Out of Sight, In Mind
Identifying How Water Should Leave Your Plant
Once water is out of sight, it can often go out of mind. However, over the last decade, the food and beverage industry is realizing that this is no longer acceptable. After understanding how properly filtering, reusing and recapturing water helps you conserve, you now have to make an informed decision about what happens to your water after it serves its production related purpose and becomes a waste stream.

You can invest to treat your water onsite or you can pay for your city or county to do it. Which makes the best sense for your facility? As an innovative food and beverage producer, it is important for you to be aware of the options for water leaving your plant prior to making a choice.

In this final Think Tank paper, we will discuss how and why you might choose to:

- Discharge directly to the municipal sewer system
- Pretreat water prior to discharge to the municipal sewer system
- Fully treat water privately to discharge
- Treat water with a reuse component

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**VOCABULARY**

**Aeration** – Mixing of water with air, either by spraying water or diffusing air through the water

**Aerobic** – Requiring oxygen; descriptive of a bacterial class that functions in the presence of free dissolved oxygen

**Anaerobic** – Not requiring oxygen; descriptive of a bacterial class that functions in the absence of free dissolved oxygen

**Anoxic** – Depleted oxygen levels

**BOD** – Biochemical Oxygen Demand; the amount of oxygen microorganisms must consume to breakdown the organic material present in the wastewater

**Dewatering** – Removal of excess moisture from sludge waste

**Digestion** – Conversion of sludge solids to gas

**FOG** – Fats, Oils and Grease

**MBR** – Membrane Bioreactor

**Membrane** – Pliable sheet like structure acting as a boundary

**Primary Treatment** – Involves basic processes to remove suspended solid waste and reduce its BOD

**Sludge** – Precipitated solid matter produced by water and sewage treatment

**Secondary Treatment** – Uses biological processes to catch the dissolved organic matter missed in primary treatment. Microbes consume the organic matter as food, converting it to carbon dioxide, water, and energy. Secondary treatment technologies vary, from the activated sludge process, to constructed wetland systems. However, the final phase of each involves an additional settling process to remove more suspended solids.

**TPAD** – Temperature Phased Anaerobic Digesters

**TSS** – Total Suspended Solids
Many food and beverage processors can probably attest to the tightening limits and enforcement in their area. Even if you are in compliance now, the high level of discharge of starches, biochemical oxygen demand (BOD), fats, oils, grease (FOG), and color removal could threaten compliance in the future.

Each of the options discussed has a place in your industry. You just have to decide which will work for the future of your plant.

**Option 1: Discharge directly to a municipal sewer system**

Some production does not impact the water in ways that require treatment prior to a municipal treatment plant. Therefore, it allows specific producers to discharge directly to the municipal sewer system without pretreatment. However, for the food and beverage industry, some level of pretreatment is most likely required. If you are one of the few that are not required to pretreat your water, be sure you understand where a municipality may tighten their controls and what would cause your plant’s discharge to be out of compliance.

When you proactively negotiate with the local municipality, you may find it more affordable than the cost of capital to invest in new treatment infrastructure. Nonetheless, if on-site treatment becomes necessary, you should be prepared for this new investment. It could involve the reconsideration of your plant master plan from a space and piping perspective.

**Option 2: Pretreatment prior to discharge**

If pretreatment is required prior to discharge, it means removing the most extreme elements of your discharge while adhering to the requirements of your municipality. As a result, the final treatment occurs at the municipal level after leaving your plant.

There are several technologies for primary treatment. One of the more prevalent technologies in the industry is a dissolved air floatation system (DAF). DAF is a form of treatment where the fats, oils and grease (FOG)

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**WATER TIP:**

A smart investment in wastewater treatment can pay for itself and even produce additional continuing revenue streams.
the right technology, this nutrient rich scum could turn a cost into a profit center for your plant. Plant scum discharge has allowed some bio-energy producers to successfully harvest biofuel via anaerobic digestion for electricity generation. In other instances, the scum can be composed and sold as fertilizer to agriculture.

Besides scum, other common discharges are starches and sugars. In a consistent discharge stream (ex. in a brewery), packaged units can be sold to produce biogas and generate electricity. A producer can sell starch cakes as a calorie rich form of animal feed where they are gathered through centrifuging or dewatering. Similarly, proteins can be harvested from waste water and resold for nutritional value.

