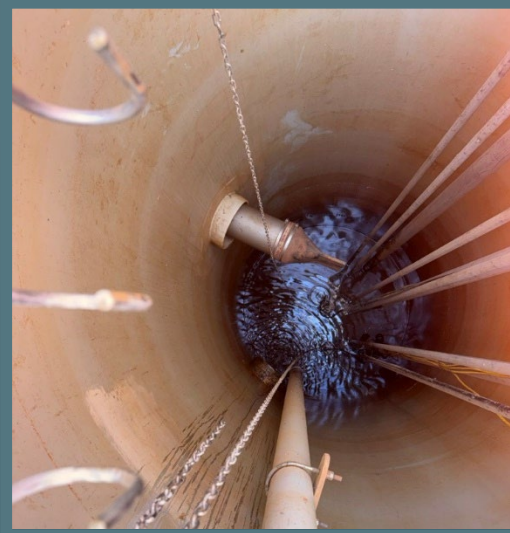
Major components of a tortilla processing plant pretreatment system

- Lift Station with Pumps
- Calamity Tank (Emergencies)
- Trash / Solids Removal
- Equalization (EQ) Tank
- Coagulation and Flocculation Reactor Tanks with pH Adjustment
- Primary DAF Unit / OWS
- Bioreactor Tank
- Solids Separation
- Sludge Storage Tank
- Effluent Monitoring & Sampling



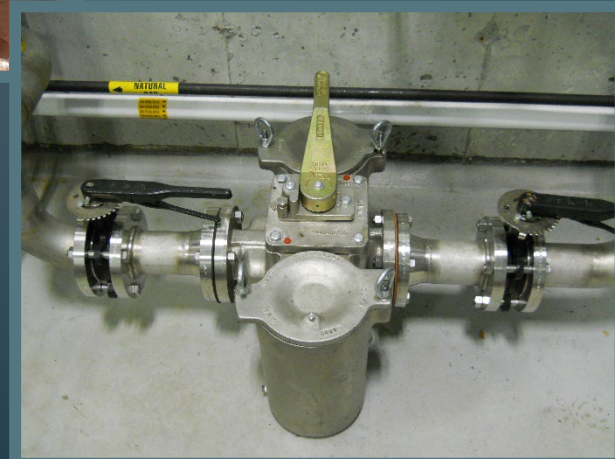
Lift Station

- ❖ Submersible or Suction Lift Pumps
- ❖ Manhole and valve box



Preliminary Treatment

- ❖ Trash / Solids Removal
- ❖ Basket Strainers
- ❖ Rotary Screen



EQ Tank

- ❖ Usually 1-day flow volume
- ❖ Mixing by Aeration
- ❖ Water level allowed to move up and down





