Opportunities and Challenges in 21st Century Fats, Oils and Grease Management

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Northwest FOG Forum
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THE GREATEST LUXURIES…

Multi Tasking gone too far?

EWPCF - Past and Present

FOG Mgmt in 21st Century: As many questions as answers

- Grease Removal Technology Advancements
- Use of Additives (by sewer users or sewer utilities)
- ~~Ordinance and Code, Rules and Requirements~~
- *The $300 Billion dollar question…*

FOG Futures: Conundrum or Commodity?

Current FOG Uses

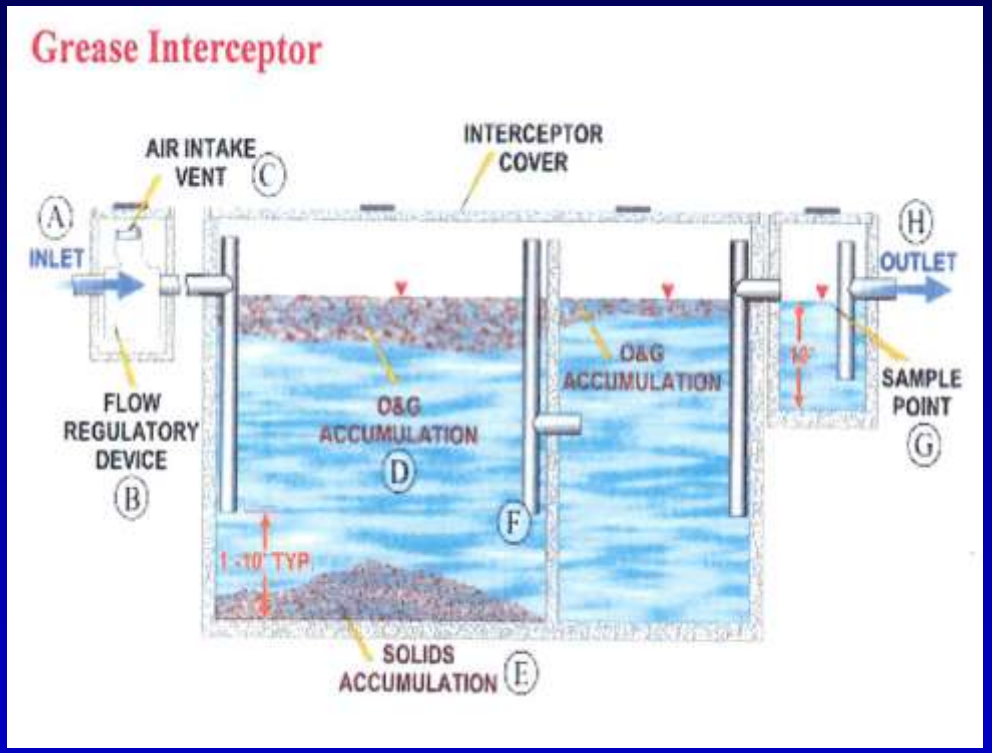
- 61% Animal Feed Additive
- 22% Fatty Acids/Glycerol for surfactants, plastics, resins, textiles and cosmetics
- 9%Soap Making
- 4% Lubricants
- 4% Misc. (biodiesel, other fuels)

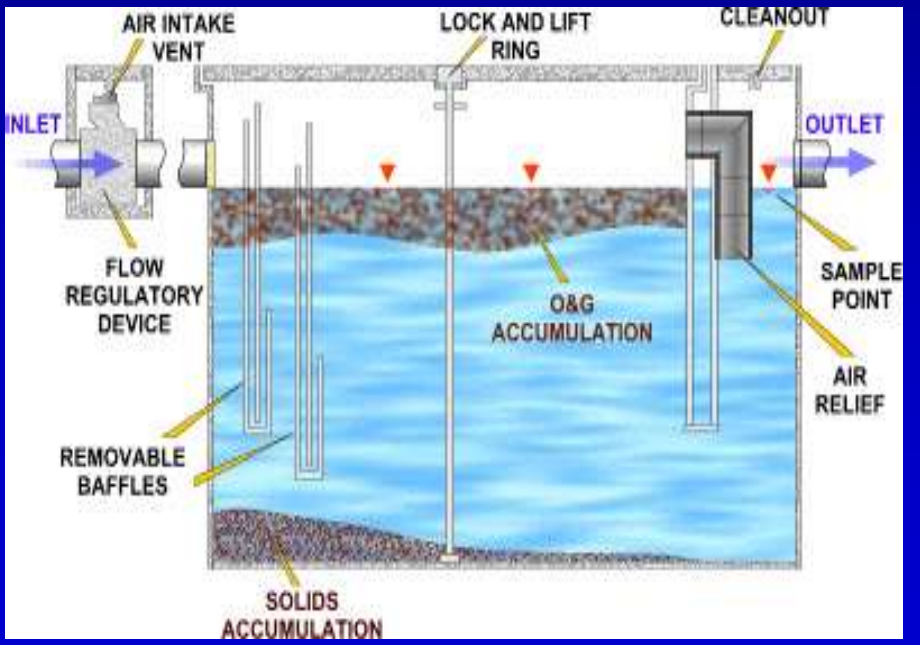
(MMS, 2009)

