



Case Study: Septage Pretreatment Facility

The path to having your own septage pretreatment facility

Prepared by Tom Ferrero, NAWT Secretary

Introduction

Many of us think how great it would be to have our own treatment facility for the septage, grease trap waste, and sewage sludges we like to put into our trucks. A wise man once said 'It's good to own the key to the dump!' Not for illicit reasons, but for 24/7 access, no long lines at a dump site, and quick disposal approvals for waste streams that meet the requirements of the facility's regulatory permits.

Prepare Several Business Plans

The first step is to answer the questions "Do I really need my own septage treatment facility? Does it make financial sense?" These questions should be answered by analyzing the dollars and cents of your current disposal options. Prepare a business plan for one of these options, or all three, to determine the lowest cost to you for disposal.

- Municipal Wastewater Treatment Plant (POTW): Consider all the costs associated with this option. What is the tipping fee? Truck travel time to/from the POTW. Location of the POTW in relation to your service area.
- Beneficial Reuse by Land Application: Do you have land available (owned or relationship with farmer)? Remember all the costs associated with land application (it is not free!) such as permitting, recordkeeping, storage, screening device,

lime addition equipment, etc. Do you have a bad weather and/or winter weather contingency plan? Perhaps you need to use both land application and disposal at a POTW when unable to land apply.

- Permit, Own, and Operate your own Treatment Facility: You will probably need some help putting together a business plan for the costs associated with this option, but if you are spending hundreds of thousands of dollars a year on disposal it is an option worth taking the time to pursue. Typically, for haulers disposing of less than one million gallons per year (1,000,000 gal/year) the capital costs associated with a facility may drive the per gallon cost of disposal too high. If this is the case you may consider planning a regional facility - taking in the waste streams from your hauling competitors to bring up the volume.

You've Decided to Operate Your Own Treatment Facility

Before you go further, be reminded that this facility is a complete other business venture that will demand much of your time, energy, and money. If you are spending most of your time in the seat of a pump truck you may want to reconsider this option for disposal.

Septage Characteristics

As can be seen in Table 1, these waste streams cover a wide range of parameter concentrations. History has shown that the Suggested Design Values are accurate for the 'average' septage. Table 1 also shows a Sample of Limits found in the local Sewer Use Ordinance.

A municipal Sewer Use Ordinance is a legally binding document that regulates the discharge of wastewater into a public sewer system.

PARAMETER	RANGE	Suggested Design Value	Sample Sewer Use Limits
BOD	440-78,600	7,000	250
TSS	310-93,400	15,000	250
Ammonia-N	3-116	150	40
Total PO ₄	20-760	250	10
Oil & Grease	210-23,400	8,000	100
pH	1.5-12.6	6.0	6 – 10



It establishes rules and standards for wastewater discharge to protect the system, prevent pollution, and ensure proper treatment. These ordinances often address prohibited substances, pretreatment requirements, and user responsibilities.

Obviously, septage discharged directly into the public sewer system would not be allowed since most parameters would exceed limits defined in the ordinance. But, interestingly, if you remove the solids from the waste stream the remaining liquid will have concentrations close to the limits imposed by the ordinance.

The operational model most commonly used for septage treatment is the dewatering of the septage resulting in a solid (usually in excess of 20% dry solids) and a liquid that may or may not need further treatment prior to discharge to the public sewer system.

One of the primary regulatory requirements is meeting the Sewer Use Ordinance. This ordinance sets the standards for what can be discharged into the sewer system. Facilities must ensure that their septage pretreatment processes align with these standards to avoid penalties and ensure smooth operations.

Identify the Resources Available to You

Location: The site of the facility is extremely important. Having a septage treatment facility that is not conveniently located to your service area will negatively effect the bottom line of your business plan. A location more central to your service area will have a positive effect.

While location is important, a search of the area for an old factory (preferably one with some tankage), abandoned wastewater treatment plant, or property adjoining an existing wastewater treatment plant would produce sites worth considering. Your business plan will produce a better bottom line if you utilize some amount of existing structure that you can retrofit for your purpose.

