



# Integrating Co-digestion with Thermal Hydrolysis: Plans vs. Reality



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# Acknowledgements

- Christopher Wilson – HRSD
- Dana Gonzalez – HRSD
- Jeff Nicholson – HRSD

# Agenda

- ❑ Considerations for Integration
  - THP Requirements and FOG
- ❑ Experience with FOG at Other Facilities
- ❑ Developing Design Criteria
- ❑ Facility Design
- ❑ Realities of Running a FOG System with THP

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- An aerial photograph of an industrial facility, likely a refinery or chemical plant. The image shows a dense network of pipes, walkways, and large storage tanks. In the background, there are several large white cylindrical tanks and a building. A white pickup truck is parked on a paved area to the left. The foreground is dominated by a complex arrangement of pipes and structural steel frames.
- Convert from Class B to Class A
    - Acid/Gas to THP
  - Integrate FOG Receiving with Digestion for enhanced resource recovery and revenue generation

# The volume of FOG matters as does how it gets there

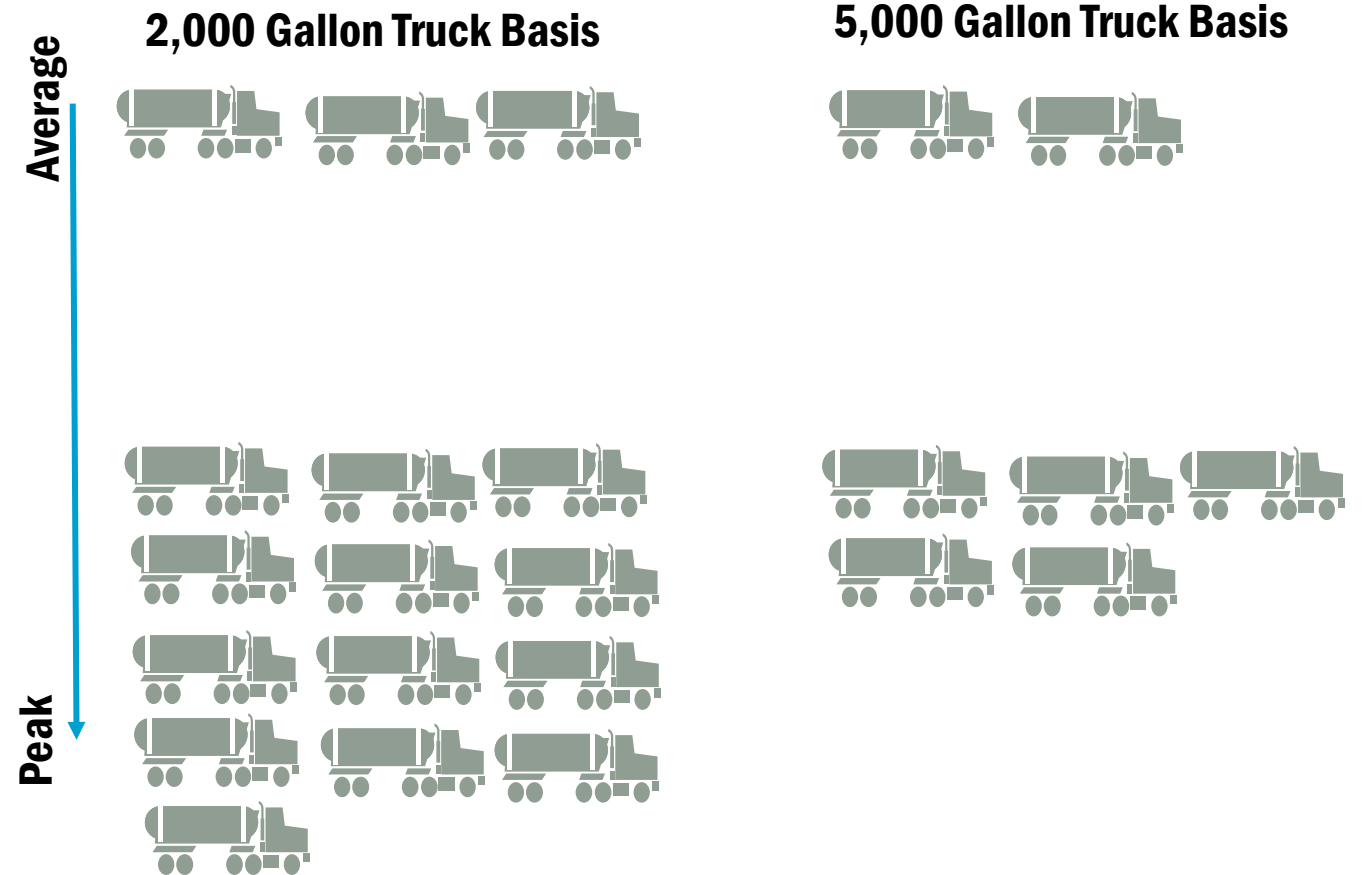
## PROCESS

## LOGISTICS

HRSD Survey of FOG Production Expected at ATP

Parameter	Units	Mean Value	Peaking Factor
Average Daily	gpd	7,467	1.00
Maximum Month	gpd	10,090	1.35
Peak 14 Day Average	gpd	13,120	1.76
Peak 7 Day Average	gpd	18,170	2.43
Peak Day	gpd	25,230	3.38

