FOG Management – DC Water and Beyond

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DC Water, Biosolids Program

dc water is life

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DC Water - Biosolids Program Site Plan

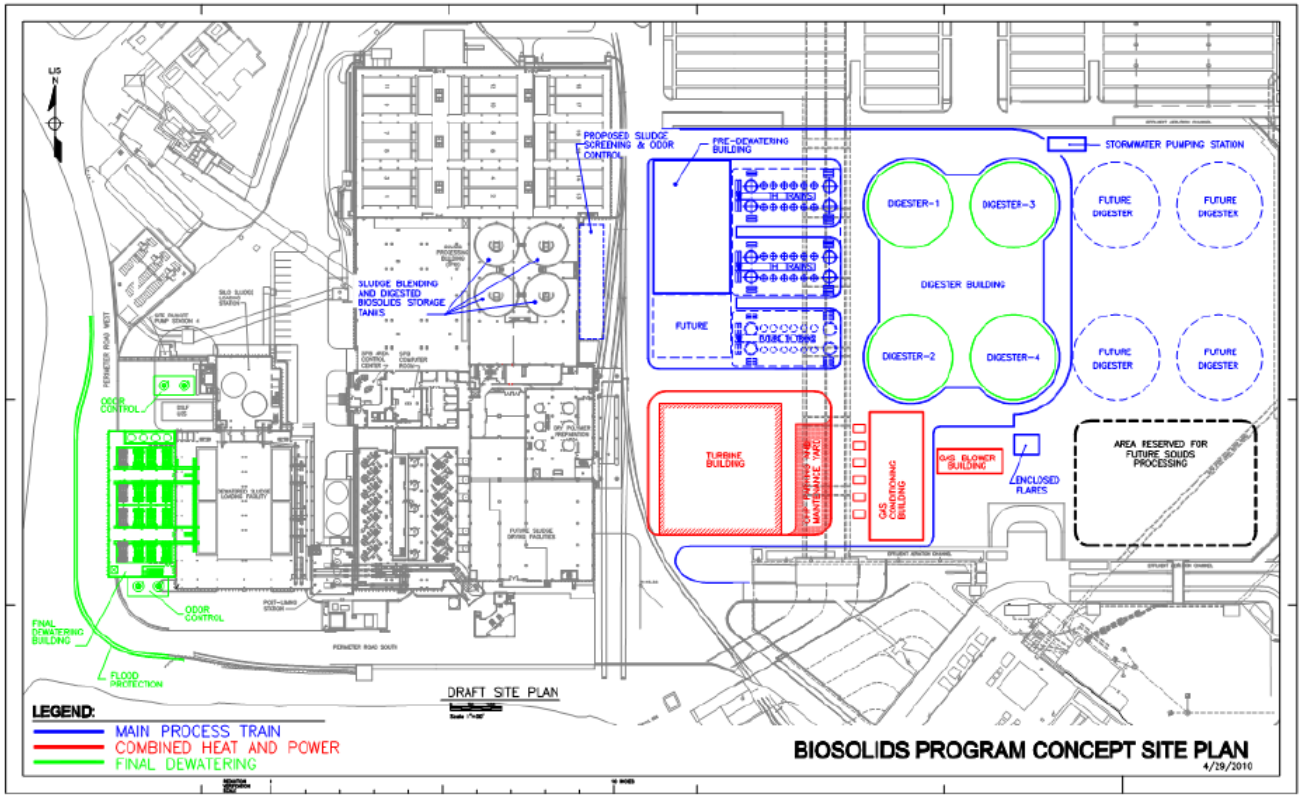


Figure 2-1. Project Site

Agenda

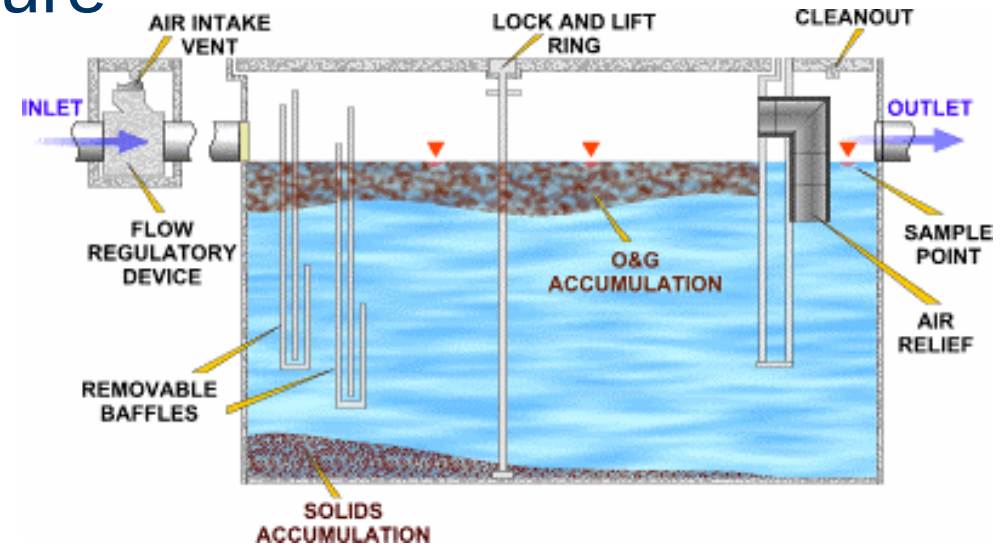
- FOG (brown grease) management methods and trends in the US
- FOG quantities estimated for the Blue Plains AWTP service area
- FOG/sludge co-digestion at Blue Plains – how does it look?

Grease Problems are Frequent – in Wet Wells and Other Places

FOG Management – WWTP Perspectives

Brown Grease – from Grease Traps and Grease Interceptors

- Contaminated with wastewater-sewage
- Slurry of several percent solids
- Usually at temperature of ww and soil (~50 to 80°F)
- Readily stratifies



Brown Grease (FOG) Quality

% solids	<1 to >15% (7 to 10 % typ)
BOD	10,000 to 130,000 mg/L
pH	Acidic (4 to 6)
VS/TS	90 to 97 %
VS reduction in digestion	80 to 90 %
