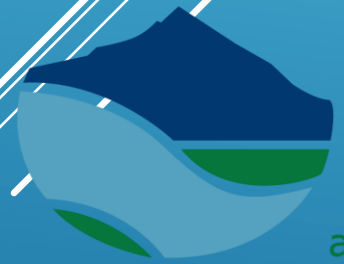
# US-EPA FOG ABATEMENT & EMERGING POLLUTANTS TRAINING:

## EFFECTIVE FOG & EMERGING POLLUTANTS ABATEMENT PROGRAM IMPLEMENTATION


POLLUTION PREVENTION
resource center

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This training was developed under a Cooperative Agreement awarded by the U.S. Environmental Protection Agency (EPA) to the Pacific Northwest Pollution Prevention Resource Center (PPRC). It has not been formally reviewed by EPA.

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Industrial Pretreatment, FOG, P2 and Septage programs

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# FOG PROGRAM IMPLEMENTATION – PART 2

# &

# EMERGING POLLUTANTS

- FOG PROGRAM IMPLEMENTATION - PART 2
  - FOG Management Practices
  - FOG and Water Separation & Effective FOG Pretreatment
  - Grease Removal Device (GRD) Design Considerations & Operation
  - FSE Inspections
  - Preferred Pumper Programs
- Emerging Pollutants
  - What are they
  - Why do we care
  - What to do about them

# "EFFECTIVE KITCHEN BMPS KEEP FOG OUT OF PUBLIC SEWERS"

## In A Perfect World …

BMPs such as scraping/wiping all utensils and plates into garbage keeps FOG out of drains

# KITCHEN BMPS

## In The Real World …

**What really happens:**

- Cleanup staff are in a hurry
- Fastest way to clean pots is with high pressure water
- Hose down the floor and squeegee to the nearest floor drain

# KITCHEN BMPS …

## … frequently not an effective tool for FOG abatement

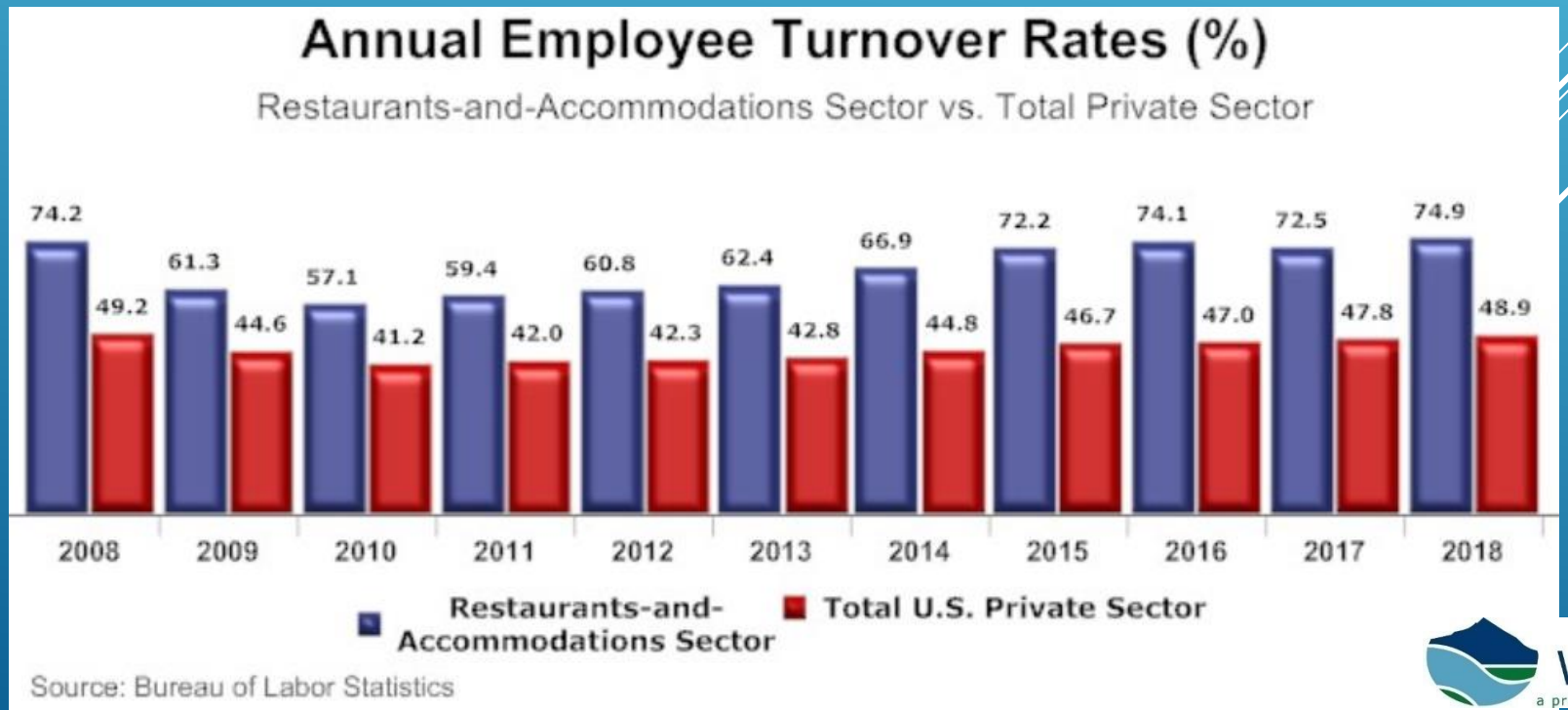
FSE manager's responsibility is about getting good food onto the customer's table

# KITCHEN BMPS …

## … frequently not the most effective tool for FOG abatement

Employee turnover rate is high (16-200%)

and Kitchen BMP training becomes very time consuming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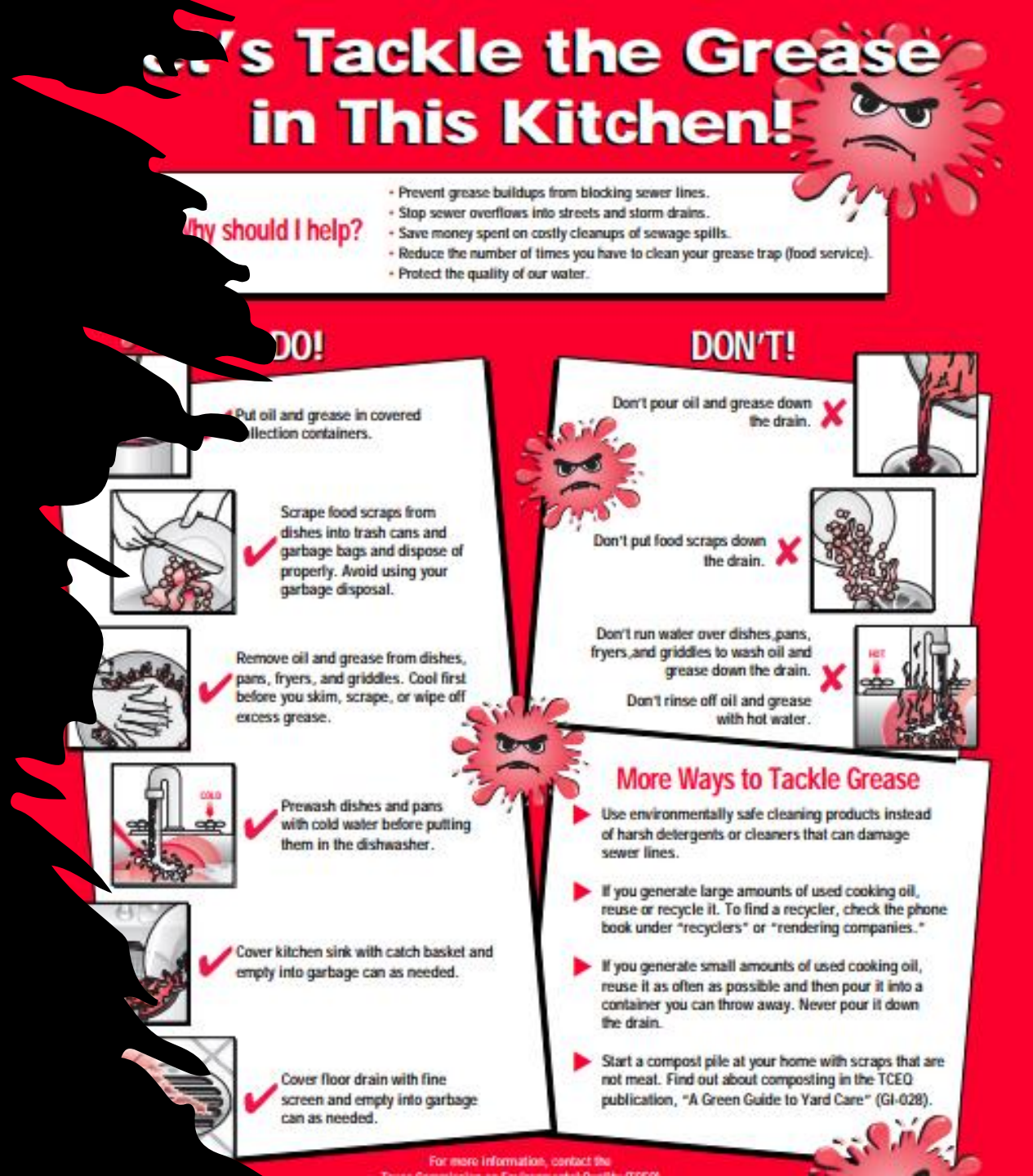
# KITCHEN BMPS …

- Scrape pots and pans prior to washing.
- Do not pour, scrape, or otherwise dispose of fats, oils, or grease into the sink or drains
- Collect fryer oil and store in barrels for recycling.
- Do not put food (including liquid food) including milk shake syrups, batters, and gravy down the drain
- Use strainers on sinks and floor drains to prevent solid material from entering the sewer.
- Post “NO GREASE” signs near sinks and drains.



# KITCHEN BMPS …

- Train all kitchen staff in best management practices for grease disposal and the impacts of grease accumulation in the sewer.
- Provide regular refresher training/discussion for proper disposal of fats, oils, and grease for all employees.
- Inspect grease abatement devices/interceptors after pumping to ensure adequate cleaning was performed.
- Dump mop water only to drains connected to your grease treatment system.
- Use absorbents to soak up spills containing fats, oils, and grease.

- CASE STUDY: Despite inspections, and training on kitchen BMPs and interceptor maintenance . . . just 3 months after public line cleaning:

**FOG buildup at FSE connections**

**Restrictions in the pipe**

**FOG on top of pipe indicates blockage**

# SO, GET OUT OF THE KITCHEN?

## Is There Nothing Good About BMP's?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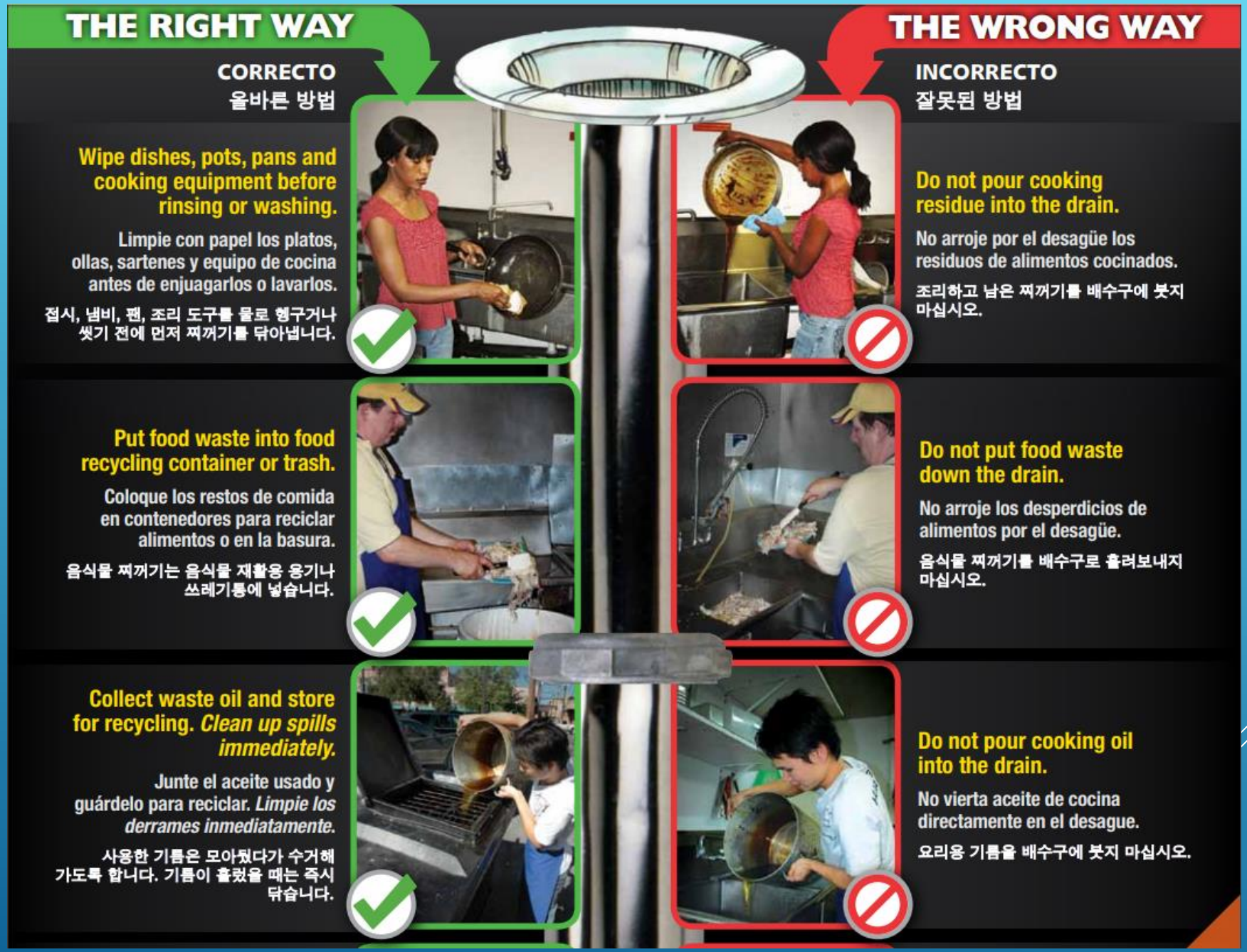
# THE GOOD ABOUT KITCHEN BMPS ?