Zoning: Zoning for a wastewater treatment involves land-use regulations that determine where treatment plants can be located. It is best if the site you have chosen is zoned to allow wastewater treatment. While changing a site's zoning can sometimes be accomplished it tends to always find opposition from the neighbors!

Sewer Authority: If the choice to discharge the liquid from your dewatering process is to the public sewer system you need to become familiar with the municipality's sewer authority Sewer Use Ordinance and that capacity is available for your discharge. At this point you are best served by having a consultant work on your behalf.



Questions to ask of the sewer authority include:

- Capacity available?
- The allowable discharge parameters? Most sewer use ordinances will define surchargeable limits on BOD₅, TSS, Nitrogen, and Phosphorous, plus not-to-exceed limits on FOG, metals, and organics.
- Surcharges for exceedances? You do not want a continual stream of discharge violations. There should be a mechanism to pay a surcharge for concentrations that exceed the sewer use limits. Because of economy of scale, it is less expensive to pay the sewer authority a surcharge than it is to pretreat your discharge onsite.
- Capital Reimbursement Fee This fee is paying your share of the capital investment the municipality has made in the wastewater treatment plant, the collection system, and pumping stations. This cannot be ignored in your business plan as it could amount to hundreds of thousands of dollars!
- What is involved with getting an Industrial Discharge Permit? In addition to a permit to discharge to the public sewer system, most states will require a permit from a state regulatory agency. You should choose a consultant that can help.

While the operational model of most septage treatment facilities is to dewater the septage and send the liquid produced to the public sewer system, depending on state and local regulations, there are other options available. Some facilities discharge to a soil treatment area (drainfield) while others spray irrigate cropland. Similarly, solids can be handled in many different ways.

Solids Handling: Remember that what you have dewatered is still septage, therefore, depending on what you do with the material, it may need further treatment.

Options such as incineration, gasification/pyrolysis, or composting probably need no further treatment. Landfilling or beneficial reuse on farmland usually requires some degree of stabilization such as lime addition to achieve a pH of 12 or greater.

Processing

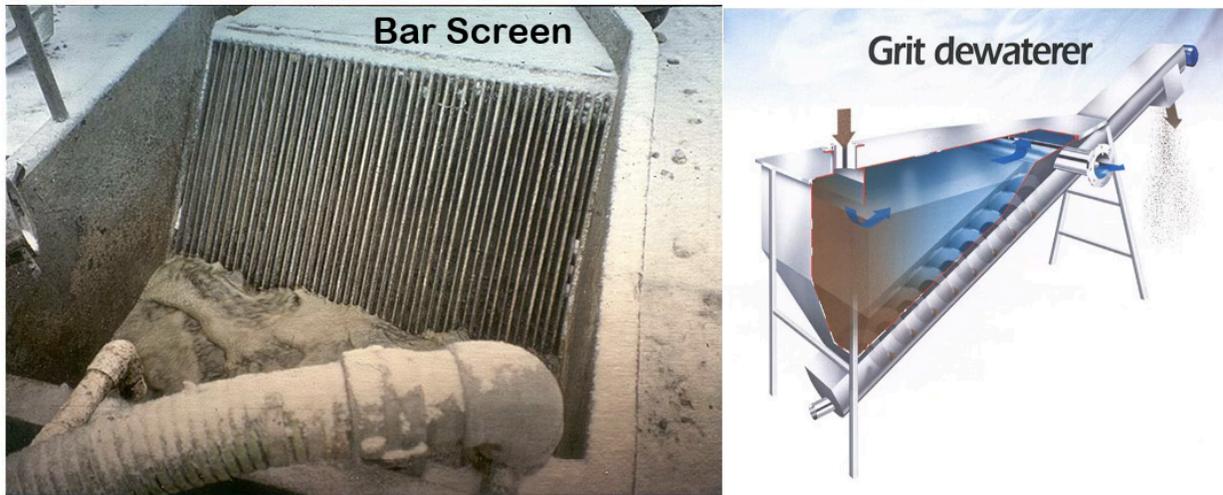
Although there are many variations to the physical processing of septage, grease trap waste, and sewage sludge all facilities will have these unit processes:

Receiving Station: An area is needed to neatly unload the trucks. An area that will contain any spillage that happens when the discharge hose is connected to the truck discharge valve. A fresh water washdown should be available so that each driver can cleanup any spills.