C/N ratio	High

Situation with Yellow Grease

- Not contaminated with sewage and very little water content
- Separately collected/sold by FSEs - a “commodity”
- Processed for animal feed and variety of other products, including biodiesel
- WW agencies do not handle this material, normally, but can digest the waste products from biodiesel production

FOG/Sludge Co-Digestion has expanded greatly since 1990s

City of Riverside, CA
FOG receiving for digester feed

- Anaerobic digestion capacity is often available at WWTPs
- Low-cost, simple approach
- Low-risk
- Electric power is a reliable market

Pinellas County, Florida
FOG Receiving Tank – Digester Feed

Watsonville, California - FOG Receiving Tank and Digesters

City of Millbrae, CA (3 mgd plant)

City decided to work with Chevron Energy Services

Energy recovery

a. FOG Receiving
b. Co-digestion
c. Cogeneration
d. FOG is 30 to 50 % of sludge load

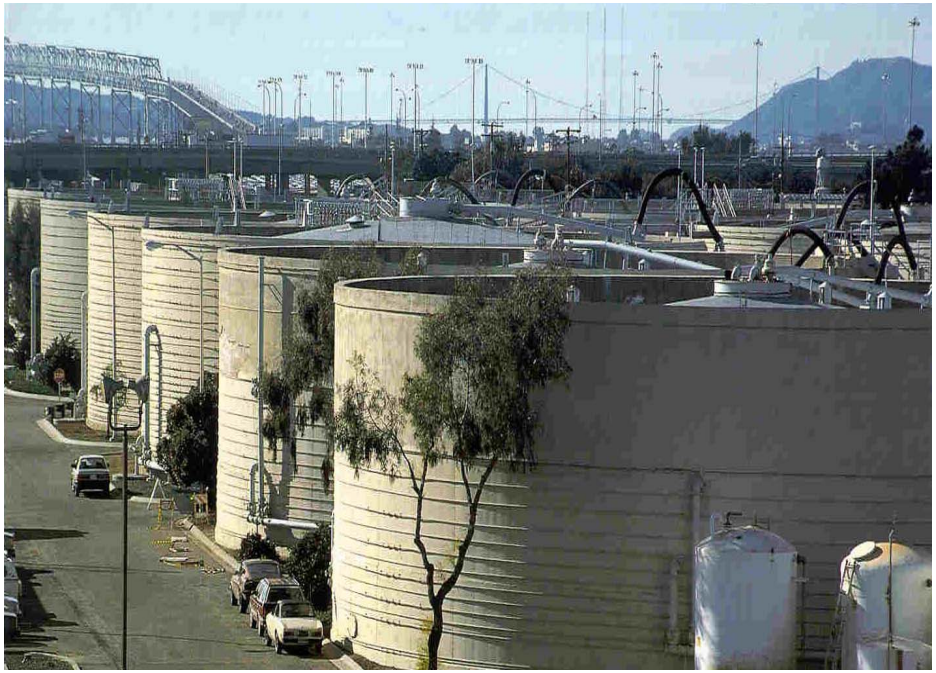
Lincoln, Nebraska (Theresa St. WWTP) FOG/Wastes to Sludge Digesters