- Are One of the Tools in the Toolbox
- Are the First Line Of Defense Against FOG
- Will Not Solve FOG Problems But Can Still Help Control Costs
- Have the Most Available Resources to Download and Print – Especially Resources for FSE Employees
- Can Help Perpetuate a Cultural Consciousness About FOG Problems

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## Kitchen Best Management Practices (BMPs)

| To Do | Why? | Benefits |
|---|---|---|
| Train employees | Employees help eliminate grease blockages and sewer spills | Avoid sewer blockage, fines and environmental issues |
| Display "No Grease" information in the workplace | Reminds employees to reduce FOG in the kitchen | Minimize grease discharge; reduce cleaning and disposal costs |
| Scrape or dry-wipe excess food and grease from cookware; dispose in trash | Keeps grease out of traps and interceptors | Less frequent cleaning, reduce maintenance costs |
| Install removable screens on all kitchen drains | Prevents food from clogging the sewer system | Reduce grease and food in traps and interceptors |
| Keep hot water to drains less than 140° F | Hot water dissolves grease and pushes it to the sewer pipe | Reduce costs to heat water; prevent FOG "pass through" in grease interceptors |
| Don't overfill FOG containers | Prevents slippery FOG spills | Employee safety |
| Pour cooking grease, liquid oil into covered grease container | Reduces amount of grease discharged to sewer | Reduce grease waste and garbage fees |
| Use Spill Kits | Absorb spilled grease and oil | Reduce material in grease traps and interceptors |
| Routinely clean kitchen exhaust system filters/hoods | Grease and oil in kitchen exhaust system can accumulate on the roof and may enter the stormdrain system when it rains | Protect local waterways. Avoid penalties or fines for polluting water |

www.cleanwaterservices.org • (503) 681-3600

Clean Water Services


## Las mejores prácticas de administración para la cocina

| Para hacer | ¿Por qué? | Beneficios |
|---|---|---|
| Entrene a los empleados | Los empleados ayudan a eliminar los bloqueos causados por la grasa y los derrames en las alcantarillas | Los restaurantes se evitarán multas al no bloquear el alcantarillado y evitan problemas ambientales |
| Coloque la información de "No se permite grasa" en el lugar de trabajo | Les recueda a los empleandos a reducir la cantidad de manteca, aceite y grasa en la cocina | Reduce la descarga de grasa e los restaurantes; reduce el costo de limpieza y de desecho |
| Raspe o limpie en seco el exceso de comida y la grasa solidificada de los sartenes; tirela en la basura | Mantiene la grasa fuera de los colectores e interceptores | Menos grasa en los colectores significa tener que limpiar menos frecuente, lo cual reduce los costos de mantenimiento |
| Instale mallas removibles en todos los desagües de la cocina | Preveine que las particulas de comida entren y bloqueen el sistema de alcantarillado | Reduce la cantidad de grasa y de material de comida en los colectores e interceptores |
| Use agua caliente en los desagües a menos de 140° F | El agua a una temperatura más caliente de 140° F disuelve la grasa, causando que se solidifique después en la tuberia del alcantarillado | Reduce los contros de calentar agua; previene que la manteca, aceite y grasa "pase a través" de los interceptores para grasa |
| No rebalse los envases de FOG (manteca, aceite y grasa) | Preveine derrames resbalosos de manteca, aceite y grasa | Seguridad de los empleados |
| Vierta la grasa para concinar y el aceite liquido en un recipiente para grasa y cúbralo | Reduce la cantidad de grasa que es descargada al alcantarillado | Los restaurantes reducen el desperdicio de grasa y el costo potencial de transportar basura |
| Use los estuchess para los derrames | Los materiales absorbentes la grasa y el aceite derramado | Reduce la cantidad de material en los coletores e interceptores de grasa |
| De manera rutinaria, limpie los filtros y campanas del systema de ventilación de la cocina. (Vacie el aqua que usó para limpiar las campanas y los filtros en un desagüe conectado a un interceptor de grasa; o haga que le limpien las campanas a través de un servicio profesional.) | Si la grasa y el aceite se escapan a través del sistema de ventilación de la cocina, pueden acumularse en el techo y eventualmente entrar al sistema de alcantarillado de aguas pluviales | Se protege la calidad del agua en las vias fluviales locales. Evita multas o infracciones debido a las regulaciones sobre aguas pluviales |

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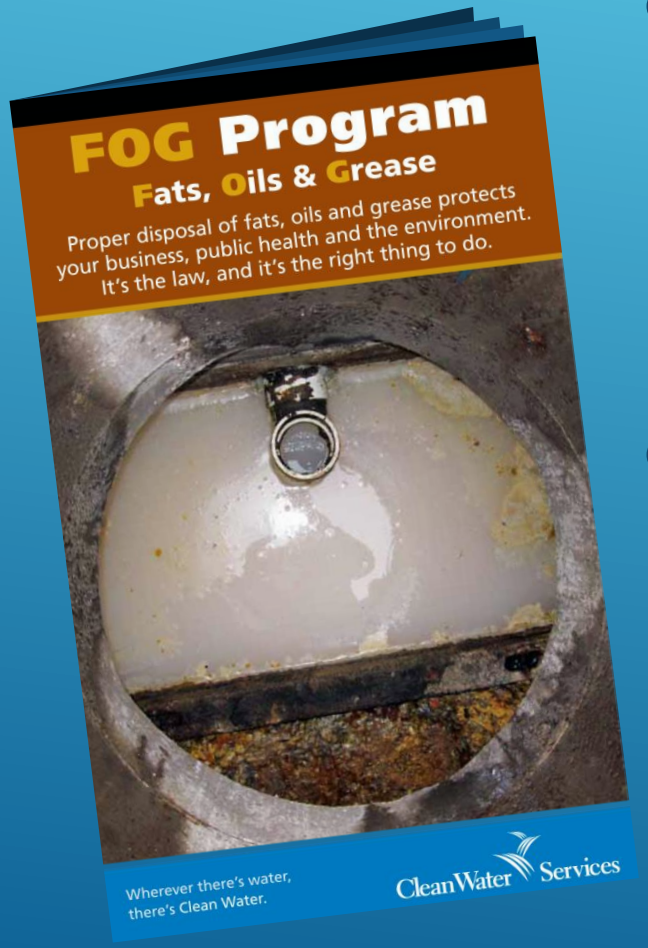
# PETE THE PLUMBER SHARES FOG TIPS FOR RESTAURANTS

# FOG PUBLIC OUTREACH, AND PRINTED MATERIAL




## Outreach for residential FOG reduction

- "Freeze-the-Grease" kits
- Web information for homeowners
- Quarterly newsletter for customers
- Videos


## Outreach for commercial FOG generators

- Web information
- FOG booklet
- Kitchen poster
- Videos


https://www.westernstatesalliance.org/fog-for-food-service-establishments

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# PETE THE PLUMBER'S TIPS ON DEALING WITH FATS, OILS, AND GREASE

# FOG PUBLIC OUTREACH


Also available in the following languages:

- Spanish (Español)
- Chinese (Simplified)
- Chinese (Traditional)
- Vietnamese
- Korean


正體字 | русский | Somali | Español | Tiếng Việt

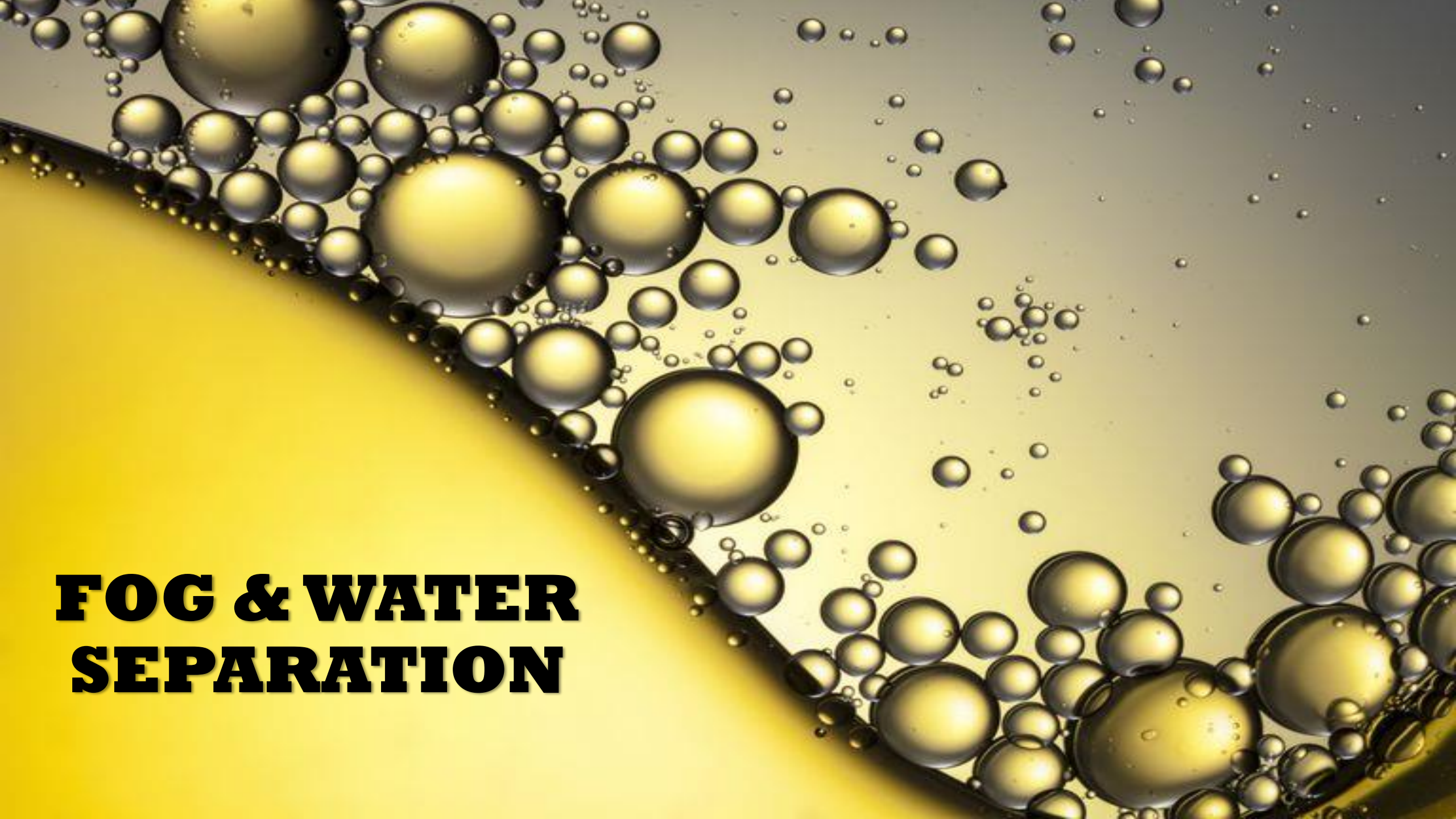
# FOG PUBLIC OUTREACH

# PETE THE PLUMBER'S THOUGHTS ON WIPES

# SO, WHAT TAKES THE PLACE OF BMPS?

- Connect all fixtures and drains in the food/beverage service areas to FOG pretreatment system
- Size FOG pretreatment system to the FOG generator's food/beverage operation (FOG production values)
- Effective FOG pretreatment system includes maintenance prior to unacceptable FOG bypass

# FSE EFFECTIVE FOG PRETREATMENT

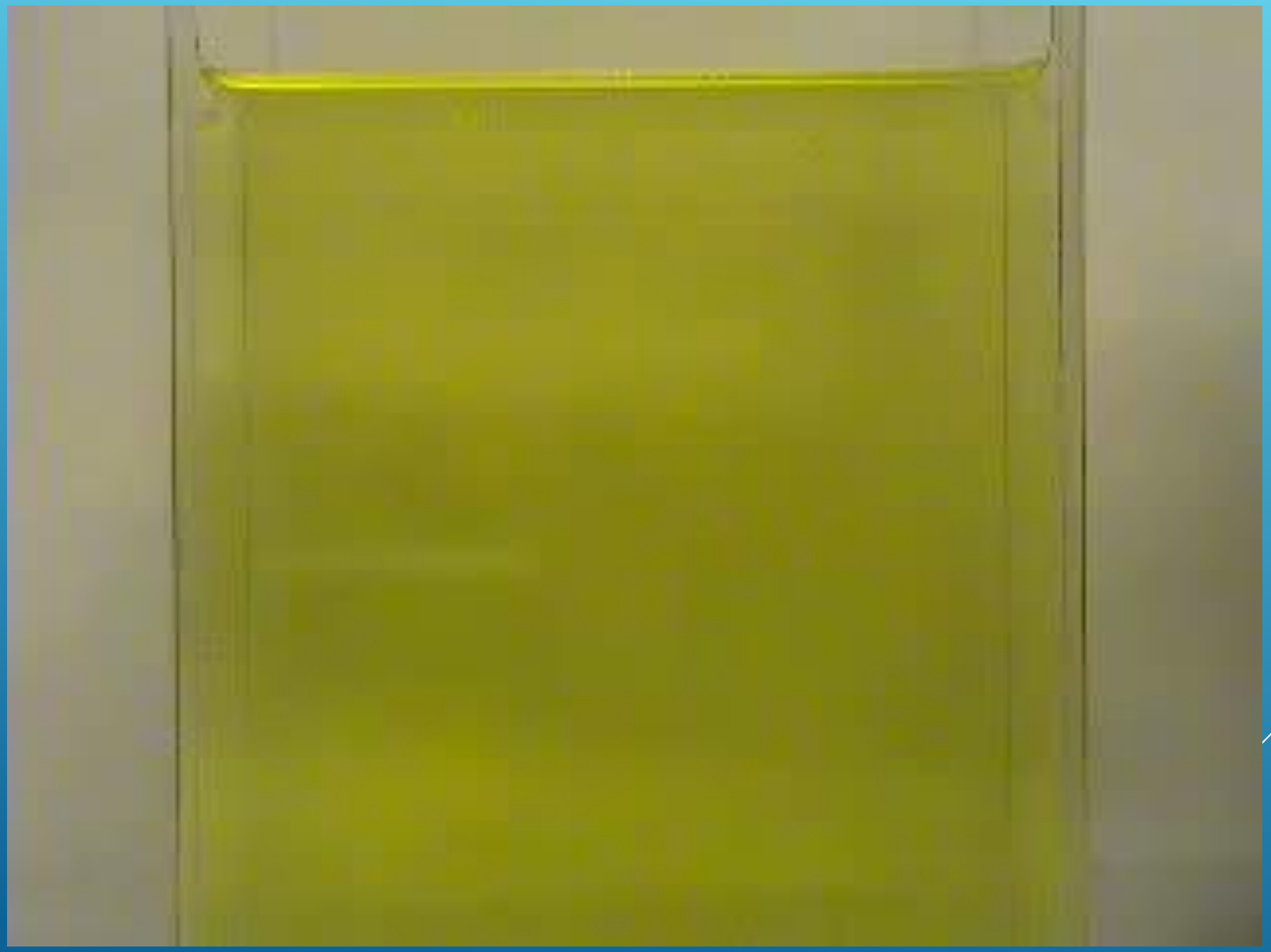

FOG & WATER
SEPARATION

# GREASE TRAP OR INTERCEPTOR?

**This is NOT a grease trap or interceptor!**

Courtesy Brownsville PUB

# Effect of Size on Performance



# Effect of Size on Performance

# Effect of Size on Performance

| FOG (Oil) Travel Time | |
|---|---|
| 3-inch Rise at 68° F - 0.90 SG - Hour:Minute:Second | |
| Droplet Diameter in Microns | Rise Time |
| 300 | 0:00:15 |
| 150 | 0:01:30 |
| 50 | 0:09:18 |
| 15 | 1:43:22 |