**Option 3: Full treatment for wastewater**

Industrial sites do not always have access to municipal sewer systems that can handle their waste loads. As a result, they must treat their wastewater completely onsite and have the process properly permitted through the governing regulatory body. In the United States, a National Pollutant Discharge Elimination System (NPDES) discharge permit for a wastewater outfall is required. The permit sets the limits of treatment required for the receiving water body. For industries with this type of treatment, a full wastewater treatment plant becomes a part of the production.

are brought to the surface of a tank using dissolved air.

This forms a layer of scum on the top of the tank and then, DAF scraps off the scum and pumps it to another tank for disposal. The treated wastewater can be discharged or treated and the scum can be disposed of in a landfill as a solid waste stream.

Although it may be easy to dispose of the scum, consider keeping it. With
All Industrial wastewater discharges require either a NPDES permit or a sewer discharge permit. NPDES permits are issued by state environmental agencies or, in some cases, the United States Environmental Protection Agency (EPA). Sewer discharge permits are issued by the local sewer authority or Publically Owned Treatment Works (POTW). In either case, the permits normally remain in effect for three to five years.

Any significant modification of the industrial facility or its wastewater treatment system can require a permit modification and/or issuance of an authorization to construct (ATC) by the regulatory agency. For any wastewater discharging industrial facility, the wastewater permit and its limitations/conditions can determine the success or failure and the continuation or closure of the facility. Whether it is an NPDES permit or a sewer permit, the wastewater discharge permit deserves high level attention and priority.

Option 4: Treatment with a Reuse Component

As water becomes more scarce and costly, many producers are reusing their water multiple times before treating it as waste and sending for treatment. Some producers reuse their water for cooling water, plant water and flushing water to reduce consumption.

General Guidelines for Industrial Permit Applicants:

All industrial applications are unique and could require additional processes such as pH adjustment, screening up-stream of the DAF or equalization. Here are some general guidelines for industrial applicants in the NPDES and pretreatment permitting process:

- Permit limits should protect the environment, but should not be unreasonable or unnecessarily restrictive. Environmental protection and compatibility is good business and a necessary part of any sustainability program for an industrial facility.
- Permit conditions and limits are negotiable. Do not accept a permit that you will clearly be unable to fully comply with.
- Permits should be clear and unambiguous. Do not assume that provisions will not be enforced or that unclear provisions will be interpreted in your favor.
- Thoroughly review and critique draft permits. The final permit will likely have no changes or corrections unless identified and requested by the applicant.
- Communicate early and often with agency permitting staff before, during and after the time the permit application is being reviewed and the draft permit is being prepared.
When the City of St. Petersburg needed to upgrade their existing wastewater treatment plant, they chose Haskell to provide electrical improvements that included adding two new temperature phased anaerobic digesters (TPAD).

As a result, the co-generation project allowed the City to use the digestion of sludge to capture gas from the new TPAD system that cleaned and stored the gas for use in their fleet vehicles.

**Project Details**

This energy, generator and electrical improvements project consists of upgrades to the existing aeration tanks, construction of two new primary clarifiers and ancillary equipment, the addition of two new temperature phased anaerobic digesters (TPAD) with batch tanks, a new digester building, methane gas storage, biogas upgrade system and cooling system, a new ferric system, a primary clarifier influent splitter and diversion box, upgrades to the existing gravity belt thickeners, a new dewatering building, new electrical building and a combined heat and power (CHP) system, a natural gas generator and engine generator facility, underground piping and all associated equipment.
Even if your application does not allow for multiple uses prior to discharge, you can treat your water to reuse standards and offset the purchase of potable water or consumption from a well or other source. Keep in mind that some water reuse projects may have tax credits available.

Solids removed from wastewater can be treated and can also be reused in other ways such as land application, pellets or sold to companies.

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**Conclusion**

Regulations and limits change. However, with the right waste process, not only would you be in compliance, but you could also turn cost into profit.

**Have questions or comments?**
Contact the contributors.

**Further Reading**

Think Tank Part 1:
Optimizing Your Water Filtration System

Think Tank Part 2:
Reusing and Recapturing