Des Moines, Iowa
Major FOG / Co-Digestion Program

- ~20 trucks/day
- Industrial greases + FOG/others
- Cogen system + sell digester gas to Cargill neighbor
- 5+ year successful program

EBMUD (CA) Co-Digestion – Very Large Program. Plus Biodiesel R&D.

- Energy production doubled since 2002 (80+ % of plant)
- Large FOG + other wastes
- Major digest mods and cogen expand
- Biodiesel R&D on FOG since 2005



SF Oceanside Plant – FOG to Biodiesel Demonstration Program Underway

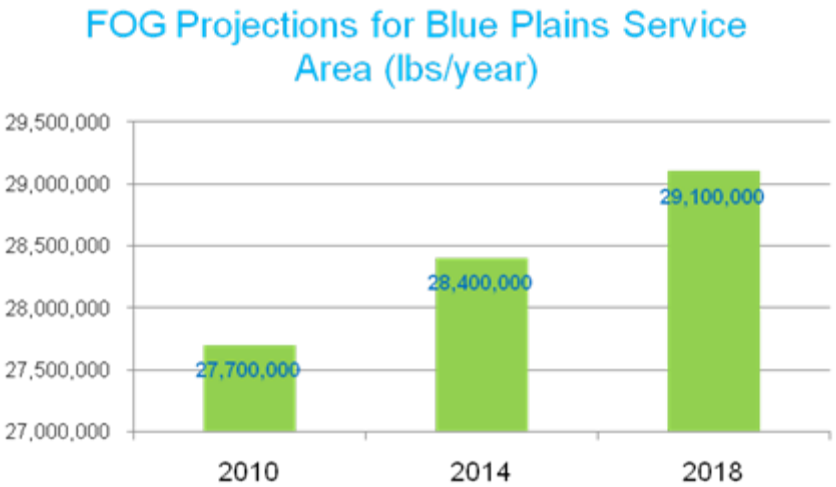
- SF has yellow grease to biodiesel now
- Brown grease to biodiesel just starting up
- Using Black Gold Biofuels for biodiesel mfg

Summary of FOG Management

- FOG/sludge co-digestion at WWTPs - major expansion in recent years in US
- FOG/manure co-digestion is gaining ground
- FOG to landfills – reducing over time
- Used as direct fuel with limited cleanup (to incinerators), or biofuel for boilers
- Used in rendering industry
- FOG R&D for biodiesel, demonstration programs underway
- FOG R&D also underway on other energy concepts