150 microns = .15 mm  50 microns = .05 mm

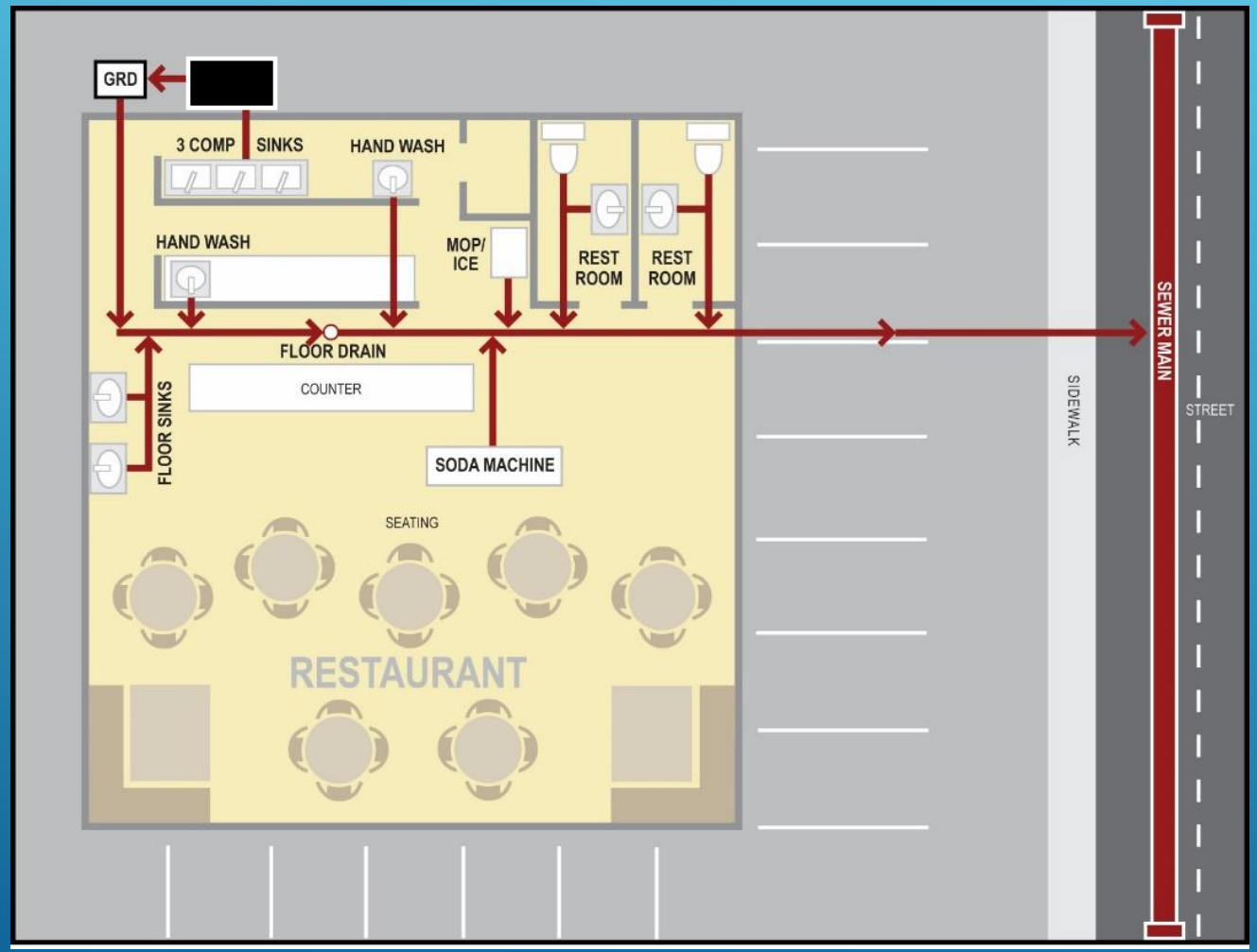
**Rise 5 ft. in 30 minutes**

# EFFECTIVE PRETREATMENT

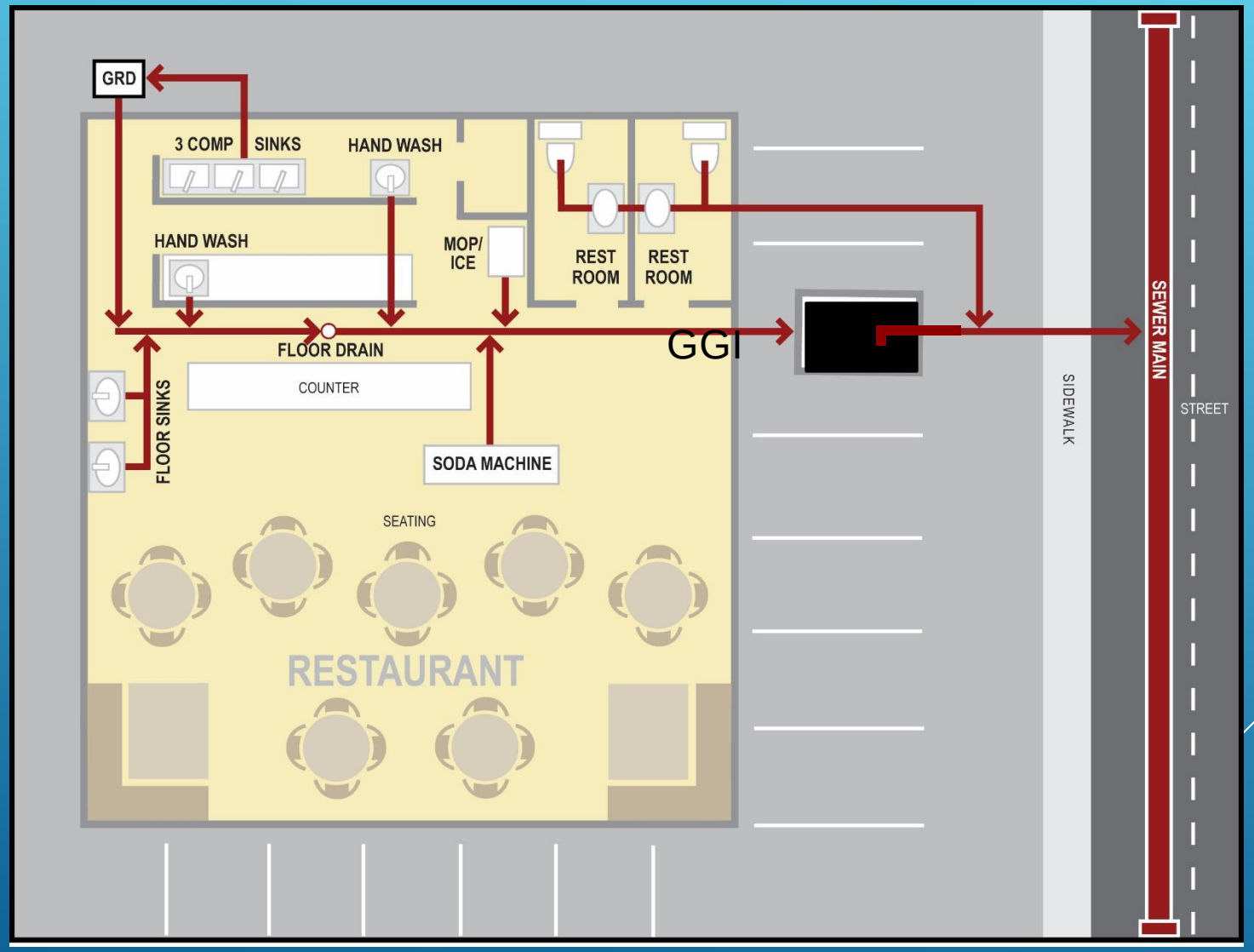
All fixtures and drains (F&D) from the food/beverage service areas shall be connected to an appropriately sized grease interceptor.

"An appropriately sized grease interceptor is sized for the food service operation [grease production] and then the flow rate."

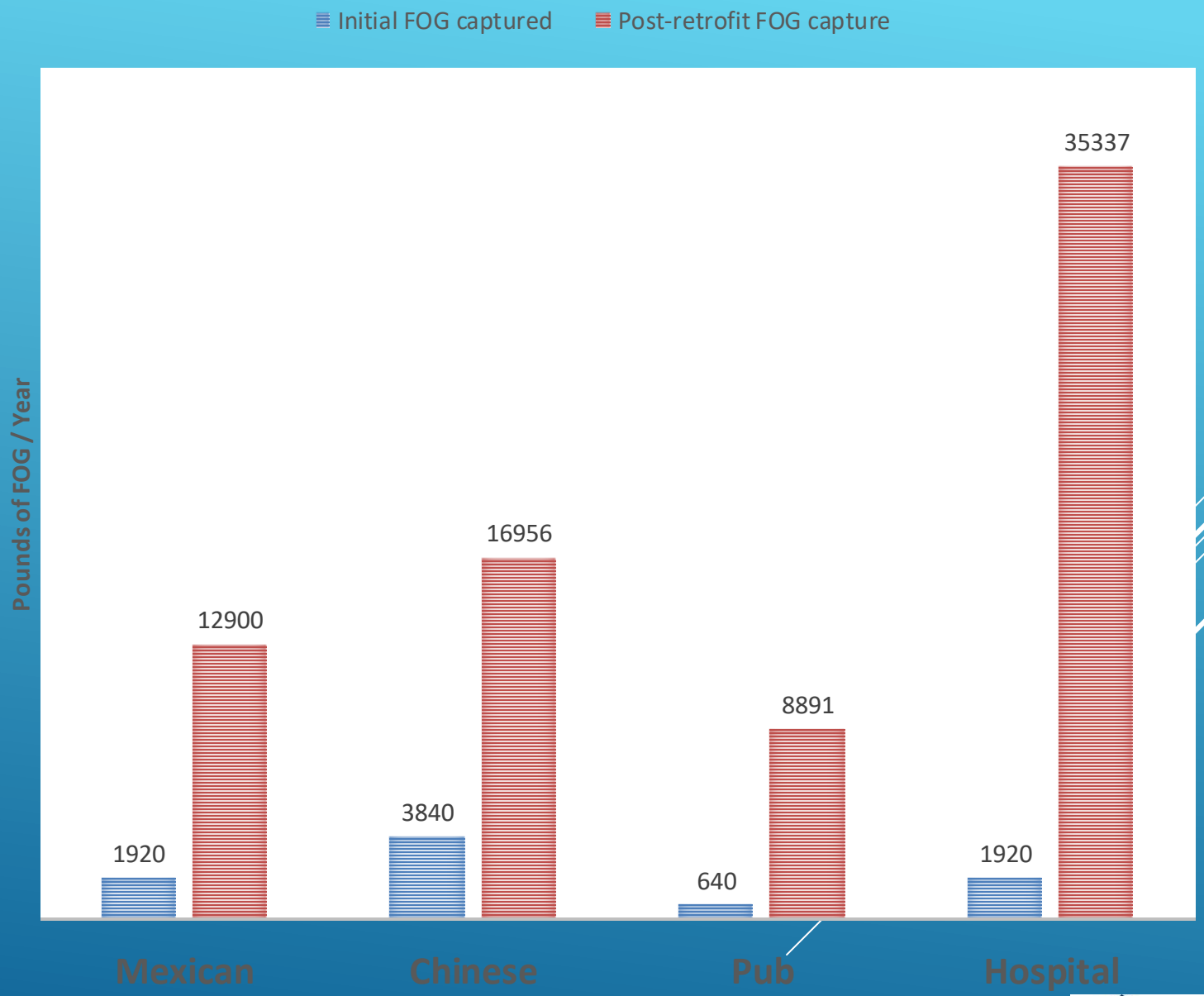
# INEFFECTIVE PRETREATMENT FOR FOG



# ALL FOOD/BEVERAGE SERVICE AREA FIXTURES & DRAINS PROTECTED



# CASE STUDIES REVEAL PRE-RETROFIT FOG LOADING



# PATRICK BRYAN, PPRC FOG TRAINER AND TECHNICAL PROGRAM MANAGER

*Stanislaus County, Hazardous Materials Inspector*
*County Of Fresno, NPDES Inspector*
*Municipal Interagency Training Coordinator*

- EXPERIENCE SERVING AS A WASTEWATER AND STORM WATER INSPECTOR FROM THE COUNTY OF FRESNO, CALIFORNIA.
- BACKGROUND IN COMMERCIAL AND DEVELOPMENT PROGRAMS PATRICK UNDERSTANDS THE DISCONNECT THAT CAN OCCUR BETWEEN THE COMMUNITIES WE SERVE SUCH AS FOOD SERVICE ESTABLISHMENT'S (FSES), OTHER REGULATORY INSPECTORS/PROGRAMS AND WITHIN OUR OWN AGENCIES.
- BUILDING RELATIONSHIPS WITH INTERNAL DEPARTMENTS AND PRIVATE STAKEHOLDERS IS ESSENTIAL FOR A SUCCESSFUL FOG PROGRAM.

# GREASE REMOVAL DEVICE SIZING CONSIDERATIONS

# GREASE INTERCEPTOR STANDARDS

HGI

GGI

| Standard | Publisher | Type of interceptor covered |
|---|---|---|
| PDI G-101 | Plumbing and Drainage Institute | Passive Hydromechanical Grease Interceptor (HGI) |
| PDI G-102 | Plumbing and Drainage Institute | Grease Interceptor Sensing and Alarm Devices |
| ASME A112.14.3 | American Society of Mechanical Engineers | Passive Hydromechanical Grease Interceptor (HGI) |
| ASME A112.14.4 | American Society of Mechanical Engineers | Automatic Grease Removal Device (GRD) |
| ASME A112.14.6 | American Society of Mechanical Engineers | FOG (fats, oils and greases) Disposal Systems |
| CSA B481 | Canadian Standards Association | Passive Hydromechanical Grease Interceptor (HGI) |
| IGC 273 | International Association of Plumbing and Mechanical Officials | Passive Hydromechanical Grease Interceptor (HGI) |
| ASTM C1613 | ASTM International | Precast Concrete Gravity Grease Interceptor (GGI) |
| IAPMO/ANSI Z1001 | International Association of Plumbing and Mechanical Officials | Prefabricated Concrete Gravity Grease Interceptor (GGI) |

**Appurtenance:** A manufactured device, a prefabricated assembly, or an on-the-job assembly of component parts that is an adjunct to the basic piping system and plumbing fixtures. An appurtenance demands no additional water supply, nor does it add any discharge load to a fixture or the drainage system. It performs some useful function in the operation, maintenance, servicing, economy, or safety of the plumbing system.(IAPMO 2009)

# MOST COMMON GREASE REMOVAL DEVICE SIZING METHODS

- Uniform Plumbing Code – 2021 most current
- International Plumbing Code – 2021 most current
- American Society of Plumbing Engineers Plumbing Engineer Design Handbook, Vol 4, Chapter 8, Table 8.3.
- EPA Methods – Onsite Wastewater and Disposal Systems, 1980 (Section 8.2.4)

# DISCHARGE FIXTURE UNITS (DFU'S)

| DRAINAGE FIXTURE UNIT VALUES (DFU) | |
|---|---|
| Sink Commercial 1½ inch drain | 3 Units |
| Sink Commercial 2- inch drain | 3 Units |
| Sink Bar 2 - inch drain | 2 Units |
| Service or Mop Basin | 3 Units |
| Dishwasher 2 - inch drain | 4 Units |
| Floor Drain | 2 Units |
| Food Waste Disposer | 3 Units |

**Delete term: ~~Grease Trap~~**
**Add term: Hydromechanical Grease Interceptor (HGI)**
**Add sizing method for HGI:**

Table 10-2 – 1015.1

**Table 10-2**
**Hydromechanical Grease Interceptor (HGI) Sizing Chart***

| DFU | HGI FLow (gpm) |
|---|---|
| 8 | 20 |
| 10 | 25 |
| 13 | 35 |
| 20 | 50 |
| 35 | 75 |
| 172 | 100 |
| 216 | 150 |
| 342 | 200 |
| 428 | 250 |
| 576 | 350 |
| 720 | 500 |

*Based on intermittent potentially full flow in drainage lines.

**Delete ~~Appendix H~~**
**Add new sizing method for Gravity Grease Interceptors (GGI):**

**Table 10-3**
**Gravity Grease Interceptor Sizing**

| DFUs (1) | Interceptor Volume (2) |
|---|---|
| 8 | 500 gallons |
| 21 (3) | 750 gallons |
| 35 | 1,000 gallons |
| 90 (3) | 1,250 gallons |
| 172 | 1,500 gallons |
| 216 | 2,000 gallons |
| 307 (3) | 2,500 gallons |
| 342 | 3,000 gallons |
| 428 | 4,000 gallons |
| 576 | 5,000 gallons |
| 720 | 7,500 gallons |
| 2112 | 10,000 gallons |
| 2640 | 15,000 gallons |

Notes
(1) The maximum allowable DFUs plumbed to the kitchen drain lines that will be connected to the grease interceptor.
(2) This size is based on: the DFUs, the pipe size from this code; Table 7-5; Useful Tables for flow in half-full pipes (ref: *Mohinder Nayyar Piping Handbook*, 3rd Edition, 1992).
(3) Based on 30-minute retention time (ref.: Metcalf & Eddy, Inc. *Small and Decentralized Wastewater Management Systems*, 3rd Ed. 1998). Rounded up to nominal interceptor volume.

# INTERNATIONAL PLUMBING CODE (2015 AND 2018)

- **1003.3.6 (2015 IPC) and 1003.6.7 (2018 IPC)**
- **Gravity grease interceptors and gravity grease interceptors with fats, oils, and greases disposal systems.** The required capacity of gravity grease interceptors and gravity grease interceptors with fats, oils, and greases disposal systems shall be determined by multiplying THE Peak drain flow into the interceptor in gallons per Minute by a retention time of 30 minutes.

