

MWEA Collections Seminar – October 20, 2016

# Does Your Sewer System Have Arteriosclerosis? Effects and A Cure

John C. Rafter, PE

Jerald O. Thaler, PE

FISHBECK, THOMPSON, CARR, & HUBER INC.



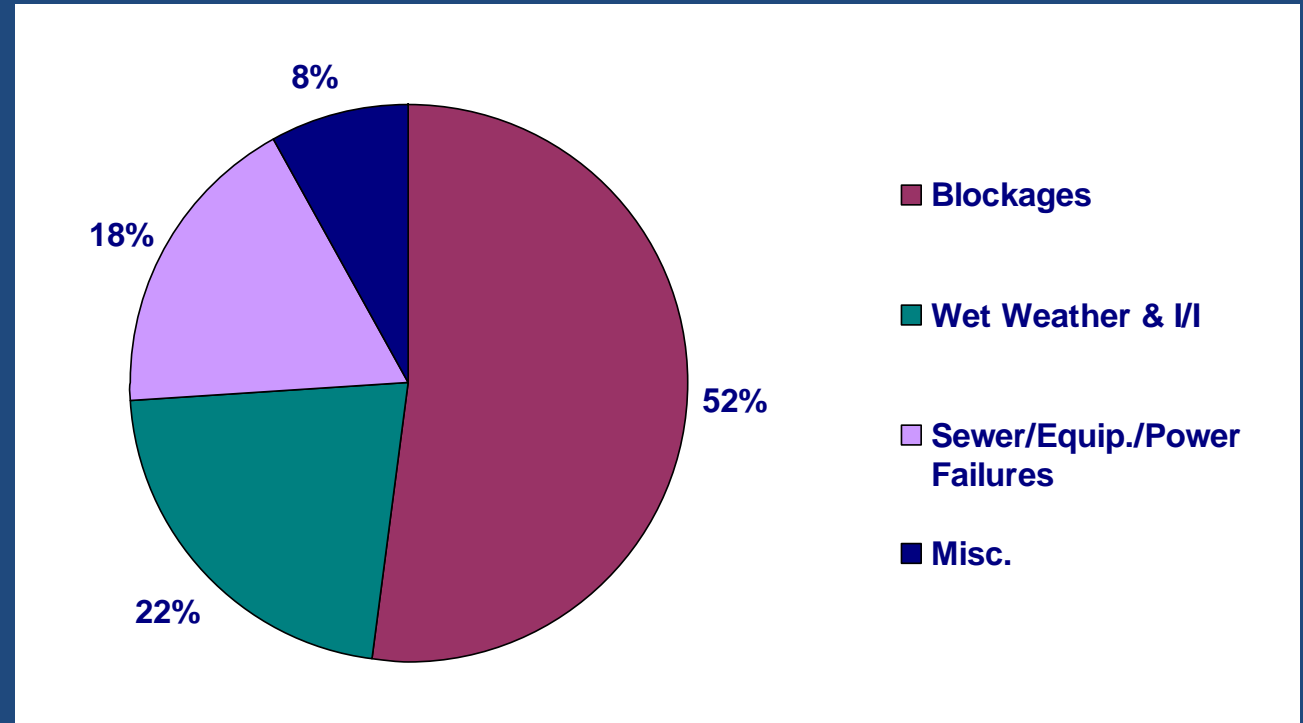
# AGENDA

- Grease – What is it and where does it come from?
- Odor – What is it and where does it come from?
- How are grease and odor related?
- What can you do?

**“A disease of the arteries characterized by plaque deposits of fatty material on their inner walls.”**

# **ARTERIOSCLEROSIS**

- Blockages
- Sewer Odors



- USEPA, CSO/SSO Report to Congress – Status and Next Steps

# THE SYMPTOMS



- Polar FOG is food-based (vs. petroleum-based nonpolar FOG)
- Hydrophobic; clogs “arteries” of collection system:

## POLAR FOG



The start of a blocked pipe begins when grease and solids collect on the top and sides of the pipe interior.



The build-up increases over time when grease and other debris are washed down the drain.



Excessive accumulation will restrict the flow of wastewater and can result in a sanitary sewer overflow.