FOG Quantity Estimates for Blue Plains AWTP Service Area

George Wiltsee Per Capita Methodology

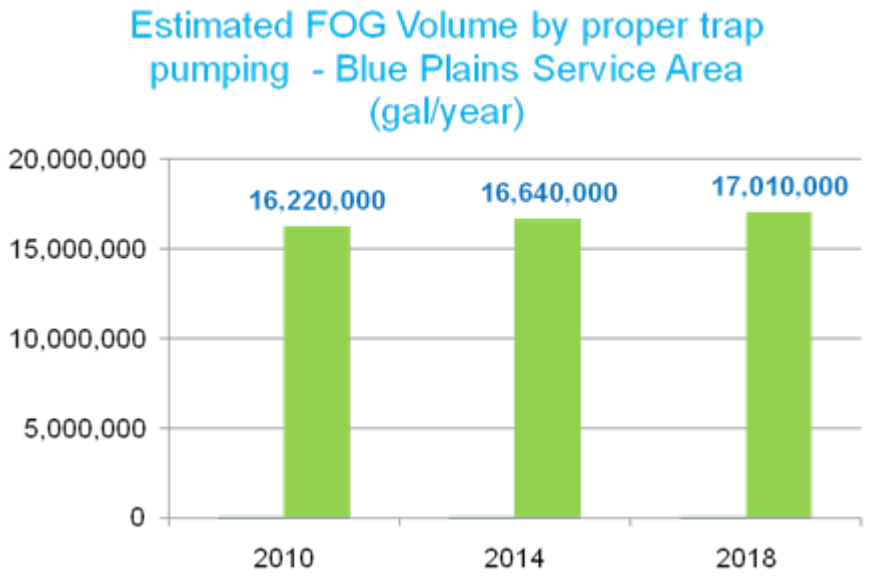


Includes WSSC Service Area

Based on 13 lb FOG/cap/year

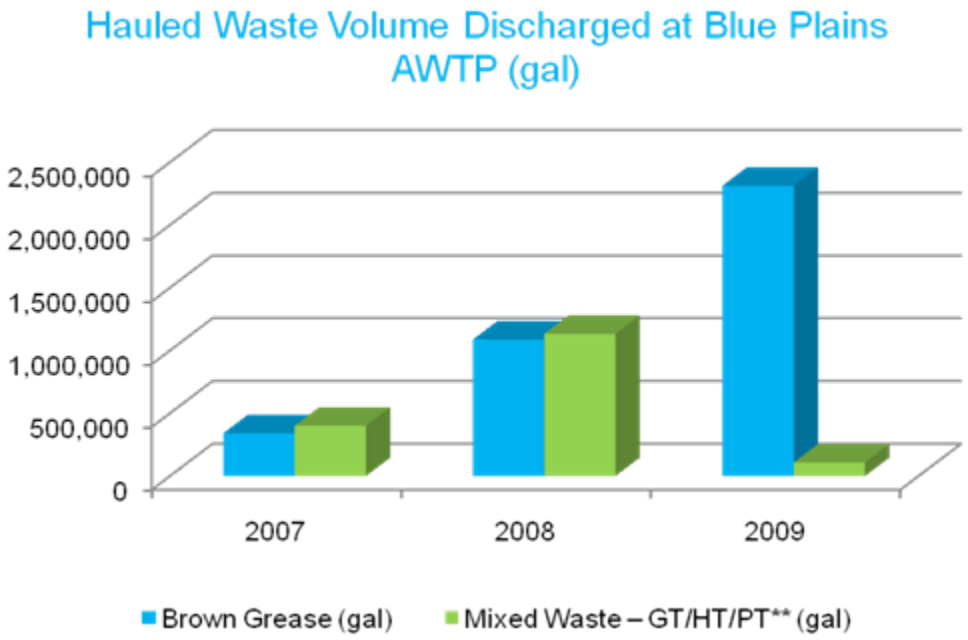
Wiltsee Method is likely too optimistic for trucked FOG collection (based on last decade of work).

Food Service Establishment Methodology



FSE Method results in too much material compared to communities with data.

Blue Plains AWTP Hauler Discharge Manifests



This is a small quantity compared to likely production in the Blue Plains Service Area.

FOG Production Potential

- Communities with better data show FOG production is 5 to 10 % of WWTP solids production (based on same service area).
- Range is for developed, enforced FOG programs in US (represents “potential”)
- For Blue Plains (300 dtpd solids), this translates to 15 to 30 dtpd of trucked FOG
- At 7 to 10 % solids content, this is 35,000 to 100,000 gal/day

Situation Today within Blue Plains Service Area

- FOG programs are variable in DC-area
- Collected FOG is largely discharged to bigger sewers, plant influent, or removed from service area
- Some/many traps are not pumped, causing FOG to proceed down the sewers
- Some FOG collects at wet wells/related and is removed by sewer maintenance
- FOG degrades in sewers to VFAs/residuals
- FOG/residuals are treated at WWTPs