# CATEGORIES ARE THREATENING…

What do you mean I'm a "high grease producer", I don't produce any grease?

| Table 8-3 Example Grease Production Values for Restaurants | | |
|---|---|---|
| **Restaurant Type** | **Grease Production Values** | **Examples** |
| Low grease producer | 0.005 lbs (2.268 g)/meal (no flatware) | Elementary cafeteria, grocery meat department, hotel breakfast bar, sub shop, sushi, take-and-bake pizza |
| | 0.0065 lbs (2.948 g)/meal (with flatware) | |
| Medium grease producer | 0.025 lbs (11.340 g)/meal (no flatware) | Cafe, coffee shop, convenience store, grocery deli, Greek, Indian, Japanese, Korean, Thai, Vietnamese |
| | 0.0325 lbs (14.742 g)/meal (with flatware) | |
| High grease producer | 0.035 lbs (15.876 g)/meal (no flatware) | Full-fare family, fast-food hamburger, hamburger bar and grill, German, Italian, fast-food Mexican |
| | 0.0455 lbs (20.638 g)/meal (with flatware) | |
| Very high grease producer | 0.058 lbs (26.308 g)/meal (no flatware) | Full-fare BBQ, fast-food fried chicken, full-fare Mexican, steak and seafood, Chinese, Hawaiian |
| | 0.075 lbs (34.019 g)/meal (with flatware) | |

# CASE STUDIES REVEAL FOG LOADING

Grease Capacity (See Below) ÷ ( Meals Per Day ✖ Grease Production Values (see A B C D E F below) ) = **Operating Days Per Pump-out Cycle**

| model | GB-15 | GB-20 | GB-25 | GB-35 | GB-50 | GB-75 | GB-250 |
|---|---|---|---|---|---|---|---|
| maximum grease capacity (lbs.) | 74 | 109 | 75 | 142 | 249 | 616 | 1,076 |

| Restaurant Type | Grease Production Values | Examples |
|---|---|---|
| Low Grease Production | A 0.005 lbs (2.268 g) / meal (no flatware) | Sandwich Shop, Convenience Store, Bar, Sushi Bar, Delicatessen, Snack Bar, Frozen Yogurt, Hotel Breakfast Bar, Residential |
| | B 0.0065 lbs (2.948 g) / meal (with flatware) | |
| Medium Grease Production | C 0.025 lbs (11.340 g) / meal (no flatware) | Coffee House, Pizza, Grocery Store (no fryer), Ice Cream Parlor, Fast Food, Greek, Indian, Low Grease Output FSE (w/fryer) |
| | D 0.0325 lbs (14.742 g) / meal(with flatware) | |
| High Grease Production | E 0.035 lbs (15.876 g) / meal (no flatware) | Cafeteria, Family Restaurant, Italian, Steak House, Bakery, Chinese, Buffet, Mexican, Seafood, Fried Chicken, Grocery Store (w/fryer) |
| | F 0.0455 lbs (20.638 g) / meal (with flatware) | |

# EXAMPLE 1: ITALIAN, WITH FRYER, WITH FLATWARE

**Grease Production Factor would be 0.0455 lbs. per meal**

| Type | Menu | Grease Factor -> | without Fryer without flatware A | without fryer with flatware B | with fryer without flatware C | with fryer with flatware D |
|---|---|---|---|---|---|---|
| 1 | Bakery | | 0.025 | 0.0325 | 0.035 | 0.0455 |
| 2 | Bar and Grille | | 0.005 | 0.0065 | 0.025 | 0.0325 |
| 3 | Barbeque | | 0.025 | 0.0325 | 0.035 | 0.0455 |
| 4 | Breakfast Bar - Hotel | | 0.005 | 0.0065 | 0.025 | 0.0325 |
| 5 | Buffet | | 0.035 | 0.0455 | 0.058 | 0.075 |
| 6 | Burger and fries, fast food | | 0.025 | 0.0325 | 0.035 | 0.0455 |
| 7 | Cafeteria | | 0.025 | 0.0325 | 0.035 | 0.0455 |
| 8 | Caterer | | 0.005 | 0.0065 | 0.025 | 0.0325 |
| 9 | Chinese | | 0.035 | 0.0455 | 0.058 | 0.075 |
| 10 | Coffee shop | | 0.025 | 0.0325 | 0.035 | 0.0455 |
| 11 | Convenience Store | | 0.005 | 0.0065 | 0.025 | 0.0325 |
| 12 | Deep fried Chicken / seafood | | 0.035 | 0.0455 | 0.058 | 0.075 |
| 13 | Deli | | 0.005 | 0.0065 | 0.025 | 0.0325 |
| 14 | Family Restaurant | | 0.025 | 0.0325 | 0.035 | 0.0455 |
| 15 | Frozen Yogurt | | 0.005 | 0.0065 | 0.025 | 0.0325 |
| 16 | Greek | | 0.005 | 0.0065 | 0.025 | 0.0325 |
| 17 | Grocery Bakery | | 0.005 | 0.0065 | 0.025 | 0.0325 |
| 18 | Grocery Deli | | 0.025 | 0.0325 | 0.035 | 0.0455 |
| 19 | Grocery Meat Department | | 0.025 | 0.0325 | 0.035 | 0.0455 |
| 20 | Ice Cream | | 0.025 | 0.0325 | 0.035 | 0.0455 |
| 21 | Indian | | 0.005 | 0.0065 | 0.025 | 0.0325 |
| 22 | Italian | | 0.025 | 0.0325 | 0.035 | 0.0455 |
| 23 | Mexican, fast food | | 0.025 | 0.0325 | 0.035 | 0.0455 |
| 24 | Mexican, full fare | | 0.035 | 0.0455 | 0.058 | 0.075 |
| 25 | Pizza | | 0.025 | 0.0325 | 0.035 | 0.0455 |
| 26 | Religious Institution | | 0.005 | 0.0065 | 0.025 | 0.0325 |
| 27 | Sandwich shop | | 0.005 | 0.0065 | 0.025 | 0.0325 |
| 28 | Snack Bar | | 0.005 | 0.0065 | 0.025 | 0.0325 |
| 29 | Steak and seafood | | 0.035 | 0.0455 | 0.058 | 0.075 |
| 30 | Sushi | | 0.005 | 0.0065 | 0.025 | 0.0325 |

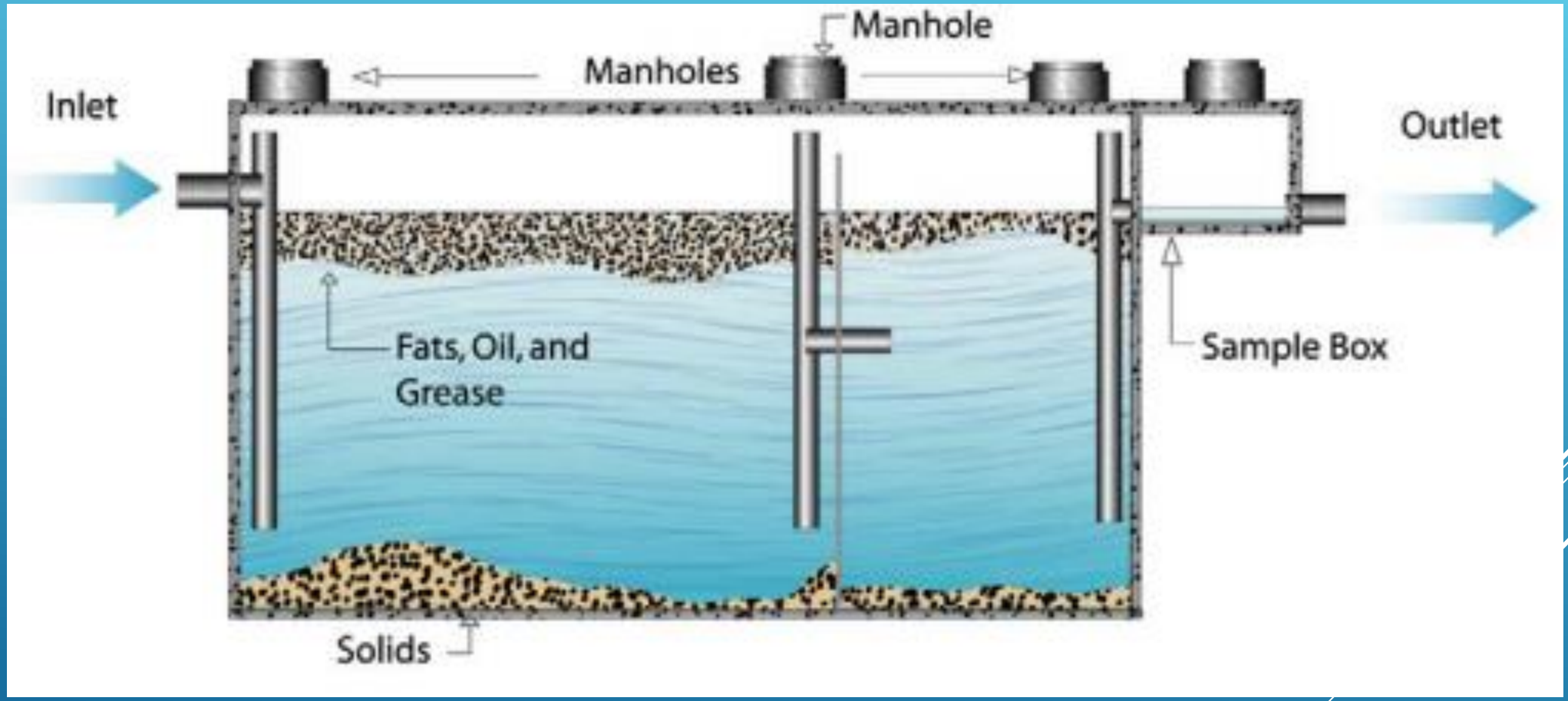
# APPLICATION OF GREASE PRODUCTION SELECTION METHOD

**Example 1: Italian, with Fryer, with Flatware**

Step 2: Calculate Grease Production

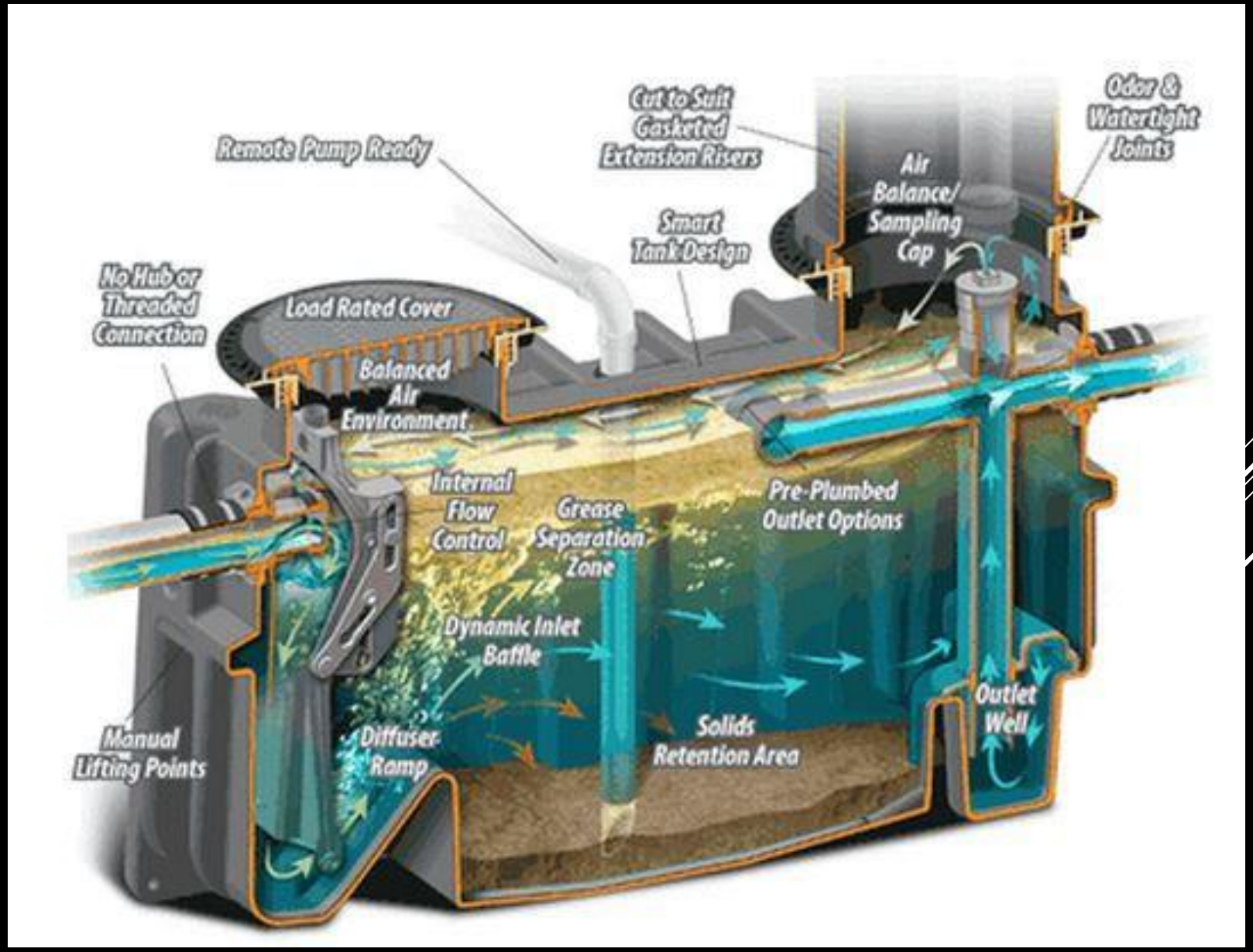
| Grease Factor from Table 2 | | Meals or Customers per day | | Days between pump-outs | = | Grease Capacity Required |
|---|---|---|---|---|---|---|
|  | X |  | X |  | = |  |
| 0.0455 lbs | | 469 meals/day | 21.3 lbs/day OR 639 lbs/mo | ? | | ? |

# Gravity Grease Interceptors (GGIs)



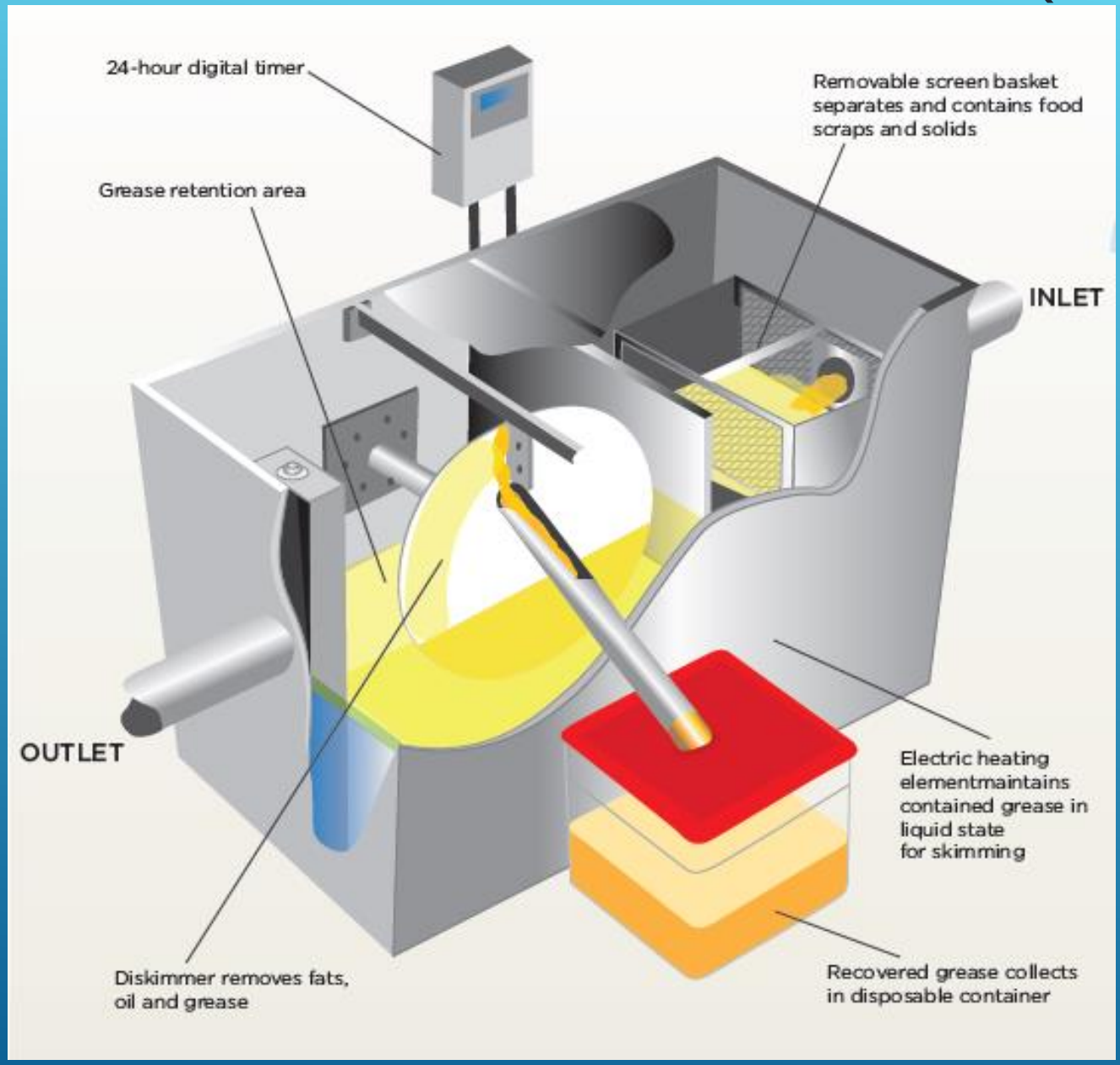
# HIGH-CAPACITY XL 75 GPM ENDURA CANPLAS

