Grease as "Green"

Reclaimed FOGs may be an important part of tomorrow's energy future *By Max Weiss*

Introduction

Traditionally, grease interception was accomplished by either a large outdoor tank—[gravity interceptor] or, a smaller indoor—[hydromechanical interceptor]. Frequently, little attention was paid to accurate sizing or proper installation of either device since all the devices had to do was capture enough FOG to reduce pipe clogging to an acceptable minimum frequency of occurrence. Cleaning of the devices was avoided by all until cleaning was absolutely necessary to maintain flow. A case could be made it was more important to the concerned parties the devices simply be present rather than function since water quality was not monitored.

Pretreatment

Times have changed. The Clean Water Act became the cornerstone of water pollution legislation, establishing discharge water quality requirements for wastewater treatment works, public and private as well as direct discharges from industrial sources. "Industrial" discharge is defined for purposes of the Act as all sources not from domestic residences.

FOG must not reach the collection system; it causes blockages. It is estimated that sanitary sewer overflows with grease as either the primary or secondary cause, cost taxpayers 24 billion dollars annually. [EPA Report to Congress, 2004]

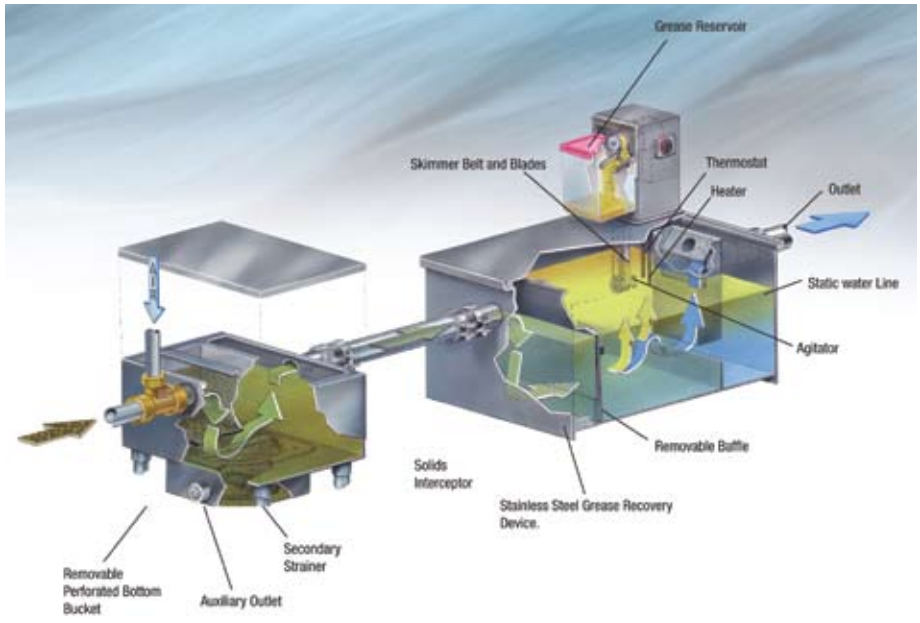
So, it is no longer an acceptable situation that an interceptor be simply present. The interceptor must perform optimally to produce acceptable discharge water quality. Proper interceptor selection, sizing, installation and, above all, *maintenance* is absolutely essential to successfully achieving acceptable discharge water quality.

Disposal

Disposal, that is proper conventional disposal, is far more complex than interception. No longer is mixing FOG from interceptors with animal feed an acceptable or legal method of disposal. Concerns over metals, chemicals and BSE (mad cow disease) caused the FDA to prohibit the practice. Other methods of FOG disposal such as land application, land filling and rendering are also either prohibited, or under much tighter scrutiny.

Recycling FOGs

Because typical FOG (Brown Grease) has been extensively altered by long-term water and cleaning chemical contact, little salable market has developed. Brown Grease is not suitable for bio-diesel [some experimental processes are being tested] but, it can be used in some incineration plants. All conventional recycling, including incineration requires the operator to pay the recycling facility to accept the grease.



Grease Recovery Devices not only keep the dreaded Fats, Oils and Greases out of our sewers, but more than a few people are exploring their use as a way of harvesting the raw material that can be used to manufacture alternative fuels. Photo courtesy of the Jay R. Smith Mfg. Co.