Future of FOG

- Advancements in processes increasing biofuels uses/mkts
- POTWs capitalizing on FOG E.
- Energy/value not just the FOG
- Drivers include fossil fuel costs, energy/C footprint of WWTPs, incentives/subsidies for alternative fuels, others..

Traditional Grease Removal Techs





Many Options, New Technologies

Considerations for New GRS techs

- Rating ≠ performance guarantees
- Plumbing design/installation considerations
- Utility/Inspector staff familiarity
- Monitoring to determine svc frequency
- Staff/mgmt training needs for proper ongoing O&M and GRS performance
- “Credit” for ratings vs. assurance of ongoing operation


IAPMO RESEARCH AND TESTING, INC.

CERTIFICATE OF LISTING

GRS TECH &WERF Research

- Analyzed field GIs during "maturation cycle" to assess FOG removal performance…
  - ** Numerical tools for assessment and design..*
- Traditional designs may be not so great..
  - **Standard pipe configuration can exacerbate problems*
  - **Inappropriate cleaning cycles increase failure potential*

WERF Findings and Implications..

- FOG Loading only one factor affecting performance
- Separation efficiency significantly impacted by use of detergents, mixing, and FOG droplet size
- Most effective FOG separation when fluid velocities near inlet and outlet <0.015 m/s
- Inlet/outlet configuration a critical component

  ***Distributive inlet baffle/piping and specific baffle wall configurations to reduce in-tank velocities..*

- *SM 1664 (HEM/SGT O&G test) variability*

  ***Up to 40% variability in measured O&G [ ]s makes it difficult to confirm compliance, enforce a numerical concentration limit..*

Case Study (SW Suburban Sewer District)

- ✓Distributed inlet baffle configuration and dual baffle wall connection
- ✓Comparisons difficult between facilities due to variable BMPs, operations
- ✓Pending design changes in new GRDs, inlet/baffle piping retrofits may have significant potential to improve performance in existing GIs..

Grease System and Sewer Additives:

- “Snake oil” legacy..not whole story?
- Outright bans vs. restrictions per policy/criteria
- Empirical data elusive
- Bio-treatment tech potential gaining ground
  - (distinctions between user and utility applications)
- COE ord. (Emulsifier Test Protocol – Bench Test..first step of broader approval protocol required to gain “Notice of Product Acceptability”

…

COE Additive Testing….

**Emulsifying agent if /when treated sample FOG [ ] exceeds 200 mg/L > test background after subtracting the product correction concentration…*

Additive use by POTWs

Some agencies have shown marked successes in collections, treatment process performance, etc.

- LOTT digester process enhancements
- SPU collection system treatments to save O&M

**Benefits/savings must be quantified and documented.*

"Bioaugmentation" has in fact helped some POTWs reduce collections system FOG and odor issues, reduce influent loading, increase treatment unit process efficiencies, reduce energy or chemical consumption, reduce solids production and handling costs, even defer capital expansions…

(e.g. Crown Pt, IN, Sioux City , IA, Jackson MS – InPipe Tech)