Screening/Grit Removal: There is a considerable amount of debris in these waste streams such as grease balls, wads of hair, rages, and grit. It is in your best interest to remove them early in the process to prevent pump and pipe blockages along with grit accumulating and taking up space in any process tanks.

This can be accomplished with a simple manual bar screen and grit chamber, or by more automated equipment. A good rule of thumb is that in 50,000 gallons of septage there will be 1 cubic yard of screenings and 1 cubic yard of grit. Again, there will be variations facility to facility.



Equalization Tanks: Unless you will be dealing in extremely large volumes most dewatering equipment used will operate at 50 to 100 gallons per minute of throughput. A loaded tanker unloading through a 4" hose will discharge at 250 to 300 gallons per minute. You want to unload quickly and process the waste over the following minutes/hours.

Screening and grit removal equipment should be first off the truck and able to handle the appropriate flow rate. Then into the equalization tank waiting for further processing.

The other reason for an equalization tank is because every truck load of material will be slightly different (a septic tank not cleaned for 20 years vs one cleaned a month ago; the same variation exists with grease trap waste). At the end of the day when all the loads are mixed together the resultant blend will be very consistent day after day. And, more importantly, the material will be consistent throughout the dewatering period.

It is recommended that there be two equalization tanks of at least capacity to hold an anticipated one day of material accepted. That way you can be filling one tank while processing the other. One tank can suffice but should be considerably larger than one day capacity.



Conditioning: Except for some settling characteristics septage, grease trap waste, and sewage sludge will not separate on its own. To make the separate happen a flocculate needs to be added. This could be lime (calcium oxide, calcium hydroxide) or, most commonly used, a cation polymer. The sludge particles are negatively charged while the cation polymer has positive charges. The two come together and cause the sludge particles to agglomerate allowing for a clear separation of sludge and water.

Dewatering: Once conditioned there are many types of thickening/dewatering equipment made to separate the liquids and the solids. You can narrow down the type of equipment based on the end disposition of the dewatered material.

If the end game is beneficial reuse on farmland and the land application sites are not too far away, you may only need to thicken the material so it can be handled as a thick liquid. At the other extreme, if you plan on landfilling the material you will want the material as dry as possible so you aren't paying for water going to the landfill.

A gravity belt thickener is good for thickening while a recessed cavity plate and frame press will give you the driest possible cake. There are all types of in-between options.



Gravity Belt Thickener



Plate and Frame

Filtrate (Effluent): Depending upon the capture (percent of solids retained by the dewatering equipment) ability of the thickening/dewatering equipment you may be able to discharge directly to the public sewer system. In most cases a little polishing of this filtrate will help reduce surcharges. This can be as simple as a clarifier or as complex as an extended aeration treatment.



Odor Control: Beginning with permitting and throughout the process one must consider odor control. This will always be questioned and odors are the basis for why a municipality would rather you sited the facility elsewhere!

A site remote from civilization is a good odor control mechanism but seldom available. A recommendation is to do all processing of wastes in a building to keep the odors contained.

Further remove foul air from the building and exhaust it through a filtering device. Best to pull odors from specific odor sources (such as, screening devices, dewatering equipment, etc).



Hood over screening



Venting off screw presses

Biofilter: An excellent odor removing device for these types of wastes is a biofilter. A biofilter is very effective at removing hydrogen sulfide and ammonia along with other odorous compounds generated by septage.

Construction of a biofilter is easy and economical. Biofilters are usually built in-house by employees you already have.