**Grease Capacity: Up to 560 lbs.**



SCHIER
GREAT
BASIN HIGH
CAPACITY
HGI

# Automated Grease Removal Device (AGRD)



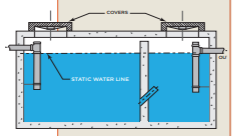
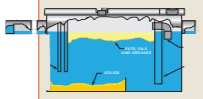
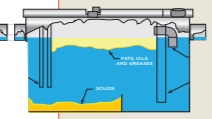
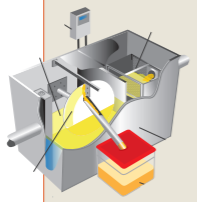
certified grease capacity
1,895 lbs.

grease capacity
912 lbs. (using 25% rule*)

| | GB-250 (100 GPM) | CONCRETE (1,000 gal.) |
|---|---|---|
| Initial installation | $6,665 | $9,744 |
| Pumpouts over 10 years | $6,050 | $16,400 |
| Replacement cost after 10 years | $0 | $14,744 |
| 10-year cost of ownership | **$12,715** | **$40,888** |

Courtesy SCHIER, Catalog 13, March 2023

# Equipment Types: the Good, the Bad, and the Ugly ($)

| | Benefits | Drawbacks | Costs |
|---|---|---|---|
| **GGI**<br>  | • **Large FOG storage capacity**<br>• **Less** maintenance<br>• **Outside** installation for easy maintenance and inspection access<br>• Maintenance can be performed during off hours<br>• **Minimal contact** by employees | • Requires **more space** for installation<br>• Can be **source of odor**s if not maintained properly<br>• **More expensive** to install<br>• **Higher maintenance cost**s per individual pumping events | • **New construction** restaurants = **$15,000 - $25,000**<br>• Existing restaurant **retrofit** = **$25,000 - $75,000**<br>• **Maintenance** = $0.20/gallon - $0.25/gallon |
| **HGI**<br>  | • Requires significantly **less space**<br>• **Less expensive** to install<br>• Can be made with durable polyethylene materials<br>• **Lower maintenance** costs per event<br>• Can be **maintained** by restaurant staff | • **Less FOG storage** capacity; more frequent maintenance<br>• Requires **flow control device** and additional **venting**<br>• **Indoor installation** requires space for device<br>• **Potentially indoor odors** if lid not sealed<br>• Typically requires **health department approval**<br>• Inspected or maintained during business hours | • **Above ground** installation = **$2,500 - $5,000**<br>• New construction, **below ground** installation = **$5,000 - $15,000**<br>• Existing restaurant **retrofit**, below ground installation = **$10,000 - $25,000**<br>• **Maintenance** = Typically a base fee of $100 - $150 per event |
| **Large HGI**<br>  <br>**Just like "regular" HGI but bigger.** | • Uses **less space** than a GGI<br>• Typically **less expensive** installation than a GGI<br>• Typically made with **durable polyethylene** materials<br>• **Lower maintenance** costs per event than a GGI<br>• **Larger FOG storage space** than an HGI<br>• Airtight lids **prevents odors** | • **Less FOG storage** capacity than a GGI; more frequent maintenance<br>• Requires **flow control device** and additional venting<br>• **Indoor installation** requires space for device<br>• Typically requires **health department approval**<br>• Restaurant staff cannot conduct maintenance | • **New construction** restaurants = **$10,000 - $20,000**<br>• Existing restaurant **retrofit** = **$20,000 - $50,000**<br>• **Maintenance** = $0.20/gallon - $0.25/gallon |
| **AGRD**<br>**(type of HGI)**<br>  | • Doesn't require significant space<br>• **Lower maintenance costs** per event<br>• **Self-cleaning** resulting in less frequent complete pumping<br>• Often preferred by sewer agencies over regular HGIs<br>• Can be maintained by restaurant staff | • Requires **daily, weekly** and **monthly maintenance**<br>• High degree of **restaurant staff training required**<br>• No air tight seals; **potential indoor odors**<br>• **More expensive** than passive HGI<br>• Requires management of recyclable grease container<br>• Typically cannot be installed below ground<br>• Requires **flow control device** and additional **venting**<br>• Typically requires **health department approval** | • **Above ground** installation = **$5,000 - $10,000**<br>• Existing restaurant **retrofit** = **$10,000 - $15,000**<br>• **Maintenance** = Typically a base fee of $100 - $150 per event |



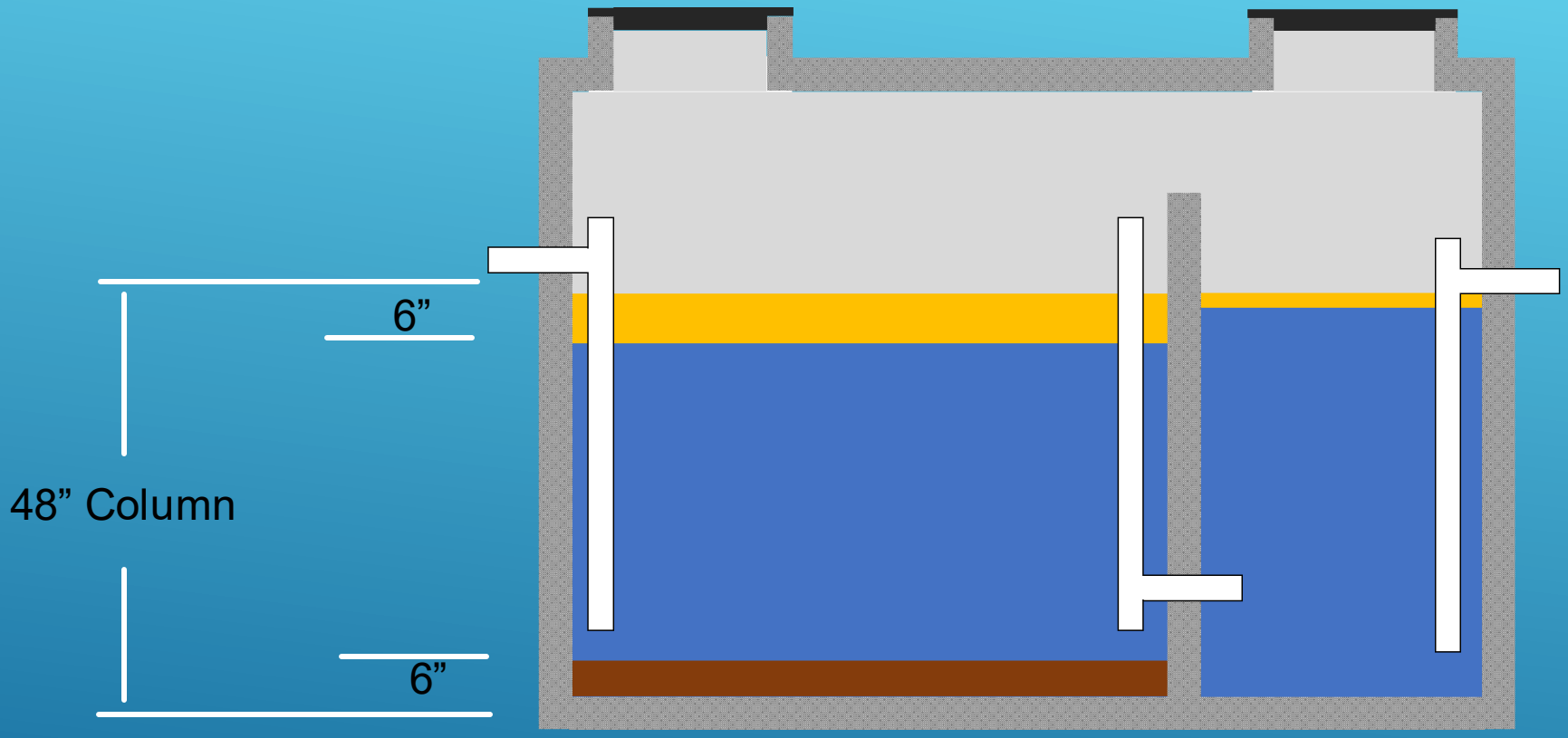
National Restaurant Association

Restaurant.org/FOG

# GRD OPERATION

When should you pump-out a GRD?

# How much FOG + Solids in a 1000 gal. GGI?




(FOG depth) / (total water column) x (total gallons) = gallons of FOG

(125 Gallons of FOG) x (7.3 lbs per gal.) = **912 lbs**

- Dip Stick Pro or Sludge Judge
- 25 % Rule:

  Measure depth of grease

  plus depth of solids

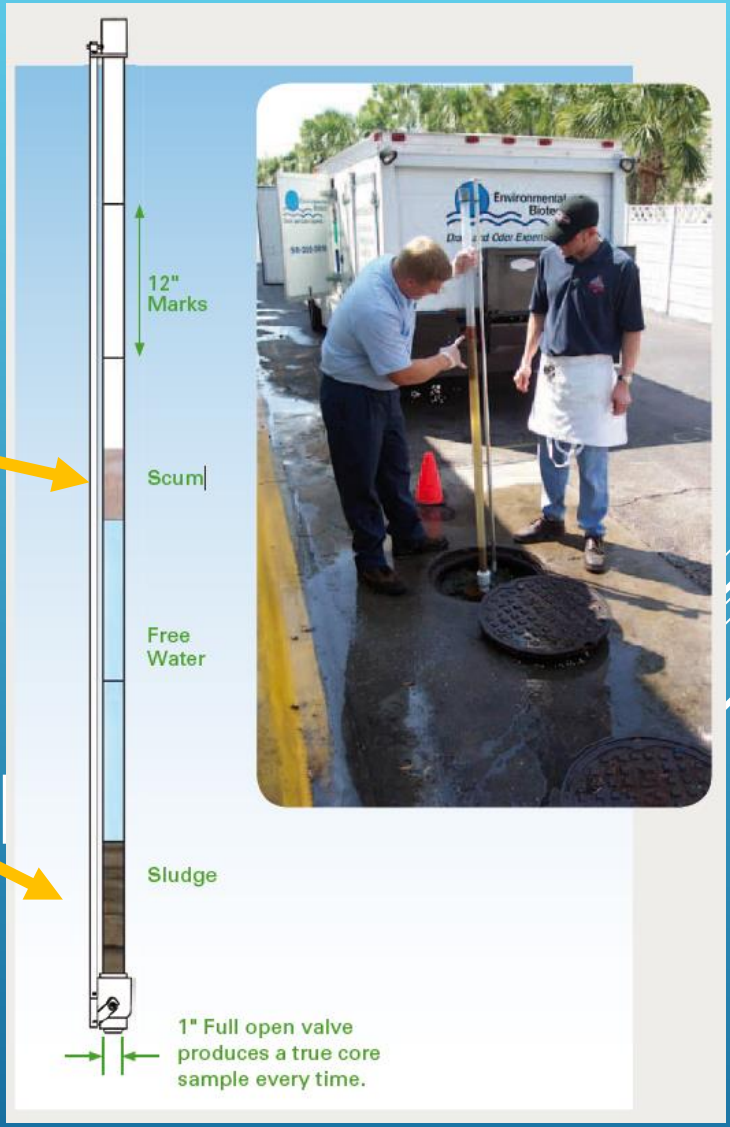
**Pump out if > 25 % of operating depth**

48" operating depth

6 " FOG + 12" solids = 18 "