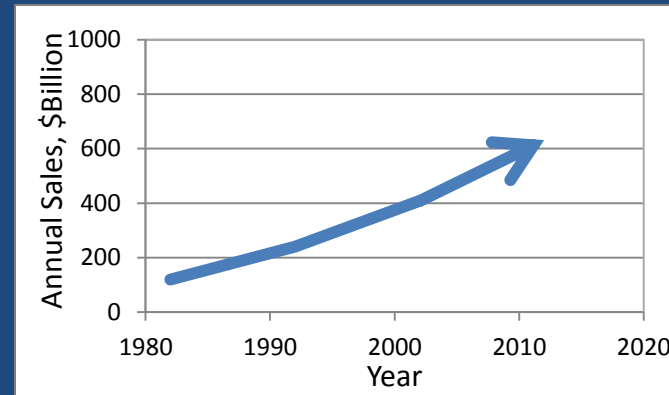
- **Domestic/Residential**
- **Industrial:**
  - Food Products
  - Meat Packing
  - Poultry Processing
  - Slaughterhouses
- **Commercial:**
  - Bakeries, Delicatessens, Caterers
  - Bars, Restaurants
  - Supermarkets, convenience stores, shopping malls
  - Hospitals
  - Hotels
  - Office Complexes
  - Prisons
  - Retirement Centers
  - Schools
  - Stadiums

## SOURCES OF POLAR FOG

**Includes any commercial facility with food preparation**

**Bars and restaurants are largest “industry” in U.S.**

- Nearly 1 million eating/drinking locations (16,000 in Michigan)
- 30-year growth rate over 5% per year:



- National Restaurant Association

# FOOD SERVICE ESTABLISHMENTS (FSEs)



Restaurant Type	FOG, mg/L
Fried Chicken	up to 6,500
Chinese	up to 1,300
Mexican	up to 1,000
Country Club	up to 700

(typical domestic sewage ~30 mg/L)

## SIGNIFICANCE OF FSEs



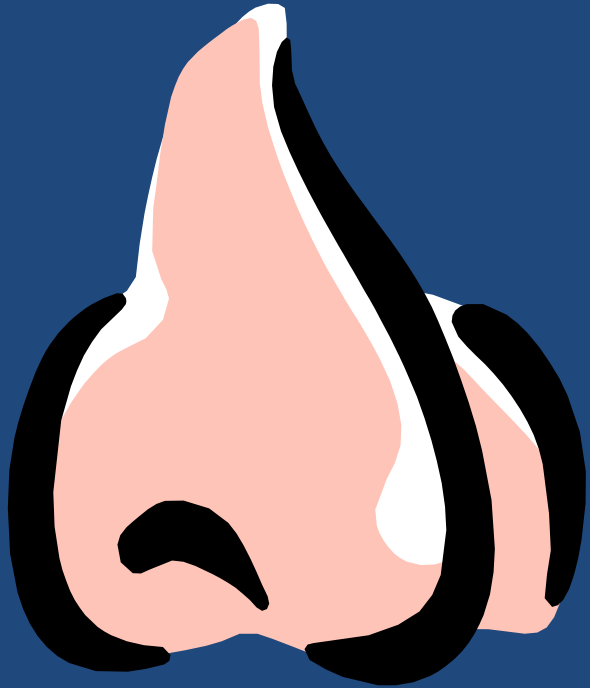
- City of Mount Clemens, MI

**DOWNSTREAM FROM A RESTAURANT**

UH-OH, HE'S GIVING YOU THE  
"STINK EYE"! I THINK SOMEBODY  
LIIKES YOOOUUU!



# WHAT IS AN ODOR?



- Odor is a sensation
- Odorous compounds stimulate smell and taste
- Trivia: The human nose has 1 million odor receptor cells

It is the human perception of a particular odor that will most likely be the first alert of a problem

# THE ODOR PROBLEM

## *The Human Side*

- Health issues
- Environmental effects
- Nuisance complaints
- Regulations



## *The Infrastructure Side*

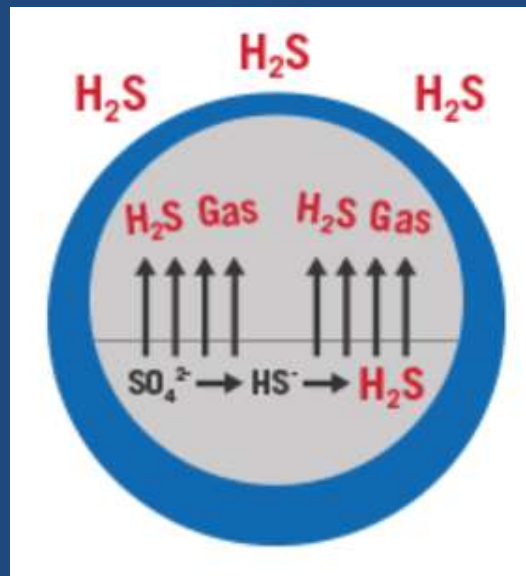
- Odors can be a sign of things happening – bad things



# GENERALLY, WHAT ARE THE CAUSES OF ODOR?

Odorous compounds include mercaptans, amines, etc. – but  $\text{H}_2\text{S}$  is the most prevalent