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In a study sponsored by the Dept. of Energy in 1998 of 30 metropolitan areas selected scientifically to represent a cross section of the country, the investigators established the annual interceptor grease per person as 13lbs. or, about 4 billion pounds annually. [*Urban Waste Resource Assessment, National Renewable Energy Laboratory, NREL/SR-579-26141, 11/98*] with an estimated crude oil energy equivalent of 1.5 million barrels.

Following, are three brief introductions to FOG conversion processes with websites, leaving it to the reader to search further; the purpose of this article being to communicate to the plumbing community the advantage of using GRDs to harvest FOG for an expanding green market.

Conversion Processes

"EcoPlus" converts FOG into a granular product with a BTU content similar to coal.

"*The EcoPlus technology has been used in commercial application since 2002 at a fully permitted plant in Charlotte, North Carolina. The plant processes the oils and grease from over 1,300 grease producers in the Southeast at a rate of over 200,000 gallons per month.*" [www.ecoplus-inc.com]

Lime slurry is added to a tank containing FOG until it reaches a pH of seven. An operator adds reagents to the mixture. The process removes waste and Brown Grease, leaving a watery solution low in total suspended solids; fats, oils, and grease; and biochemical oxygen demand. The liquid goes to the sanitary sewer system under an industrial discharge permit.

Five thousand gallons of brown grease will yield approximately five tons of solids resembling damp beach sand with about 55 percent moisture. Drying is aided by the processing reaction, which is somewhat exothermic. The solids can be used for fuel or as a soil amendment.

Another method is called "Thermal Depolymerization." The process utilizes superheated water under high pressure to produce crude oil from a range of carbon-based materials. FOG is an exceptionally good feedstock for this process. [*www.thermaldepolymerization.org*]

Finally, "Startech" is a plasma-based process using superheated gas to convert carbon-based waste to a gas called Plasma Converted Gas (PCG). From which, hydrogen can be directly extracted. Gas-To-Liquid (GTL) fuels such as ethanol, synthetic diesel fuel and other higher alcohol fuels can be produced from PCG. [*www.startech.net*]

Harvesting FOGs

FOG with low water content, minimum alteration from extended contact with water and cleaning chemicals is, by far, the most energy productive feedstock for waste to energy processes.

Grease Removal Devices [GRD] [ASME A112. 14.4] are most amenable to FOG harvesting because of the immediate removal of the FOG from the water and chemicals. GRDs are attractive to administrative authorities because water quality does not depend on the operator's staff removing grease from the interceptor.

Definition

GRDs are based on Hydromechanical Interceptors, which are those interceptors, which separate FOG from wastewater by means of air entrainment through air injecting flow controls, counter flow baffles and barrier baffles. More specifically using the hydromechanical energy of the incoming flow to assist in the separation of materials of dissimilar density. The definition appears in UPC, Chapter 2 and ASME A112.14.3.

What does this mean for the plumbing industry? Opportunity is expanding for installation of GRDs as an original installation or retrofit with those GRDs designed to mount on existing interceptors.

GRD Installation

Where: GRDs should be installed as close as possible to the last contributing fixture, air-injecting flow control at the highest invert elevation following the last connected fixture, and no more than 10 feet total unbroken inlet head; installed where they can be easily serviced, where the FOG-receiving vessel is easily observed and accessed for emptying.

Sizing: Sizing a GRD is the same as for HGIs. Use PDI G-101 illustrated method. Do not use Drainage Fixture Units [DFU]. [*Perhaps a more detailed look at the intricacies of sizing will be presented in another article. Drop us a line at* jack@reevesjournal.com *and tell us whether such an article would be of interest to you—Ed.*]

Solids Interceptors: should be installed at each solids-generating fixture or immediately following the last connected fixture prior to the interceptor. Placing solids interceptors in remote machinery spaces or with high inlet head elevations is not advised. Food waste grinders must not be connected to HGIs or GRDs.

Conclusion

Harvesting FOG for reprocessing is the future of FOG disposition. Forward thinking plumbing engineers, and contractors can seize upon the green emphasis and profit from GRD installation. Both our water and energy supplies will benefit as well. ■

Max Weiss is a consultant with Jay R. Smith Mfg. Co. in Montgomery, Ala. Weiss has authored several articles on FOG and interceptors, and serves on several U.S. and Canadian task groups and committees regarding grease interceptor design, manufacture, classification, sizing, application, operation, maintenance, discharge regulation and water reuse. Weiss can be reached at Jay R. Smith Mfg. Co., Inc. or, via e-mail at max@weissresearch.net