(18 )x(100) / 48 " = 37.5 %

# HOW TO MEASURE THE DEPTH OF [redacted] AND SOLIDS



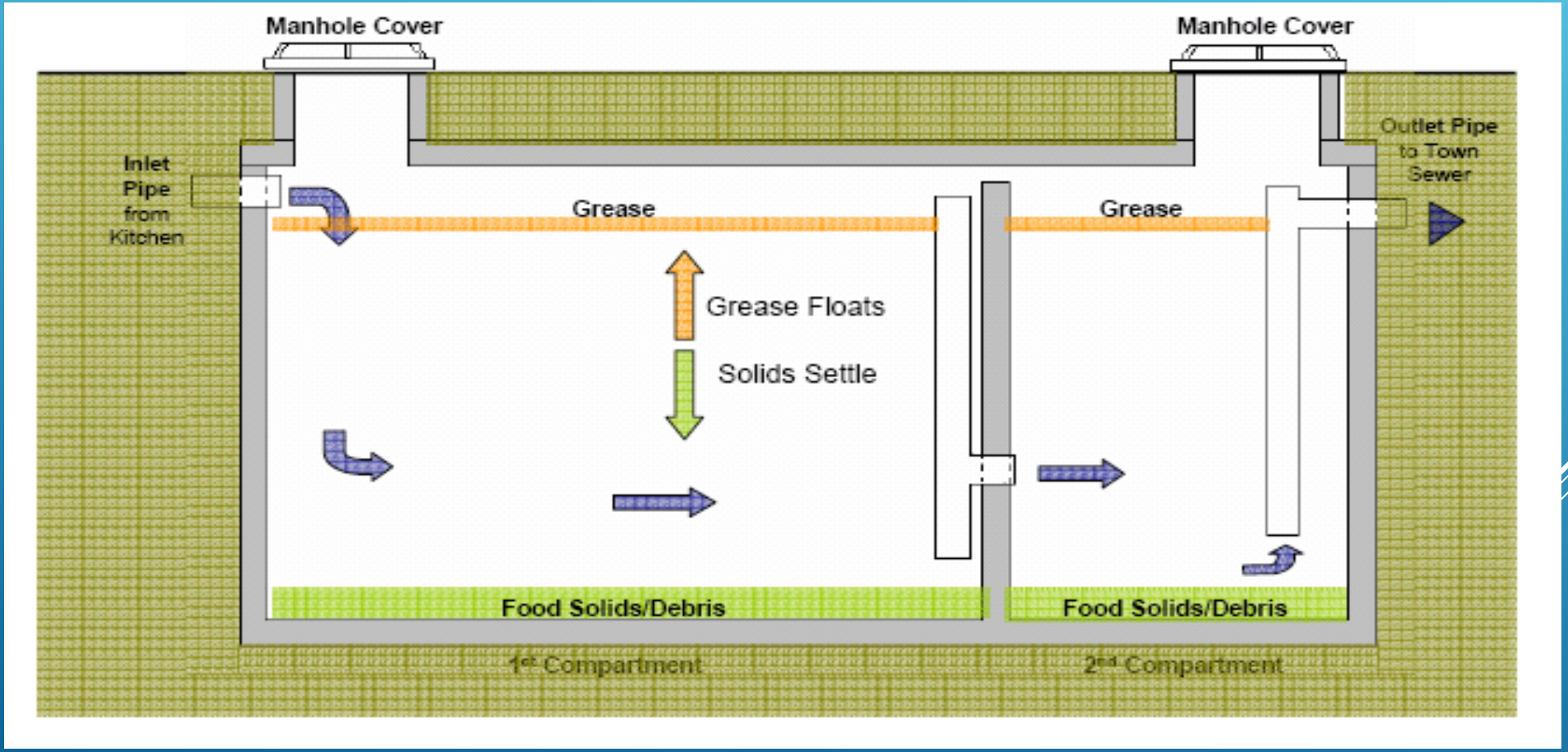

Courtesy Dip Stick

# AM-FOG PROBE

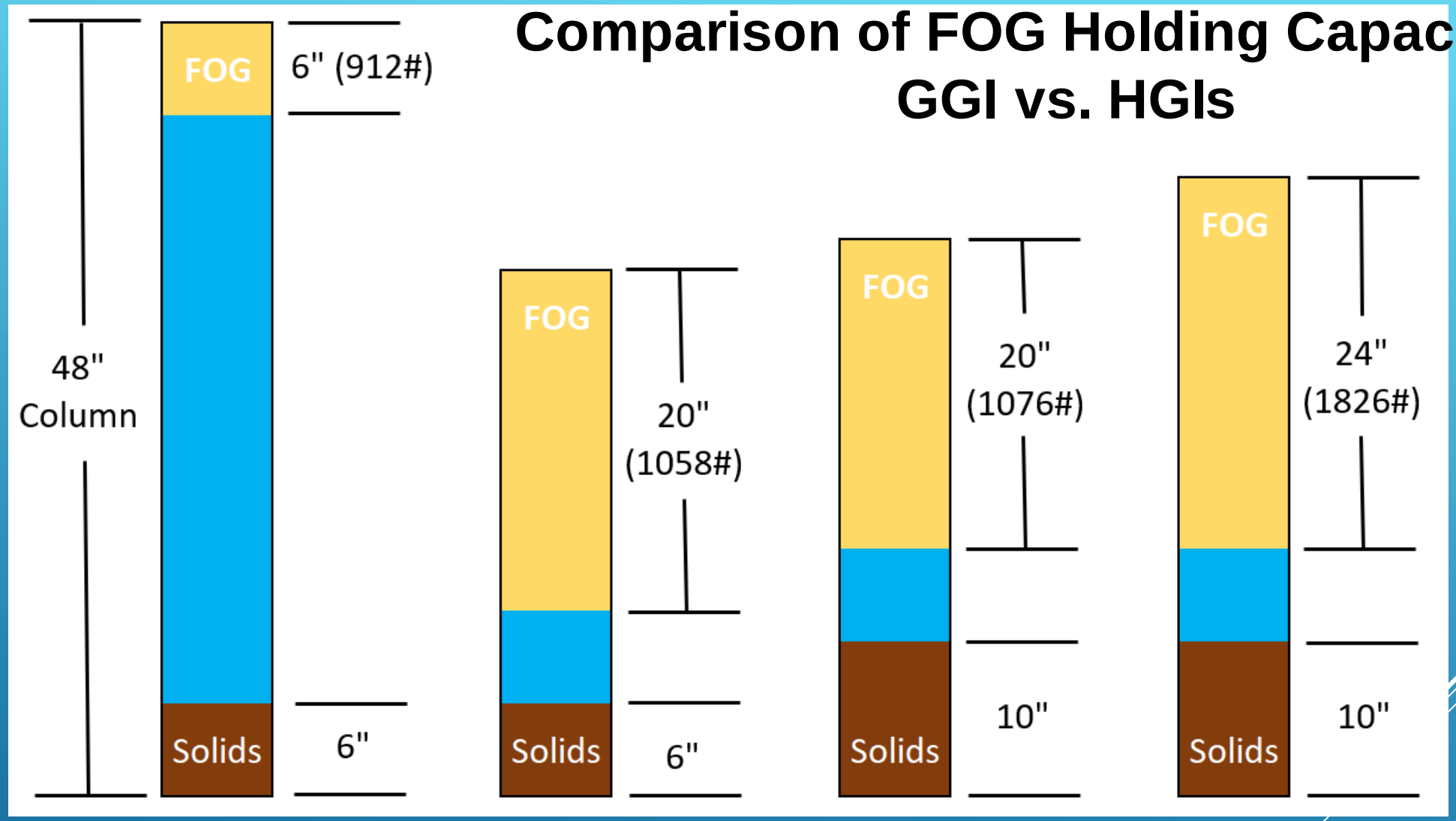

www.digitalfogprobe.com

# 25% RULE SAYS..

"When interceptor reaches 25% FOG/solids by volume, it's at capacity, and begins bypassing"



# Comparison of FOG Holding Capacities - GGI vs. HGIs




1000 gal.
GGI

Endura
XL 100

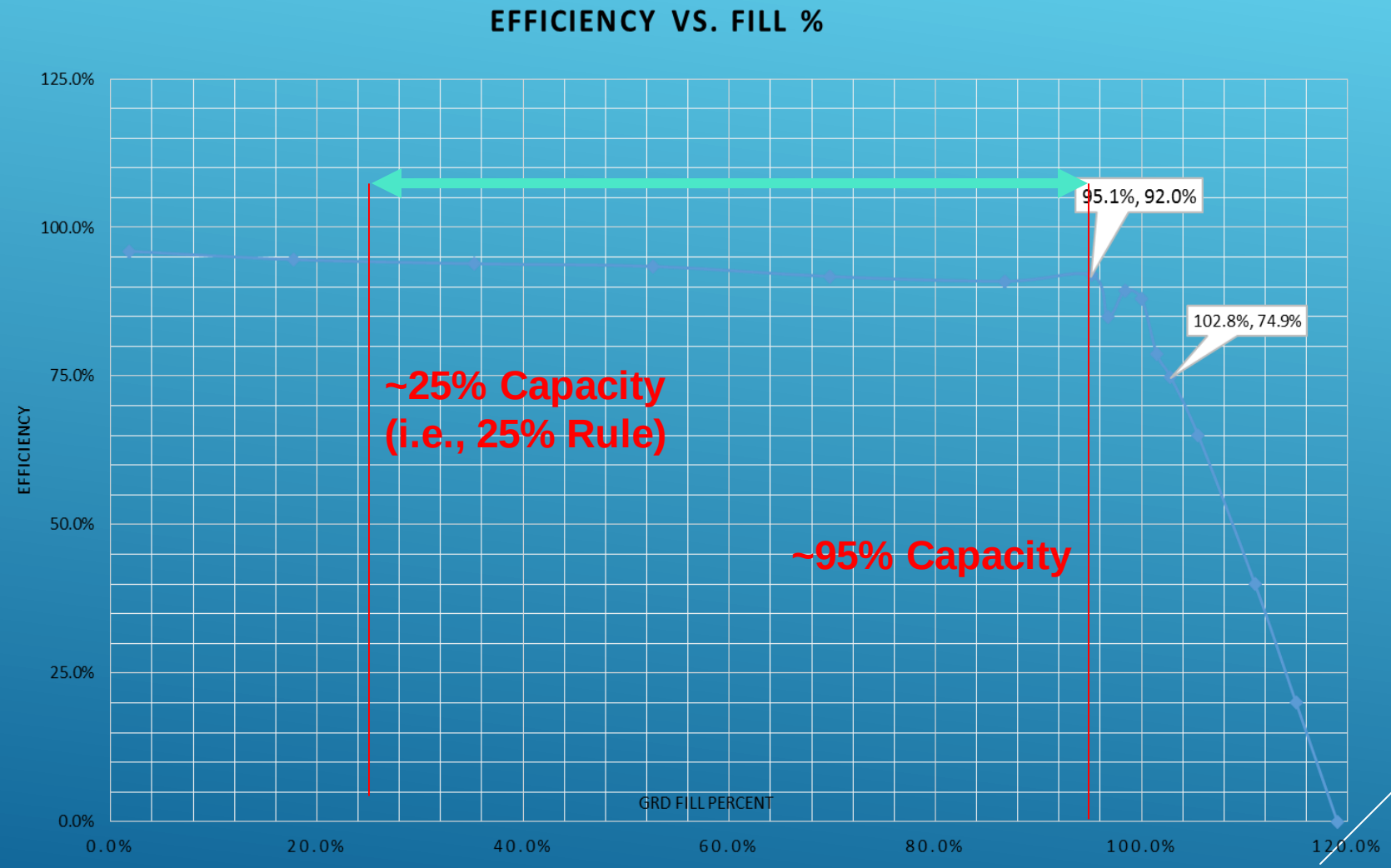
Great Basin
GB-250

Trapzilla

measurements calculated

# HGI EFFICIENCY TESTING RESULTS / FOG STORAGE CAPACITY

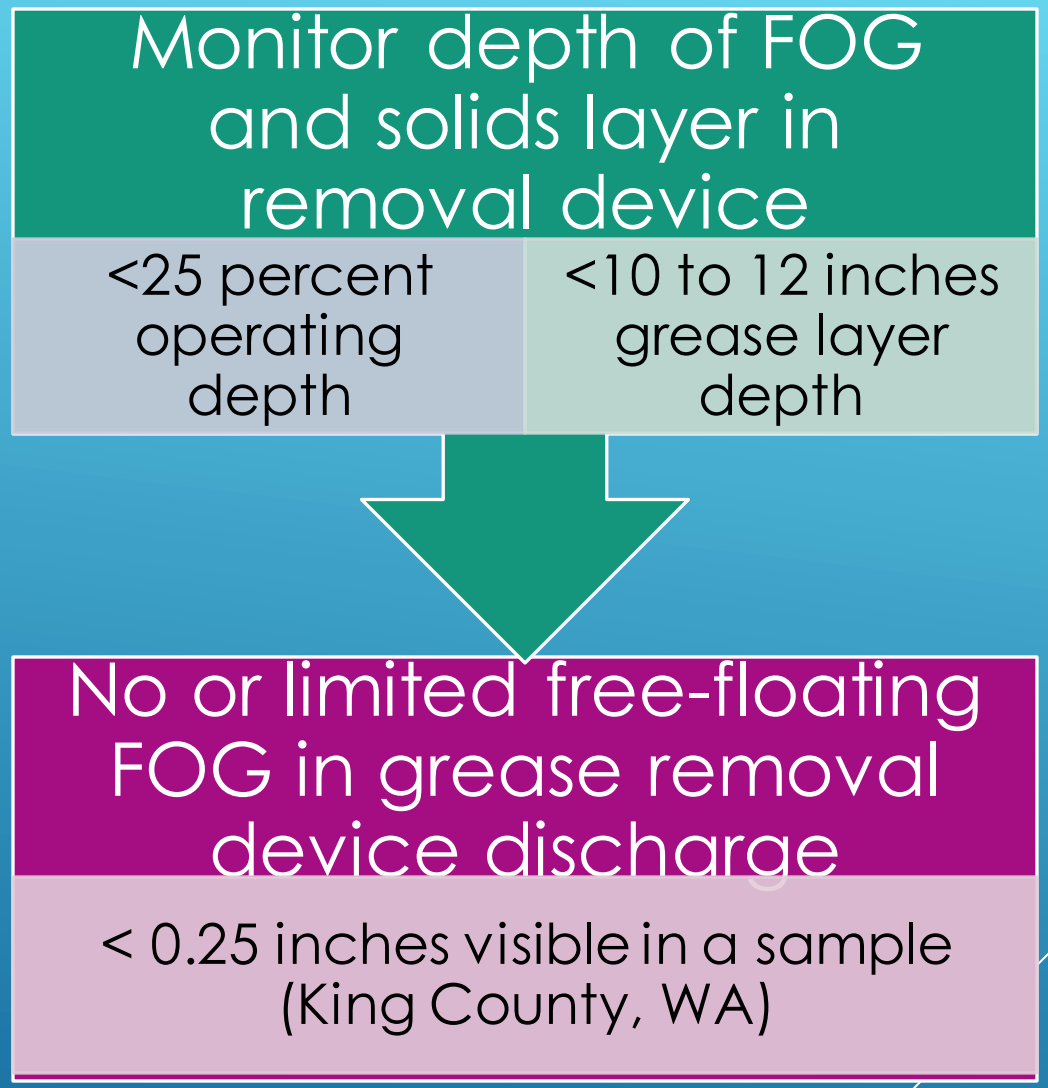
## 25% Rule applied to HGIs can cost FSEs excessive pump-out costs




EFFICIENCY PERCENT

HGI FILL PERCENT

# TYPICAL LIMITS



# TYPICAL FOG DISCHARGE NUMERIC LIMITS

100-600 mg/L

Common: 200 mg/L

pH ≥ 5.0 but < 12.0 standard units

Temperature: 85-140 °F

# CHALLENGES OF NUMERIC FOG LIMITS

**The time of day to sample a FSE is important**

## Oil & Grease Sampling
## O&G results

- Chinese Restaurant – open from 10am-10pm
  - 9:25 am 22 mg/L
  - 12:40 pm 530 mg/L
  - 3:30 pm 150 mg/L
- Cafeteria-American style food- open from 11am – 8pm
  - 11:00 am 60 mg/L
  - 12:50 pm 390 mg/L
  - 1:30 pm 230 mg/L
  - 2:45 pm 340 mg/L

# CHALLENGES OF NUMERIC FOG LIMITS

**The time of day to sample a FSE is important**

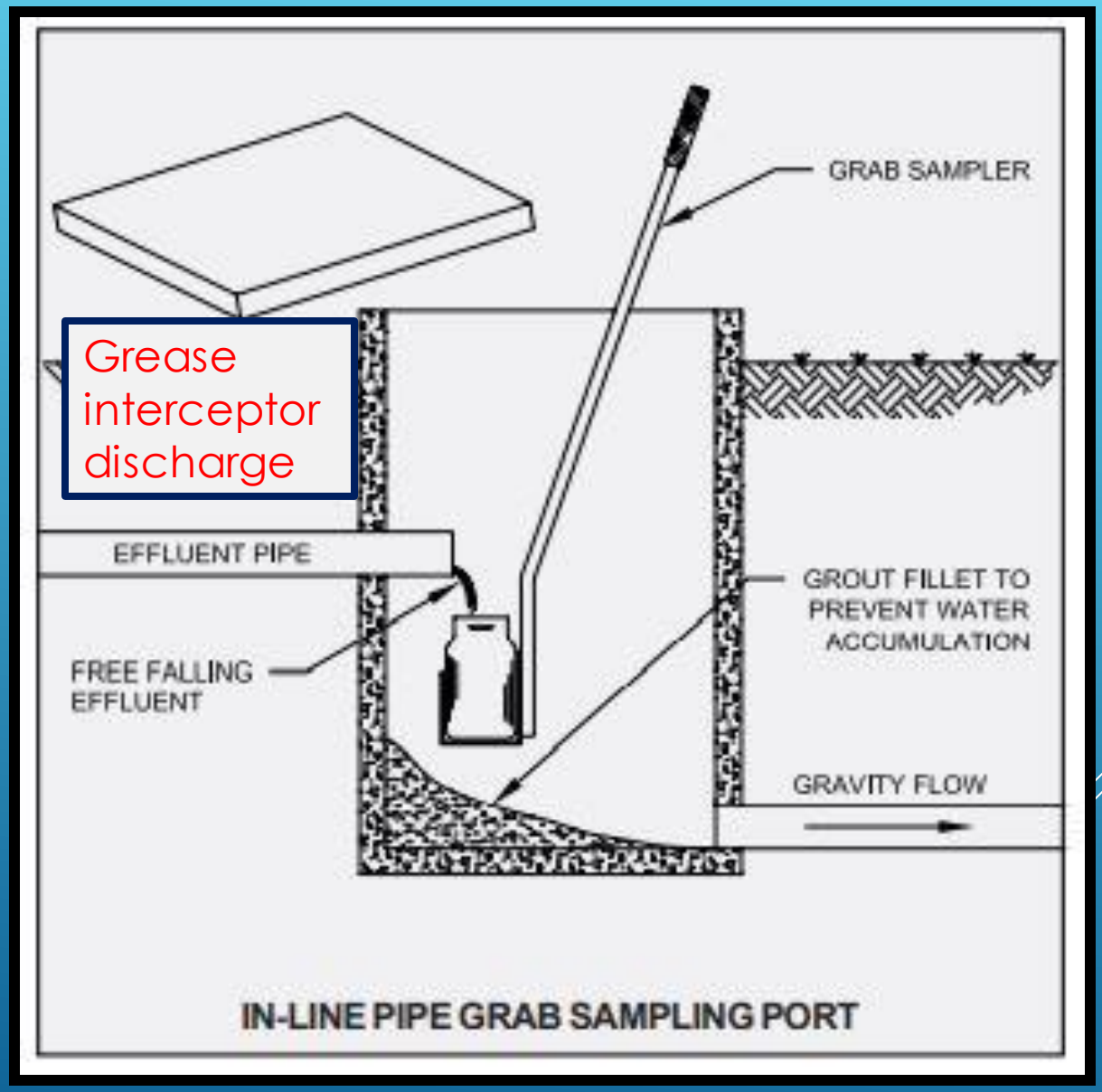
## Oil & Grease Sampling
## O&G results

- American Style Food Full Service- 7am to 4pm
  - 8:00 am 68 mg/L
  - 10:45 am 320 mg/L
  - 12:30 pm 305 mg/L
  - 3:15 pm 270 mg/L
  - 5:15 pm 80 mg/L (after clean up)