### Truck Acceptance Scenarios



# Removing trash and inerts protects THP and biosolids quality

**Heavy/Large Debris**



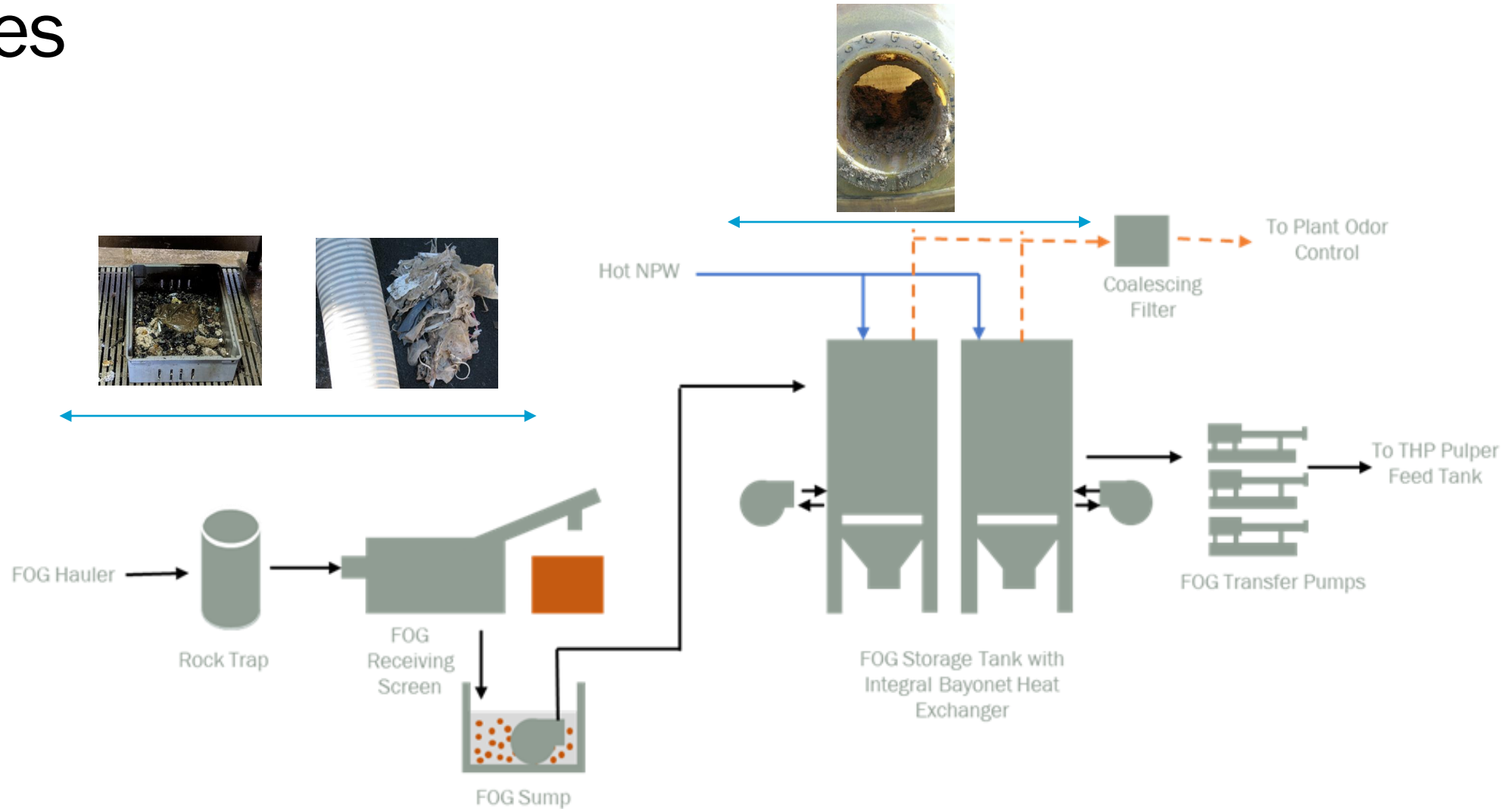
**Light Plastics**



**Fine Grit**