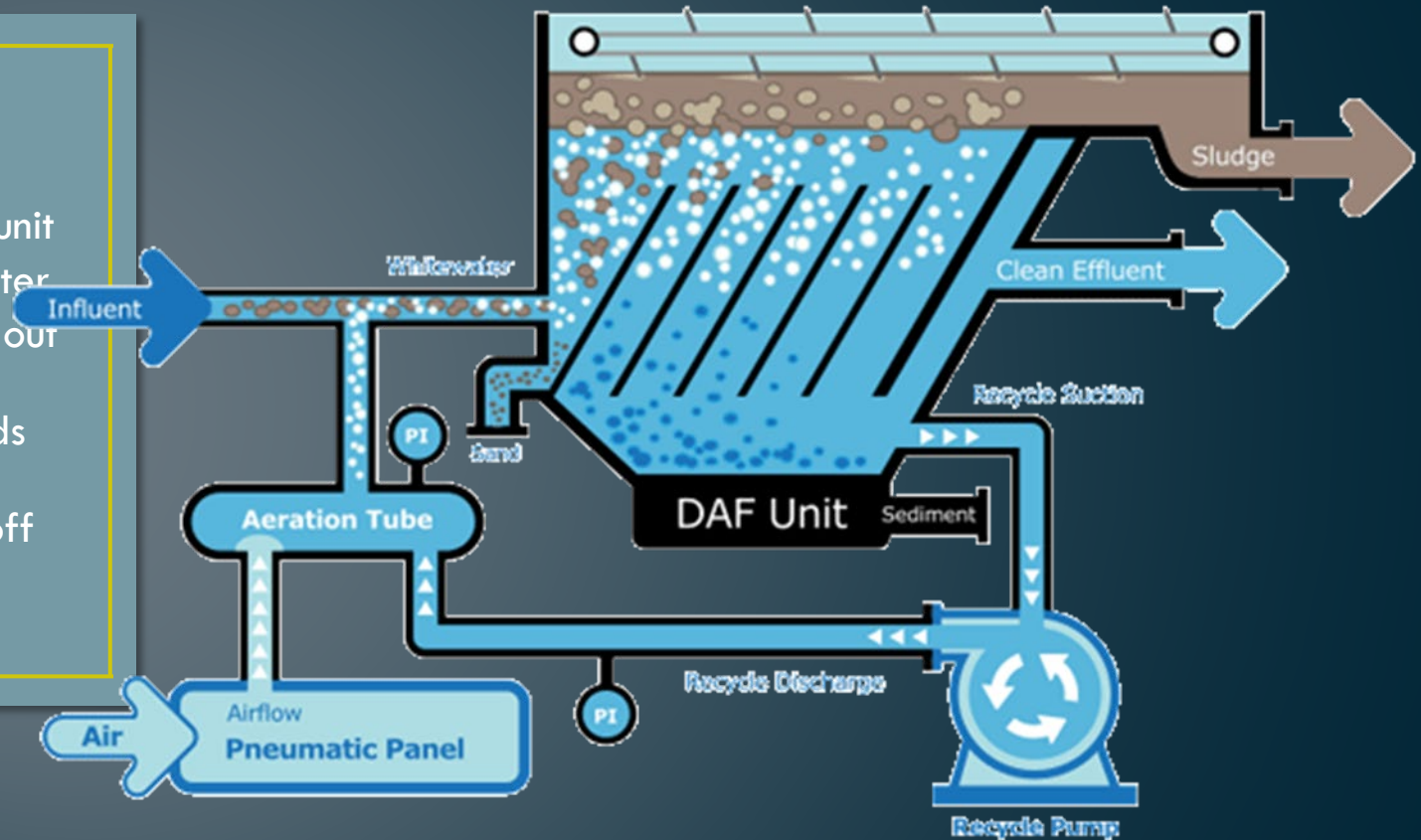
Reactor/Floc Tanks

- ❖ Flow-controlled feed pumps
- ❖ Chemical Addition / pH Adjustment
- ❖ Reactor and Floc Tanks with mixing



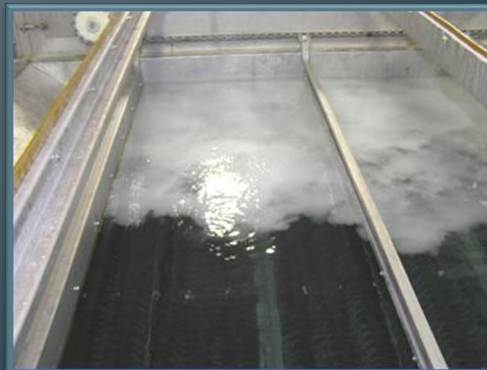
Dissolved Air Flotation

- ❖ Wastewater enters unit
- ❖ Mixed with whitewater
- ❖ Dissolved air comes out of solution
- ❖ Floatables rise; solids sink
- ❖ Floatables skimmed off
- ❖ Solids blown down



Dissolved Air Flotation

- ❖ Skimmer
- ❖ Recirculation Pumps
- ❖ Sludge Blow-down Valves (Automatic)



Biological Treatment

- ❖ Bioreactor Tank with Aeration
- ❖ Clarifier or
- ❖ Secondary DAF or
- ❖ Membranes



Sludge Holding Tank

- ❖ Flat bottom or coned bottom
- ❖ Decant Lines to remove water
- ❖ Pump-out Connection



Effluent Flow Monitoring and Sampling

What are we discharging and how did we do?

Effluent Flow Monitoring

- ❖ Flow Meter
- ❖ Flume
 - ❖ Free Standing
 - ❖ Inside Manhole
- ❖ Automatic Sampler
- ❖ Submit Samples to Laboratory



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Questions & Comments



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