# SAMPLING FOR NUMERIC FOG LIMITS

**Sample Location**

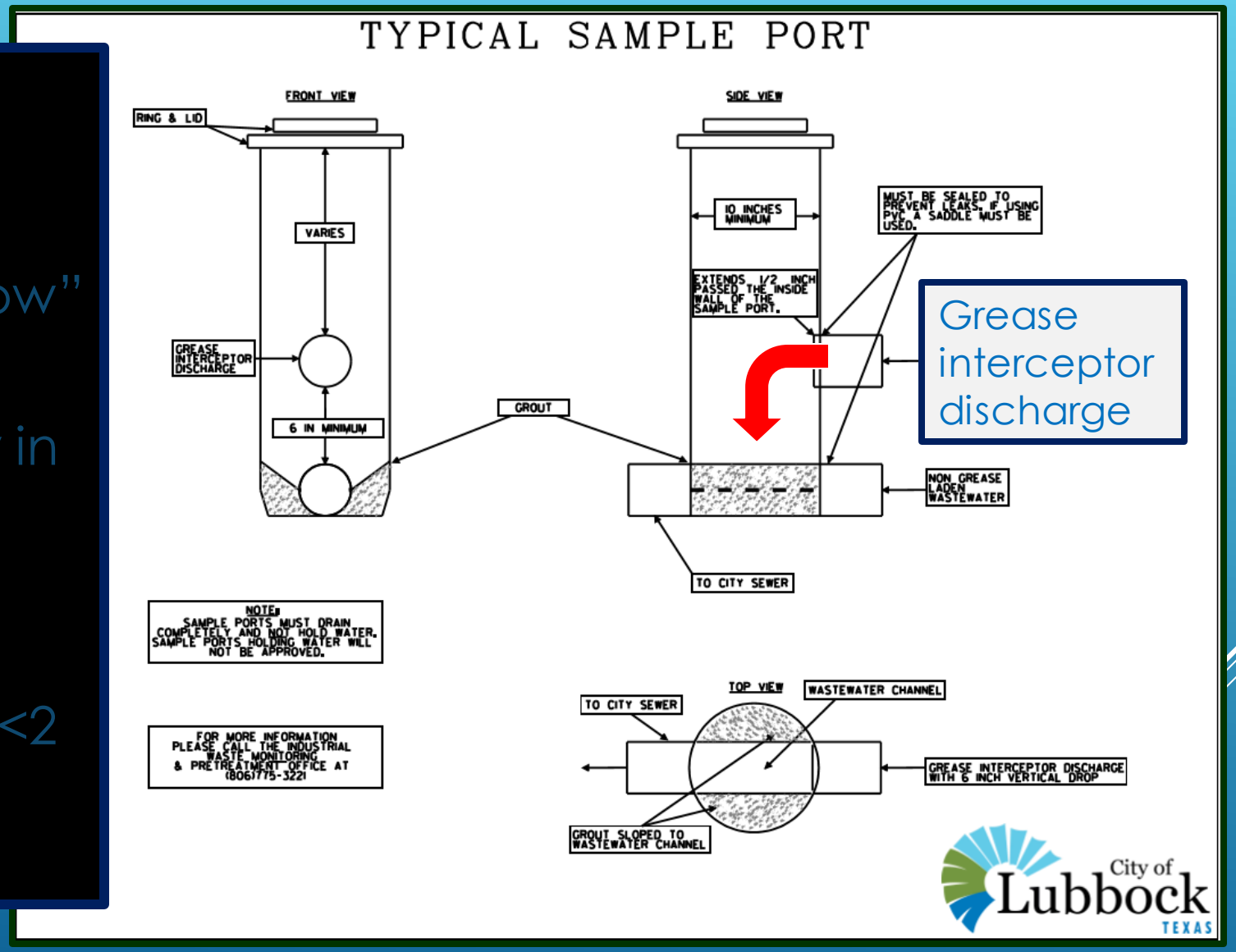
- GRD effluent
- Need to collect "free-flow" grab sample
- Collect directly in clean, wide-mouth glass container
- Acidified to pH<2



# REPRESENTATIVE FOG SAMPLES

## Sample Location

- Need a port to collect "free-flow" sample
- Collect directly in clean, wide-mouth glass container
- Acidified to pH<2



# FOG LIMIT PROS & CONS

- Used for surcharge of high-strength wastewater
- Minimizing FOG accumulations
- Minimize collection system maintenance
- Minimizing SSOs
- Determine when GRDs performance
- Determine when GRDs need to be pumped out
- Determine program effectiveness

- Hard to collect "representative" sample without a sample port
- Grab samples reflects FOG concentration at the time of sampling
- Hard to duplicate sample results on split samples
- Increased monitoring costs

Ed Gilmore

11 years Restaurant Owner

20 years, Source Control Specialist, Clackamas County, Oregon
Industrial Pretreatment, FOG, P2 and Septage programs

Currently Trainer, Western States Alliance, PPRC

Bachelor of Science, Biochemistry, Portland State University

# FSE INSPECTIONS

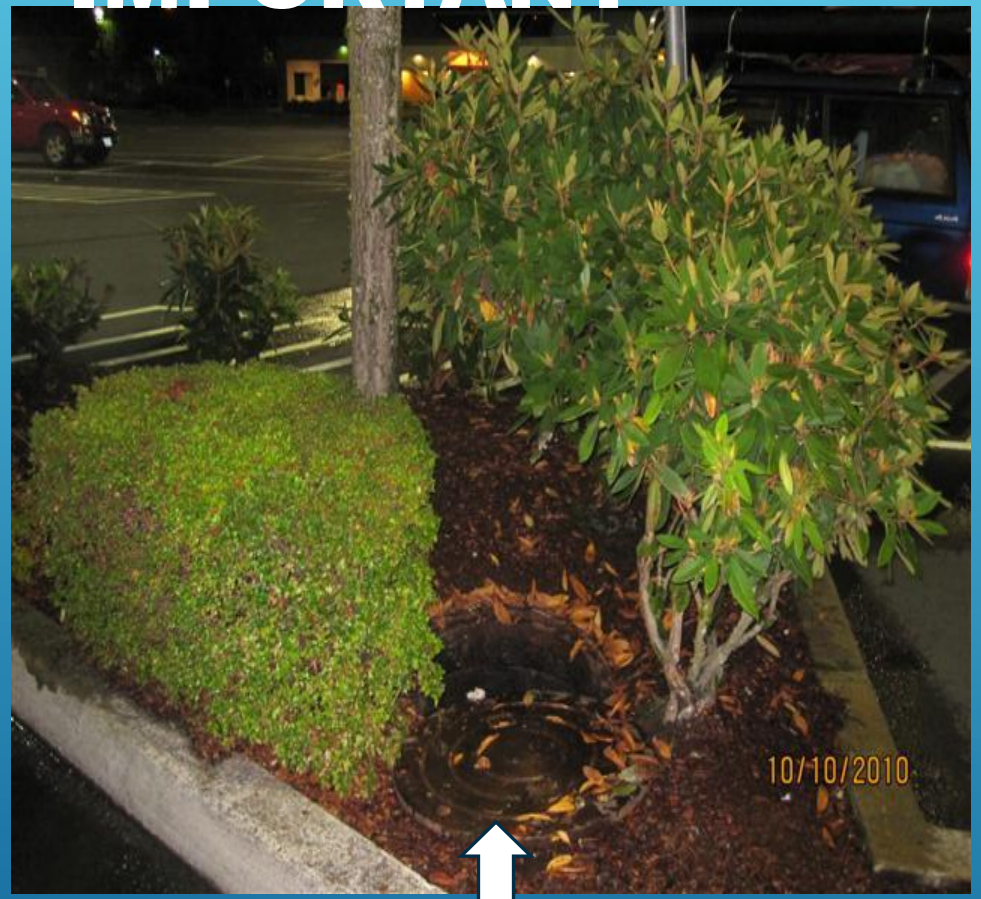
# INSPECT THE FOOD SERVICE ESTABLISHMENT

- Walk Through the Facility
- Identify Where the Grease Removal Device (GRD) is
  - *It's a Different Plan if there is NO GRD*
- Find Out What Fixtures are Connected to the GRD
- What is the Condition of the GRD
- How Often is the GRD Pumped
- Establish a Pump Out Schedule

# WHAT TO LOOK FOR DURING AN INSPECTION…

- Is the entire kitchen area plumbed to a Grease Removal device?
- Are all fixtures properly plumbed/connected?
- Is everything in proper working order?

# GREASE INTERCEPTOR LOCATION IS VERY IMPORTANT




**Where's the accessibility to PRESSURE WASH**

**What are the chances of REGULAR CLEANING**

# WHICH FIXTURES PRODUCE GREASE IN QUANTITIES THAT CAN AFFECT LINE STOPPAGE?


Floor Sink drain used as a condensate drain

# All drains are being impacted

Deck Wash at the end of the day

Handwash Sink

Floor drain

# WHAT'S HAPPENING OUTSIDE THE INTERCEPTOR ?

Western States Alliance

# You Can See The FOG Going Down The Drain?

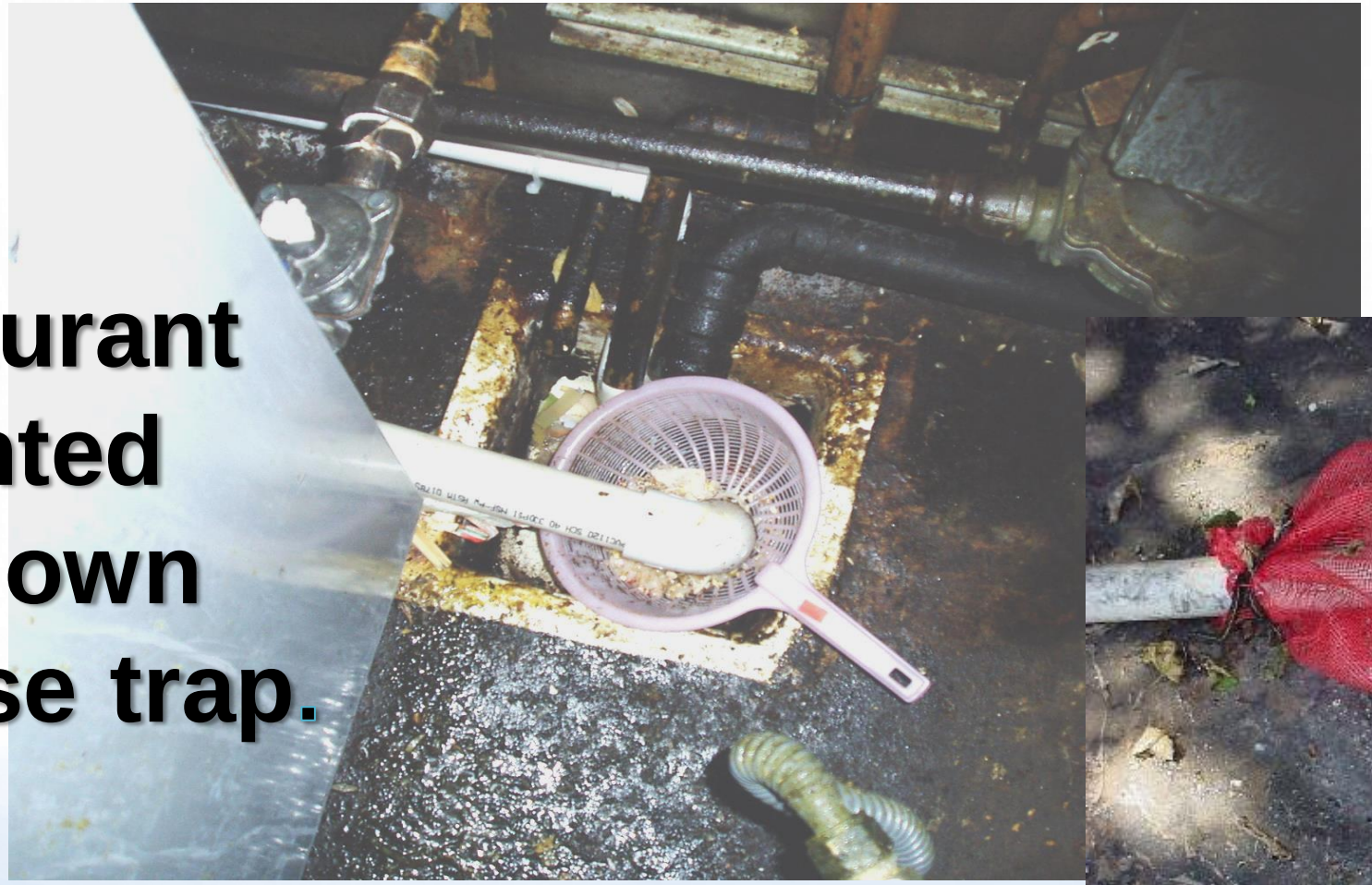



SEP 29 2004
Always check the plumbing


PLUMBING CODE REQUIRES THESE BE ACCESSIBLE
BUT REALLY YOU NEED TO BE A PLUMBER AND
MECHANIC TO OPEN SOME OF THESE.


“We have never dumped grease down the drain.”

This restaurant invented their own grease trap.



# WHAT ABOUT DISHWASHERS AND FOOD WASTE DISPOSAL UNIT CONNECTIONS?

**2018 & 2021 International Plumbing Codes (IPC):**

**1003.3.1 Grease interceptors and automatic grease removal devices required**

A grease interceptor or automatic grease removal device shall be required to receive the drainage from fixtures and equipment with grease laden waste located in food preparation areas, such as in restaurants; hotel kitchens; hospitals; school kitchens; bars; factory cafeterias and clubs. Fixtures and equipment shall include pot sink; prerinse sinks; soup kettles, or similar devices; wok stations; floor drains or sinks into which kettles are drained; automatic hood wash units; and dishwashers without prerinse sinks.

**1003.3.2 Food waste disposers restrictions**

A food waste disposer shall not discharge to a grease interceptor.

**2018 & 2021 Uniform Plumbing Codes (UPC):**

**1014.1.3 Food waste disposers and dishwashers**

No food waste disposer or dishwasher shall be connected to or discharge into a grease interceptor. Commercial food waste disposers shall be permitted to discharge directly into the building's drainage system.