Estimated FOG Situation 2014

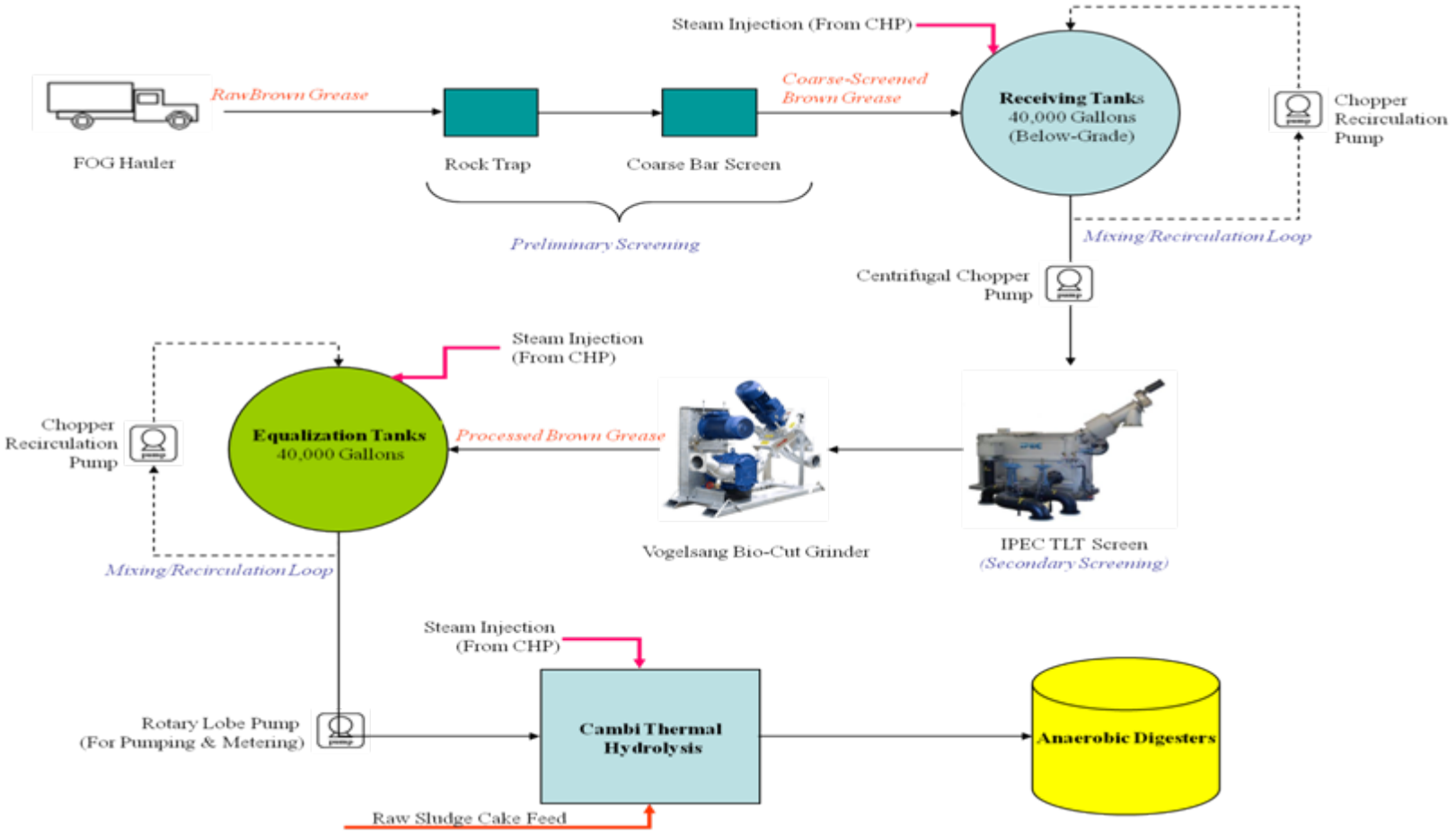
- Assume developed/enforced FOG programs are in-place in DC Metro area
- Assume Blue Plains could attract 5 % of its sludge production as trucked FOG. 5 % of 330 dtpd = 16.5 dtpd
- Estimate BP sludge production drops by 1 % due to proper FOG removal upstream. 1 % of 330 dtpd = 3.3 dtpd
- Net solids increase to BP digestion is 4 %, or about 13 dtpd

Grease to Gas/Energy

Changes in Digestion from adding 5 % brown grease load

	Sludge only	Sludge + grease	% increase
TS fed to Dig.	327 dtpd	343.3	5.0 %
VS fed to Dig.	251.8 dtpd	267.3 dtpd	6.1 %
VS destroyed	138.5 dtpd	151.7 dtpd	9.5 %
Digester Gas	4.43 Mil ft^3/d	4.96 Mil ft^3/d	12 %
Methane	2.84 Mil ft^3/d	3.22 Mil ft^3/d	13 %

Process Flow Diagram for DC Water – FOG to Cambi-THP and Digestion



Economic Analysis is Underway

- Costs
  - Capital costs for BP FOG-handling facilities
  - O&M costs of FOG facilities
  - Other costs?
- Revenues/Offsets
  - Power produced (reduced BP power purchases)
  - FOG tipping fee revenue
  - Reduced sewer maintenance costs
- Prelim Assessment shows favorable economics.

Summary

1. Grease wastes are valuable feedstocks for renewable energy - viable projects are being implemented.
2. FOG co-digestion has become major FOG management method – expansion continues across North America
3. FOG also used as biofuel in boilers, etc.
4. For Blue Plains, FOG/sludge digestion is economically attractive

Questions/Discussion