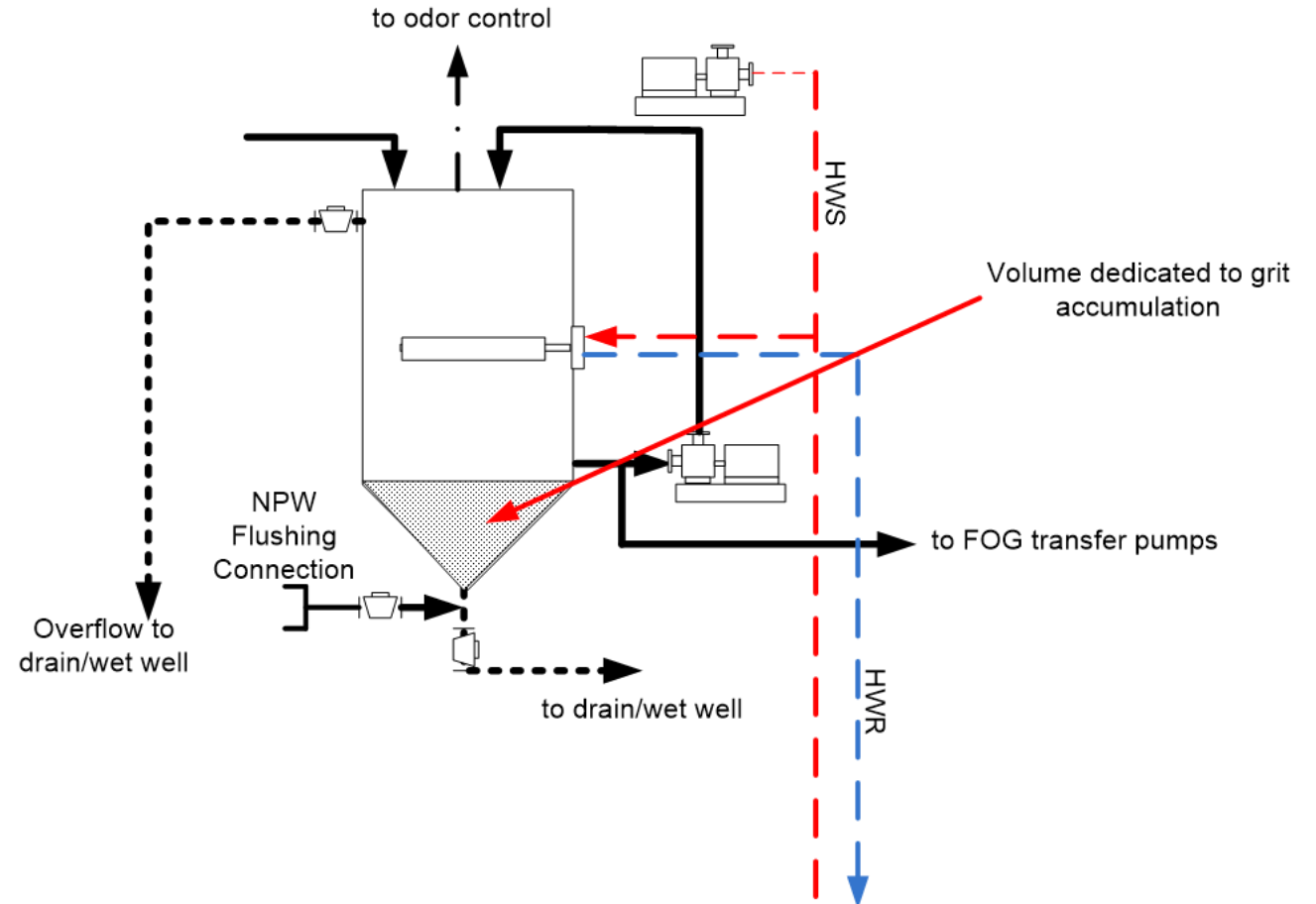


# Different parts of the process addressed debris issues



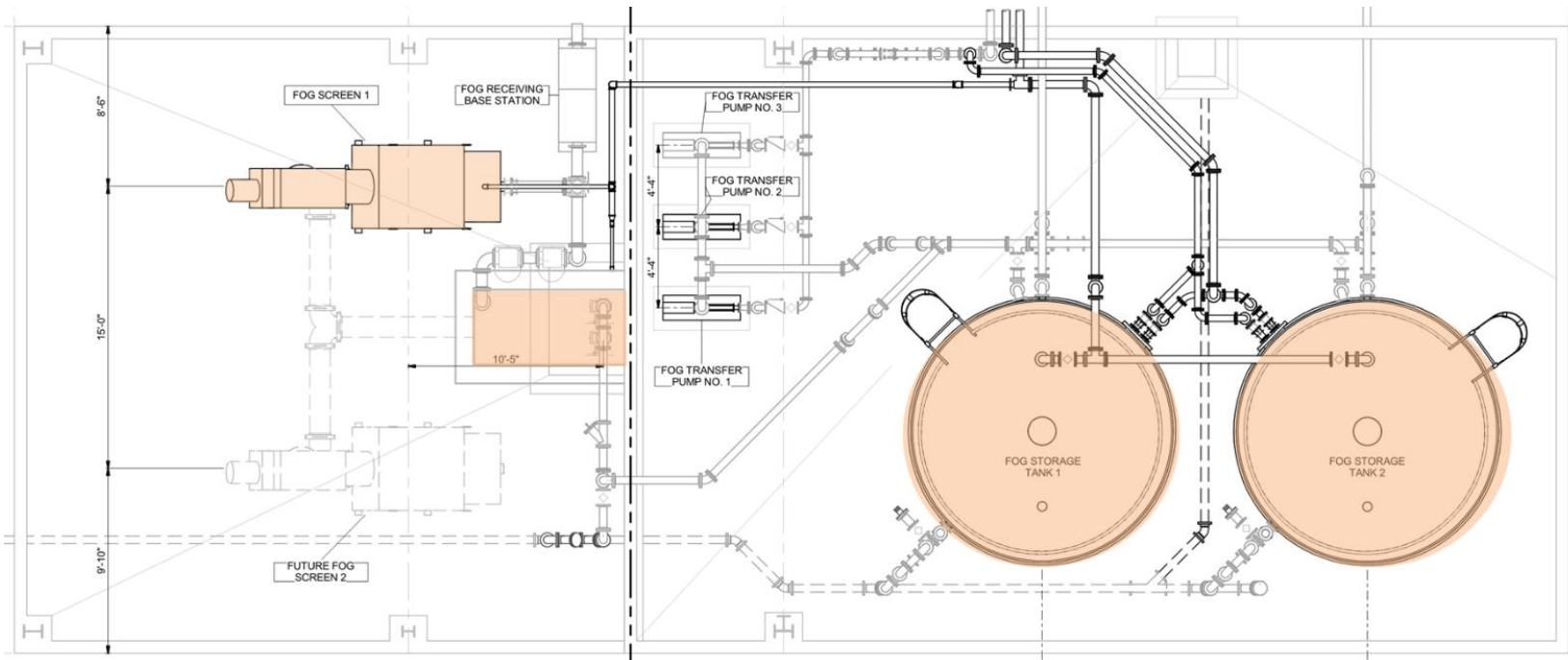
# Heating the FOG helped remove grit but also benefitted operations