← **Wood chips**

← **Gravel**

Conclusion:

Navigating the regulatory landscape for septage pretreatment facilities requires a thorough understanding of the Sewer Use Ordinance, obtaining the necessary Industrial User Discharge and State Permits, and implementing effective pretreatment processes. By adhering to these regulations, facilities can ensure compliance, improve operational efficiency, and reduce environmental impact.

Case History: Ambler, PA 1984

The hauler was not desperate for a disposal site. He had two permitted land application sites and four wastewater treatment plants (one of which accepted grease trap wastes) as disposal options. Logistically all of these were located on the perimeter of his service area. It made good business sense to locate a facility somewhere near the center of his service area.

The hauler had been involved with a research project to find ways to improve land application regulations conducted by the PA Dept of Environmental Resources. In this study lime was added to septage to stabilize the material prior to land application. What the hauler noticed when lime is added to the septage a floc is formed and sludge settles to the bottom leaving a fairly clean supernatant on top.

A property was found within a half mile of the center of his service area that had an abandoned 200,000 gallon tank. The landowner was willing to rent the hauler the tank and some space for \$500 a month! The hauler was happy since his production went from four septic tanks per day per truck to seven septic tanks per day per truck!

\$1,000 was spent with an engineer (one familiar with the research project) to apply for an industrial discharge permit to the public sewer system. Approval was given in twenty-four hours. At that time no state permit was required.

A manual bar screen was installed to which bagged calcium oxide (quicklime) was added by the truck driver as he unloaded. The limed septage was pumped into the 200,000 gallon tank and allowed to settle. As needed the supernatant was pumped off the top of the tank and discharged to the public sewer system. As appropriate the settled solids were hauled out as stabilized septage to the land application sites.



A 'bailing wire and bubble gum' facility but a good introduction for the industry as to how to get septage into a wastewater treatment plant that will NOT accept trucked in septage.

Case History: Warminster, PA 2018

The hauler was asked by a local municipal sewer authority to visit one of their satellite treatment plants to quote on emptying all their tanks. When the hauler saw the idle facility he asked why they were emptying all the tanks. The plant manager responded by saying the facility was built twelve years ago to treat a flow of 1.2 million gallons per day. It had never received any more than 100,000 gallons in any one day so it was decided to bypass the facility and let that flow downstream to their large plant.

The hauler was astute enough to realize this facility had all the makings of a great septage pretreatment facility. Components onsite included an automated screening device, grit removal equipment, two 300,000 aerated tanks, and a centrifuge.

Once a business plan was produced that showed the feasibility of operating this facility as a septage pretreatment facility meetings with authority members began. First to gain the support of the plant manager, plant superintendent, authority general manager, and, finally, with the Board of Public Works. It took one year before a lease agreement was signed and an industrial discharge permit issued. Government agencies never do things quickly!

In Pennsylvania there is a special permitting structure called 'Permit by Rule'. This essentially says that if you operate the facility by the rules you do not need a state permit. The applicable Permit by Rule for this facility includes requirements that you accept septage only and be governed by some regulatory agency (in this case the municipal sewer authority). This rule allowed the facility to begin operations without the expense and time delay of acquiring a state permit. Once up and operating the hauler did move forward with a more encompassing state permit that allowed acceptance of grease trap waste and sewage sludge.

About \$300,000 was spent on modifications to the plant to make it a truly trucked-in waste facility. A concrete pad was poured to level the area where the trucks unloaded and piping installed to allow discharge to the screening device.



Odor control upgrades consisted of two biofilters built and a cover on one of the 300,000 gallon aeration tanks. The 300,000 gallon aeration tank was used as an equalization tank. The aeration was maintained for mixing purposes.



Piping and pumping from the aerated equalization tank to the centrifuge was already in place. Only improvement left to do was to install a metering/monitoring pit on the discharge side of the centrifuge.



This facility processes 75,000 to 100,000 gallons of septage, grease trap waste, and sewage sludge per day. At 7 cents/gallon the facility is profitable.

Final Comments:

The moral of this story is to keep your eyes open to opportunities that could help your business. As an industry we can keep whining about disposal issues or take charge of our own destiny!