FOG no longer an untapped energy source for POTWs

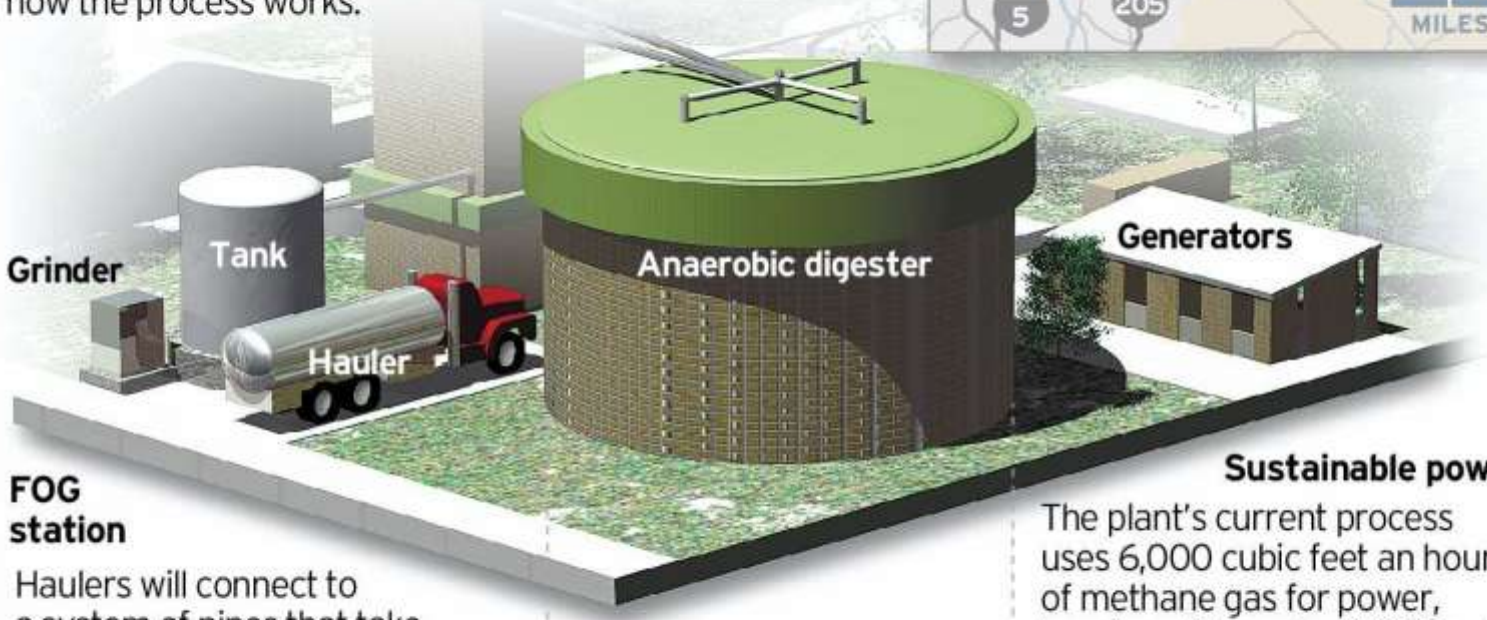
BG2E Successes

- San Francisco PUC
  - Biodiesel from BG operation at SF WWTP, URS partnership (Powermag.com, Oct 2010)
- Millbrae, CA
  - Digestion systems upgrade/retrofit (Chevron

    (*~70% of WWTP energy needs met in-house*)
- Gresham, OR
  - 50% of WWTP Power needs
  - $1.5 million in avoided electrical costs.
  - 3.5 year payback
- King Co. pilot studies (featured in Forum today)

Creating more methane

Gresham's wastewater treatment plant is putting fat, oil and grease (FOG) waste from restaurants through solid waste treatment, producing more methane gas in an effort to be energy neutral. Here is an artist's rendering of how the process works.



FOG station

Haulers will connect to a system of pipes that take FOG deposits through a grinder and screen to remove solids – no forks will slip by – and into a 12,000-gallon tank, heated to prevent solidification. A pump will feed FOG into million-gallon anaerobic digesters.

In the digesters, bacteria digest solid waste into water, sludge and methane gas. Gas is transported through the cogeneration system or flared off.

Sustainable power

The plant's current process uses 6,000 cubic feet an hour of methane gas for power, burning off an extra 2,000 cubic feet. Additional FOG waste will increase the amount of methane gas available to convert to energy, and within two years, a second generator will make use of it.

DAVID BADDERS/THE OREGONIAN

April 10, 2013

Kitchen Grease Powers London Sewage Works

Leftover grease and oil from restaurants will power a new combined heat and power (CHP) station at Beckton in East London.

The plant, developed and run by 2OC and financed by a consortium led by iCON Infrastructure, is set to produce 130 Gigawatt hours (GWh) a year of renewable electricity. Thames Water has agreed to buy 75 GWh of this output to run Beckton sewage works, which serves 3.5 million people, and the nearby desalination plant, which is operated in times of drought or other emergencies. The remaining power will be sold to the national energy grid.

Read more at Energy Manager Today.

RELATED STORIES

Used Fry Grease Rich Target For Grease Gangs…Seriously

City of Millbrae Powers Wastewater Treatment Plant on Kitchen Grease

San Fran Restaurants Recycle Cooking Oil With SFGreasecycle

ASCE Report Card

- Per CBO, $300 billion to address the nation's collection and treatment infrastructure needs over 20 years
- 2X current level of investment by all levels of our government
- Congressional appropriations have declined over the five-year period 2008 to 2012..only $10.5 billion—avg. $2.1 billion/yr or $42 billion over 20 years
- WA - $5.3B in wastewater infrastructure needs over the next 20 yrs