- FOG heating separates finer grit from the solids
- Operated at 131 °F
  - Temperature is less of a concern ahead of THP
- Cone sacrificial
- Used immersion heat exchanger to save space
- FOG station is the source of dilution water for THP

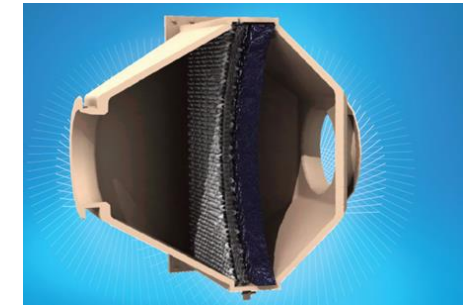




# Odor control was targeted to high potential areas, screening, storage, conveyance



**Highlighted areas under odor control**



**Odor control connected to main plant system. Included coalescing filter to reduce the potential for grease from entering the main system.**

Trucks pull through for safety and connect ahead of the rock trap.



Ensure the fasteners are up to the job to keep the FOG in!

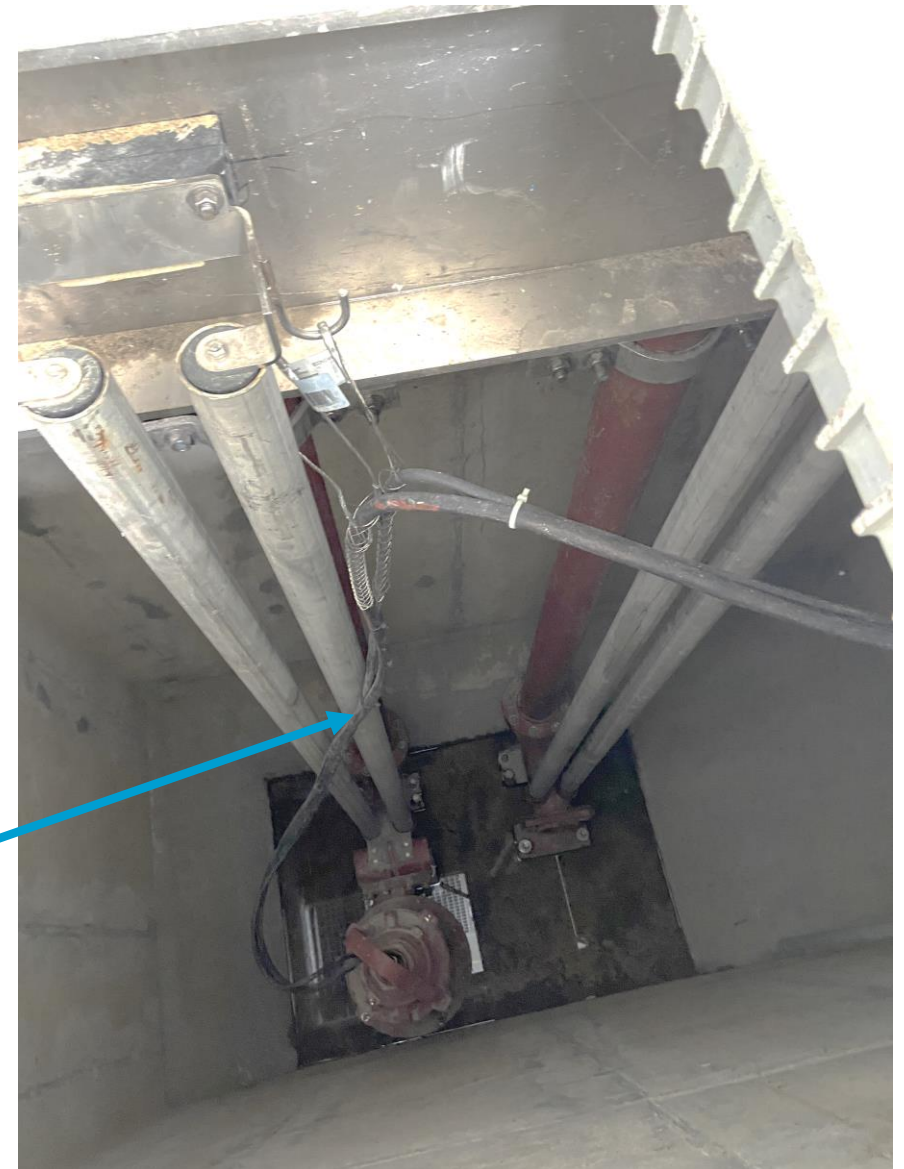


A single FloBeast Screen was used with 5 mm aperture size



The screened FOG sump allowed gravity discharge of FOG and provided a means of bypassing screening if needed.

**Change during construction:  
change out the cable material  
on the sump pumps.**

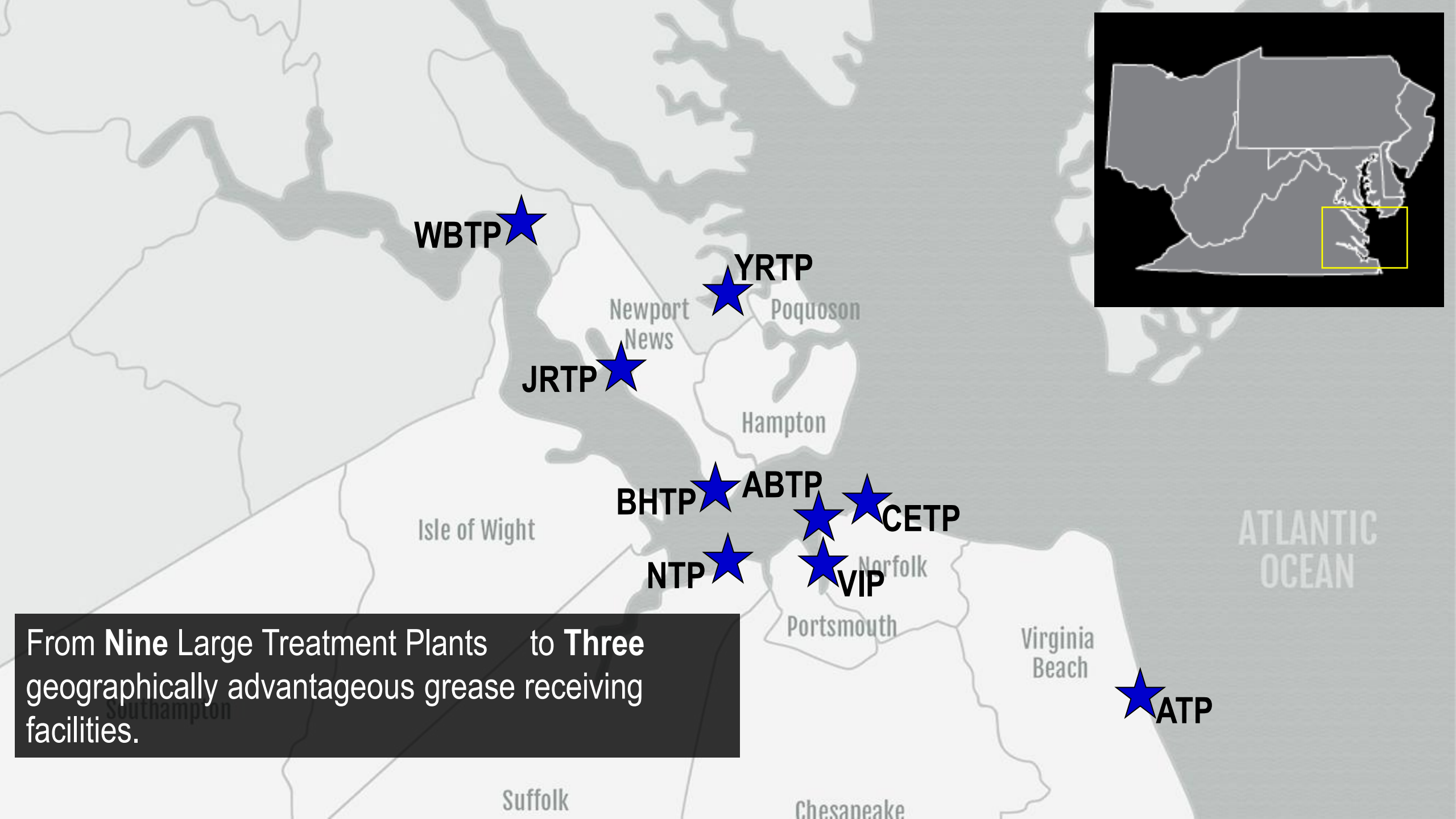


Storage tanks provide you with a lot of cheap flexibility.