- Bacteria transitioning to an anaerobic condition
- Sulfates converted to sulfides
- Turbulence, splashing, or agitation release  $\text{H}_2\text{S}$



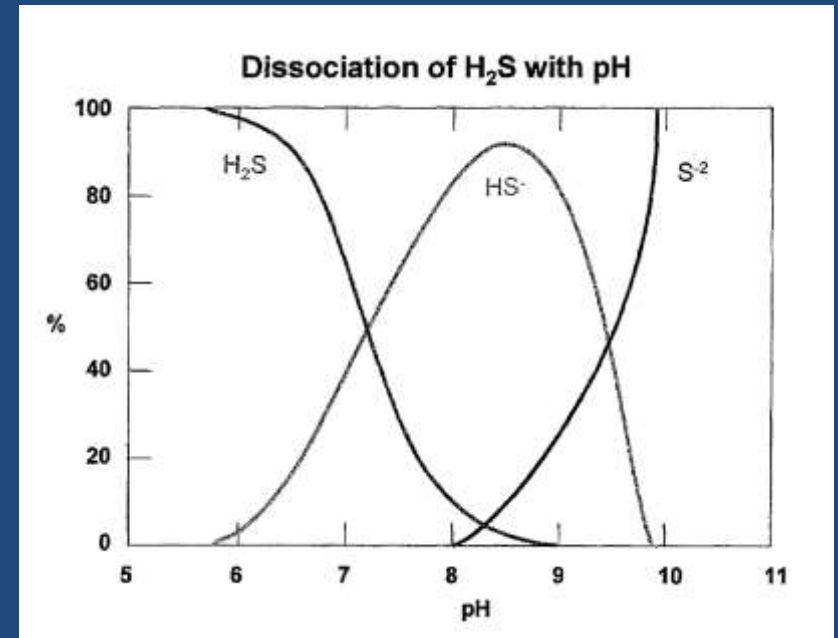


# WHAT CONDITIONS FAVOR H<sub>2</sub>S FORMATION?

- High organic matter and nutrients; aggravated by FOG build-up
- Long retention times at low DO
- “The H<sub>2</sub>S Triangle” - high sulfates, warm temperature, and low pH

## Note

H<sub>2</sub>S vapors released to sewer headspace can be oxidized into corrosive sulfuric acid



# WHAT ARE THE TYPICAL H<sub>2</sub>S ODOR SOURCES?

- Service leads (home or business)
- Vents
- Pump station wet wells
- Maintenance structures
- The WWTP





# HOW CAN H<sub>2</sub>S BE CONTROLLED?

- **Liquid Phase**
  - Precipitants – capture H<sub>2</sub>S after formation
  - Oxidizers – convert H<sub>2</sub>S back to sulfate
  - Inhibitors – prevent H<sub>2</sub>S formation
- **Vapor Phase**
  - Activated Carbon
  - Biofilters
  - Scrubbers
- **Can also manage FOG build-up in the sewer**



London Sewer System Cleaning

UH-OH, HE'S GIVING YOU THE  
"STINK EYE"! I THINK SOMEBODY  
LIIKES YOOOUUU!



- **Treatment at the Source**
  - Under-the-counter grease trap
  - In-ground grease interceptor ✓
  - Bacteria or enzyme addition
- **Many communities implementing formal FOG Control Program**



# FOG MANAGEMENT

## Objectives

- Identify major FOG sources; regulate where necessary
- Comply with CMOM guidelines
- Not overly burdensome or costly to administer

## Implementation

- Add legal authority to Sewer Use Ordinance
- Prepare policy/procedures document
- Obtain MDEQ concurrence

# FOG CONTROL PROGRAM



- Periodic system-wide surveys
- General FSE permits, when needed
  - Acceptable control devices
  - Design and construction standards
  - O&M requirements
- Public participation
- FSE education



## FOG CONTROL PROGRAM ELEMENTS



- Nature of grease and its affect on collection system
- How grease-related costs lead to higher rates
- Best Management Practices for grease disposal in kitchens
- Brochures, posters, etc. (multilingual)



**FSE EDUCATION**

# PERSPECTIVE



- FOG discharges can lead to sewer build-up and H<sub>2</sub>S odors
- H<sub>2</sub>S odors are a warning sign of sewer corrosion
- FSEs are a primary source of FOG
- Engineered H<sub>2</sub>S control is feasible, but many communities are implementing a formal FOG Control Program
- FOG Control Programs can be effective without being overly burdensome or costly to administer

# Thank You

For more information...

John C. Rafter, Jr., PE, BSEE

(616) 464-3814

[jcrafter@ftch.com](mailto:jcrafter@ftch.com)

Jerald O. Thaler, PE

(248) 207-1710

[jothaler@ftch.com](mailto:jothaler@ftch.com)



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