An aerial photograph of an industrial facility, likely a power plant or refinery. The image shows a complex network of pipes, valves, and structural steel frameworks. In the foreground, there are several large, cylindrical storage tanks. The background features a paved area with a white pickup truck and a forklift. The overall scene is a detailed view of industrial infrastructure.

**So how did our collective thoughts translate to real-life at ATP?**



From **Nine** Large Treatment Plants to **Three** geographically advantageous grease receiving facilities.

**WBTP** ★

**YRTP** ★

**JRTP** ★

**BHTP** ★

**ABTP** ★

**CETP** ★

**NTP** ★

**VIP** ★

**ATP** ★

Newport News

Poquoson

Hampton

Isle of Wight

Norfolk

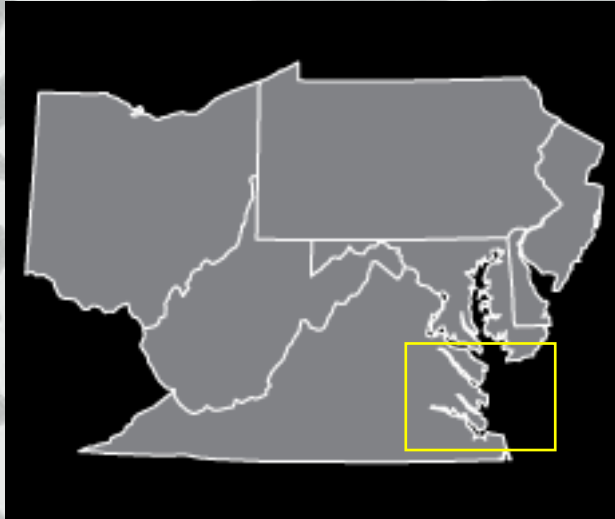
Portsmouth

Virginia Beach

ATLANTIC OCEAN

Suffolk

Chesapeake

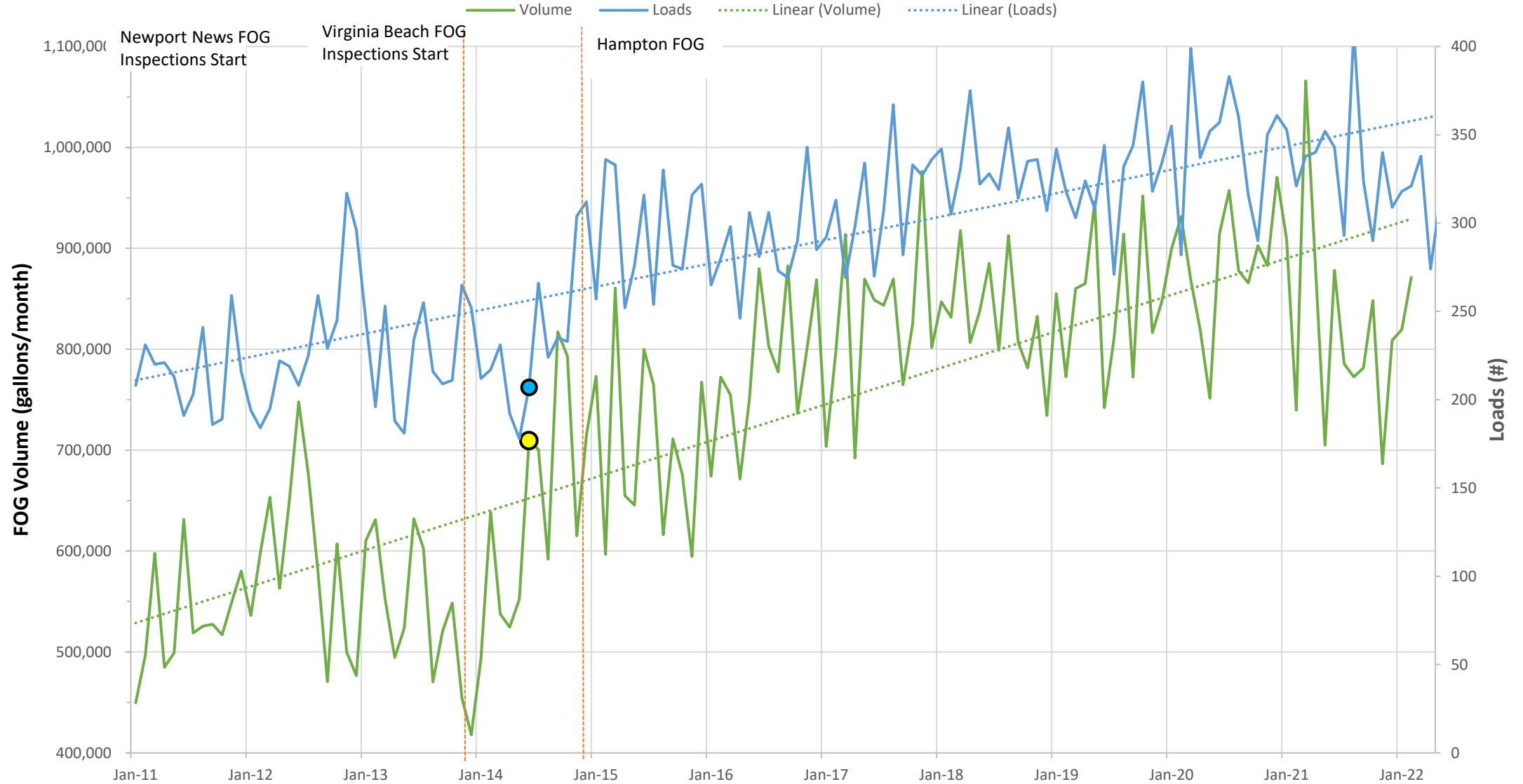




**HRSD receives lots of grease trucks because:**

- 1. HRSD serves approximately 1.7 million Virginians.**
- 2. I-64 drains Central and Northwest VA and ends in Coastal VA.**
- 3. Many of those people, as Virginians and Americans, like to take food that are either soft and/or heathy and make them warm and crunchy.**

# Grease Volume and Loads 2011-2022



Our survey, >50 different samples, said our FOG should look like this

Table 4-1. FOG Characteristics for the HRSD Service Area			
Parameter	Mean value	Standard deviation	Units
Total solids concentration	0.0579	0.0266	lb-TS/lb-FOG
Volatile fraction	0.967	0.0141	lb-VS/lb-TS
Total chemical oxygen demand	132,977	64,563	mg-COD/L
Total Kjeldahl nitrogen	535.6	203.2	mg-N/L
Total phosphorus	43.3	10	mg-P/L
pH	4.3	0.3	Standard units

But some times it does not.

Sample End Date	Substance	Result	Unit
4/1/2021 11:45	Biochemical Oxygen Demand	157000	mg/L
4/1/2021 11:45	Biochemical Oxygen Demand-Carbonaceous	149000	mg/L
4/1/2021 11:45	COD, Sol-GF	5990	mg/L
4/1/2021 11:45	Chemical Oxygen Demand	325000	mg/L
4/1/2021 11:45	Dissolved Solid (Total)	4600	mg/L
4/1/2021 11:45	Suspended Solid (Volatile)	98	%
4/1/2021 11:45	Total Kjeldahl Nitrogen	365	mg/L
4/1/2021 11:45	Total Phosphorus	117	mg/L
4/1/2021 11:45	Total Suspended Solids	119000	mg/L

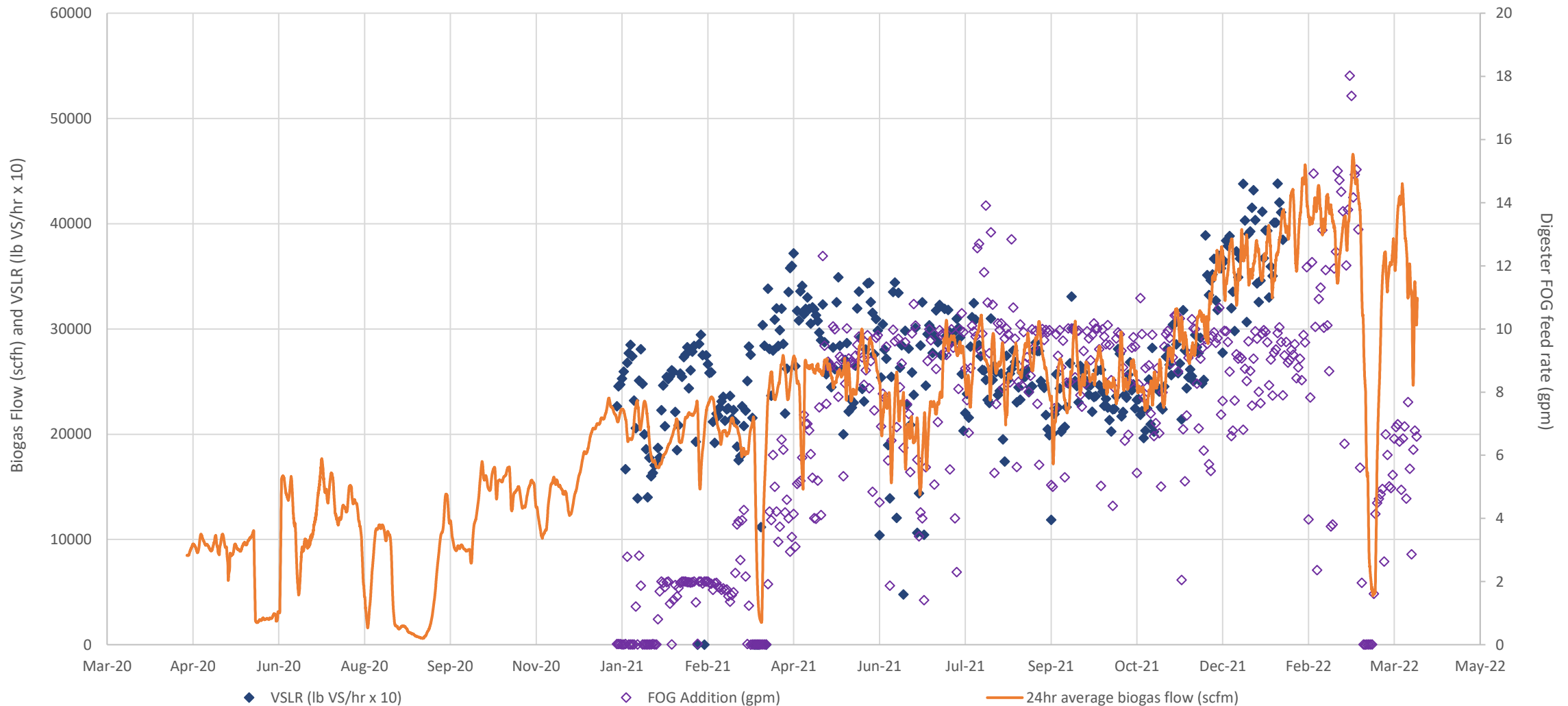
Consider in your design taking things other than FOG



Melting some FOG is harder than others, melting the FOG makes it easier to convey



# FOG and sludge loading throughout 2021 revealed the potential capacity of the overall THP-Digestion system.

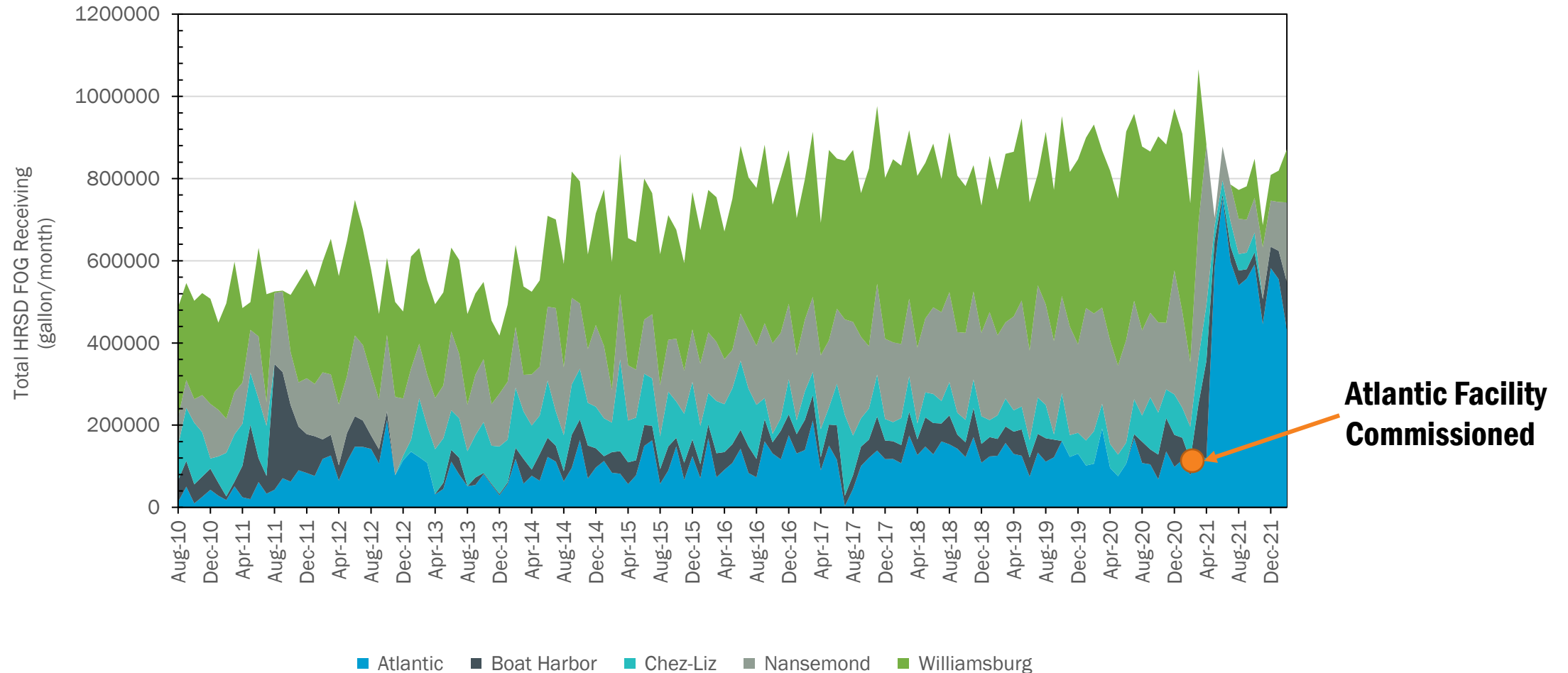


Really thick FOG can be hard on check valves, make sure you back up systems are up to the task





# Increasing FOG capacity at Atlantic allowed other facility upgrades



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# In summary, FOG receiving need not be the bane of wastewater treatment operations

- A robust screening and FOG handling system is good money; good materials and redundancy pay off.
- I think that digesters can handle more than we would prescribe, so keep an eye on the bottlenecks elsewhere (e.g. storage).
- That said, there are limits to what a liquid handling system should process. Industrial pretreatment is your friend (and hammer).
- Value the service that is provided; treatment plants should be able to recover the cost of operationally intensive processes.

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# Thank you.

Questions?





### Grease Volume by Plant 2011-2022