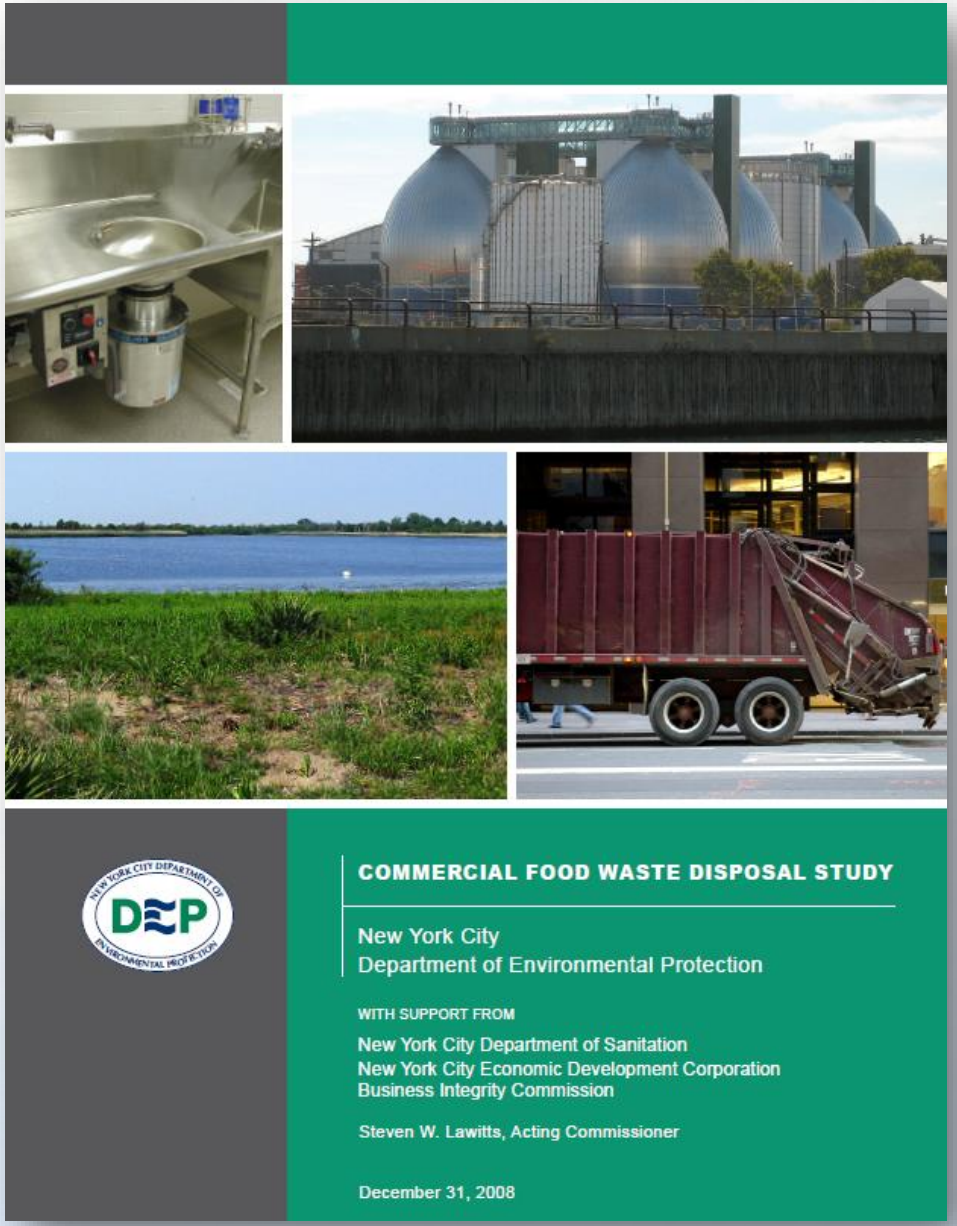
Exception: Food waste disposers shall be permitted to discharge into grease interceptors that are designed to receive the discharge of food waste.

# Down The Dishwasher Drain

# There Goes The FOG!!!


**First Cycle from the Dishwasher**

# FOG LOADING FROM FOOD WASTE DISPOSAL UNITS



# FOOD WASTE DISPOSAL STUDY

Food waste before grinding

Food waste after grinding

EPA METHOD1664 LABORATORY RESULTS FOR FSES (ALL TYPES)

- RANGE: 6 TO 10 G/KG FOOD WASTE

Source: NYCDEP Commercial Food Waste Disposal Study 2008

# FSE SAMPLING FOR FOG LOADING FROM FOOD WASTE DISPOSAL UNITS

| Category | No. of Samples | 1664 Oil and Grease (g/kg food waste) |
|---|---|---|
| Colleges and Universities | 15 | 14.83 |
| Medical Facilities | 32 | 1.03 |
| Retail Food Establishments (supermarkets) | 29 | 6.16 |
| Restaurants and hotels | 61 | 18.59 |
| Other FSEs (caterers, shelters, non-public schools, and senior centers) | 35 | 18.21 |

| Category | No. of Samples | 1664 Oil and Grease (mg/L food waste) |
|---|---|---|
| Colleges and Universities | 15 | 14830 |
| Medical Facilities | 32 | 1030 |
| Retail Food Establishments (supermarkets) | 29 | 6160 |
| Restaurants and hotels | 61 | 18590 |
| Other FSEs (caterers, shelters, non-public schools, and senior centers) | 35 | 18210 |

# Hood and Vent Hood Cleaning




# Roof Top Exhaust



Public Sewer


3 Comp Sink

# INSPECTION PORT

# How Many Backups?

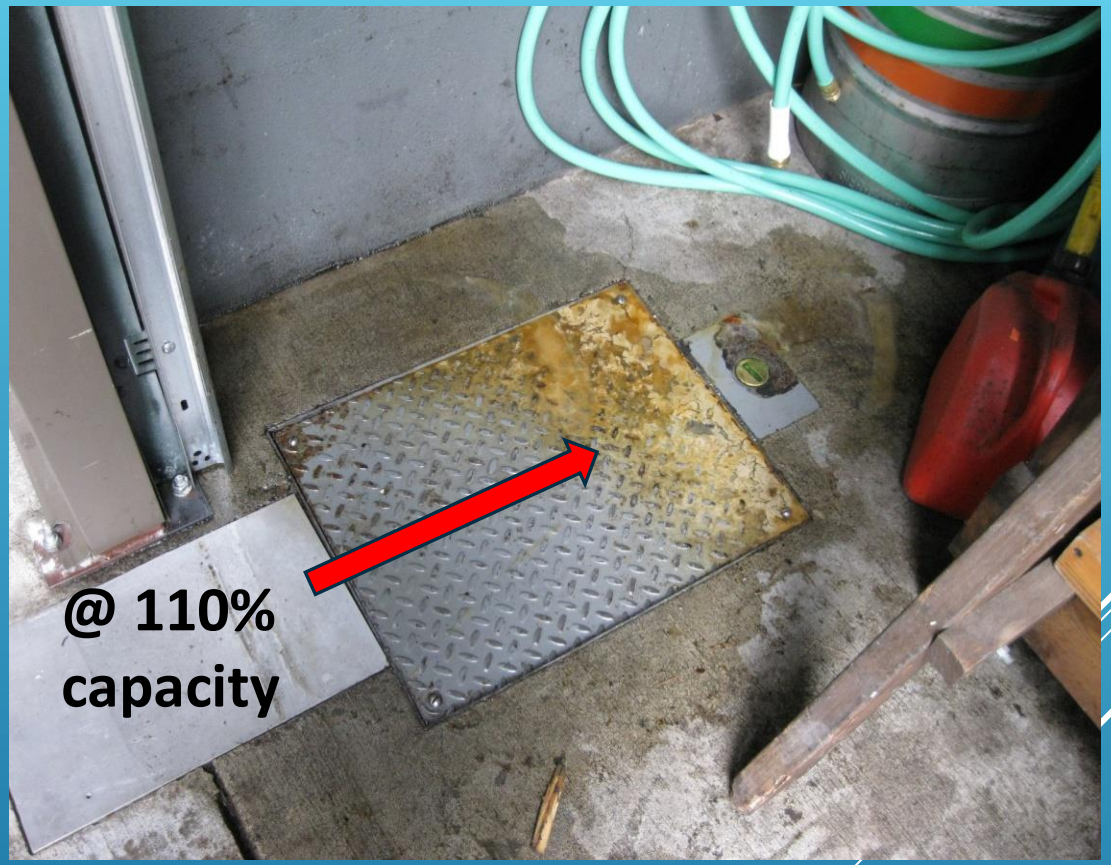
# PATRICK BRYAN, PPRC FOG TRAINER AND TECHNICAL PROGRAM MANAGER

*Stanislaus County, Hazardous Materials Inspector*
*County Of Fresno, NPDES Inspector*
*Municipal Interagency Training Coordinator*

- EXPERIENCE SERVING AS A WASTEWATER AND STORM WATER INSPECTOR FROM THE COUNTY OF FRESNO, CALIFORNIA.
- BACKGROUND IN COMMERCIAL AND DEVELOPMENT PROGRAMS PATRICK UNDERSTANDS THE DISCONNECT THAT CAN OCCUR BETWEEN THE COMMUNITIES WE SERVE SUCH AS FOOD SERVICE ESTABLISHMENT'S (FSES), OTHER REGULATORY INSPECTORS/PROGRAMS AND WITHIN OUR OWN AGENCIES.
- BUILDING RELATIONSHIPS WITH INTERNAL DEPARTMENTS AND PRIVATE STAKEHOLDERS IS ESSENTIAL FOR A SUCCESSFUL FOG PROGRAM.

# HOW HARD DO WE MAKE IT TO SERVICE?

# Current FOG Abatement


- Not all Food Service fixtures/drains connected
- Grease interceptor not serviced until drains plug

# WHAT'S WRONG WITH THESE DEVICES?



## 13 months in service

Inaccessibility for maintenance & inspection

- Problem for plastic as well as fiber glass models


# Do the Photos Demonstrate FOG bypass



WSA
a project of pprc.org



## Cacaklacks & Zeeks - (2 of 4 kitchens coming on board)

- High food production
- No ware washing, only 3comps, Handwash (s) , Foodprep (s), floor drain (s)
- Plumbing Engineer's design - anticipated 30 days (Regulatory Frequency 20 days)

- Heavy food production
- Expecting to take over sales from Wilsonville & Beaverton
- Plumbing Engineer's design - anticipated 90 days

(1st spec 1000 gallon)


## 22 days in service


## 43 days in service


**Do these Photos Demonstrate FOG Compliance?**

# HOW DO YOU MISS THIS!

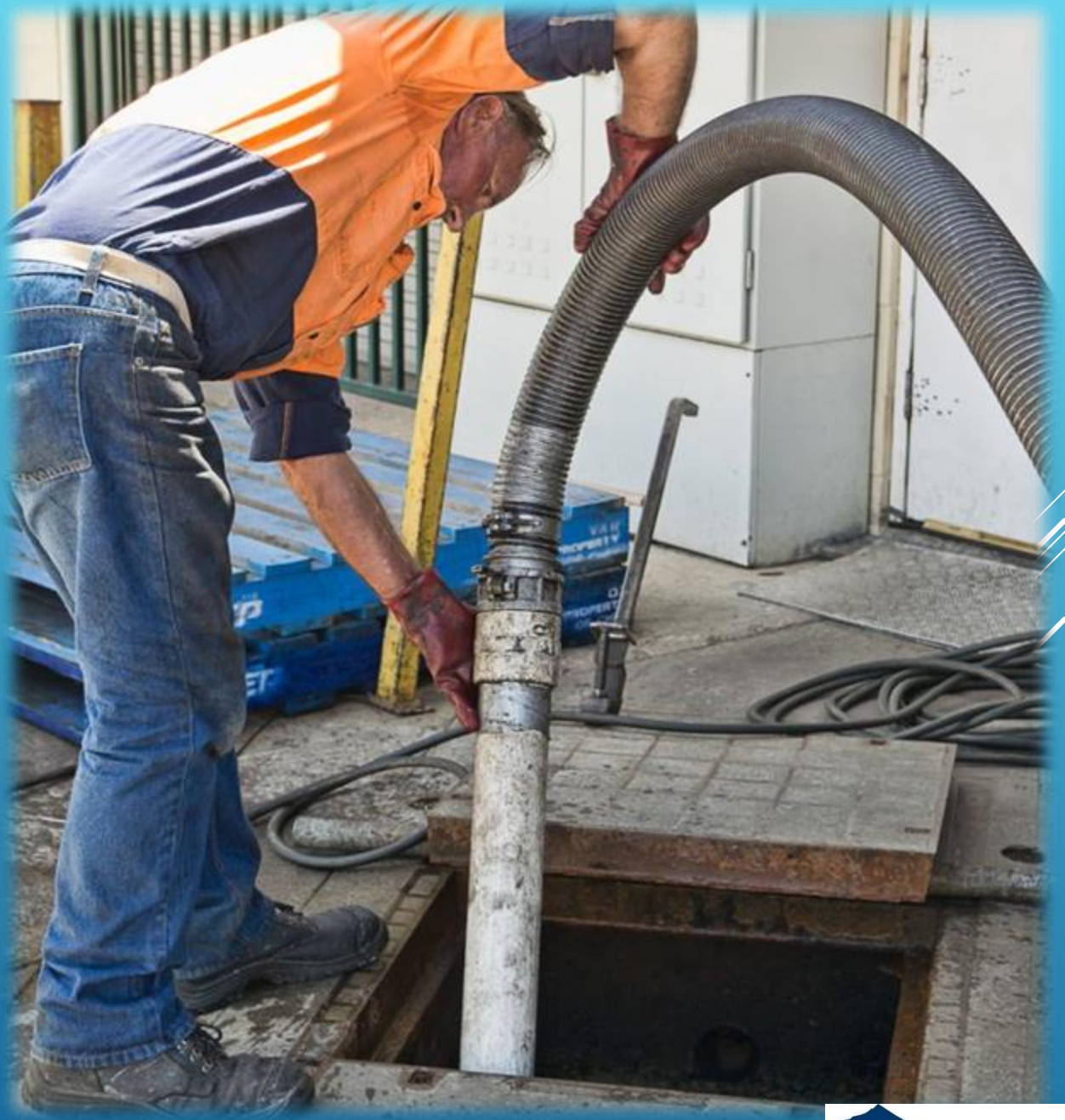


**If I Can See It, You MISSED IT...**

# HOW DO YOU MISS THIS!

# Grease Pumpers and the Preferred Pumper Program

# PUMPING GREASE IS HARD WORK!



# WHAT ABOUT THE SELF-CLEANERS?

# PREFERRED PUMPER PROGRAM

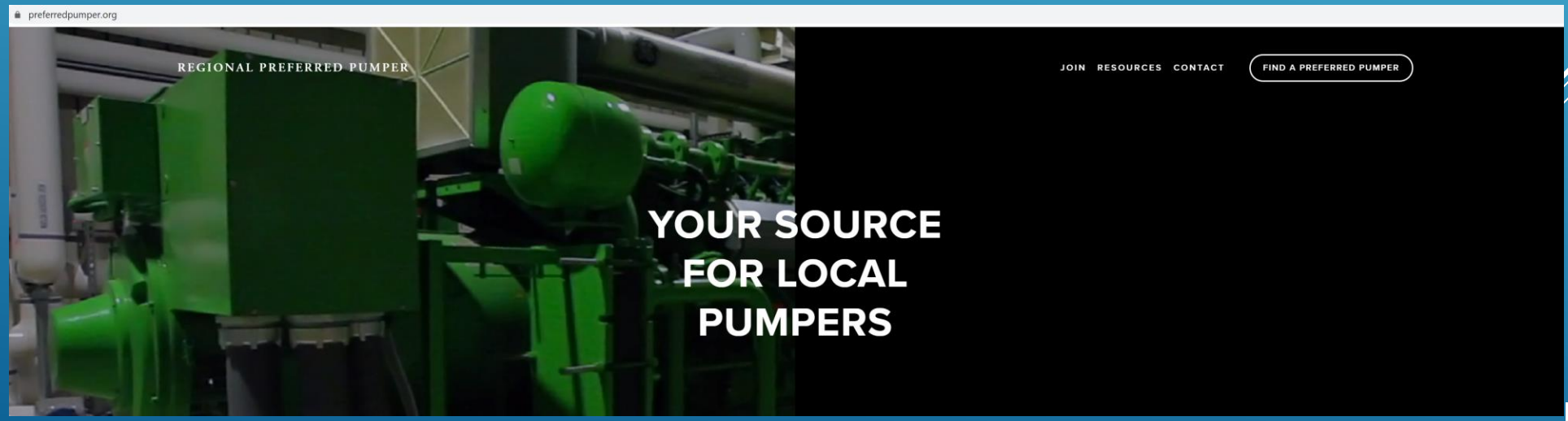
The Preferred Pumper Program (PPP) is an alliance of pumper companies working with local sewer agencies to establish standards of cleaning and reporting procedures for grease interceptors.

The developed criteria encourages effective maintenance, which extends the life of pretreatment equipment, helps prevent building sewer backups and helps promote compliance with local sewer use ordinances.

WSA
a project of pprc.org

# PREFERRED PUMPER STANDARDS

- Follows approved best practices for interceptor service
- Submits schedule of interceptor maintenance to sewer agency seven days in advance
- Submits FOG pump-out reports to sewer agency within 10 days of pump-out
- www.preferredpumper.org




WSA
a project of pprc.org

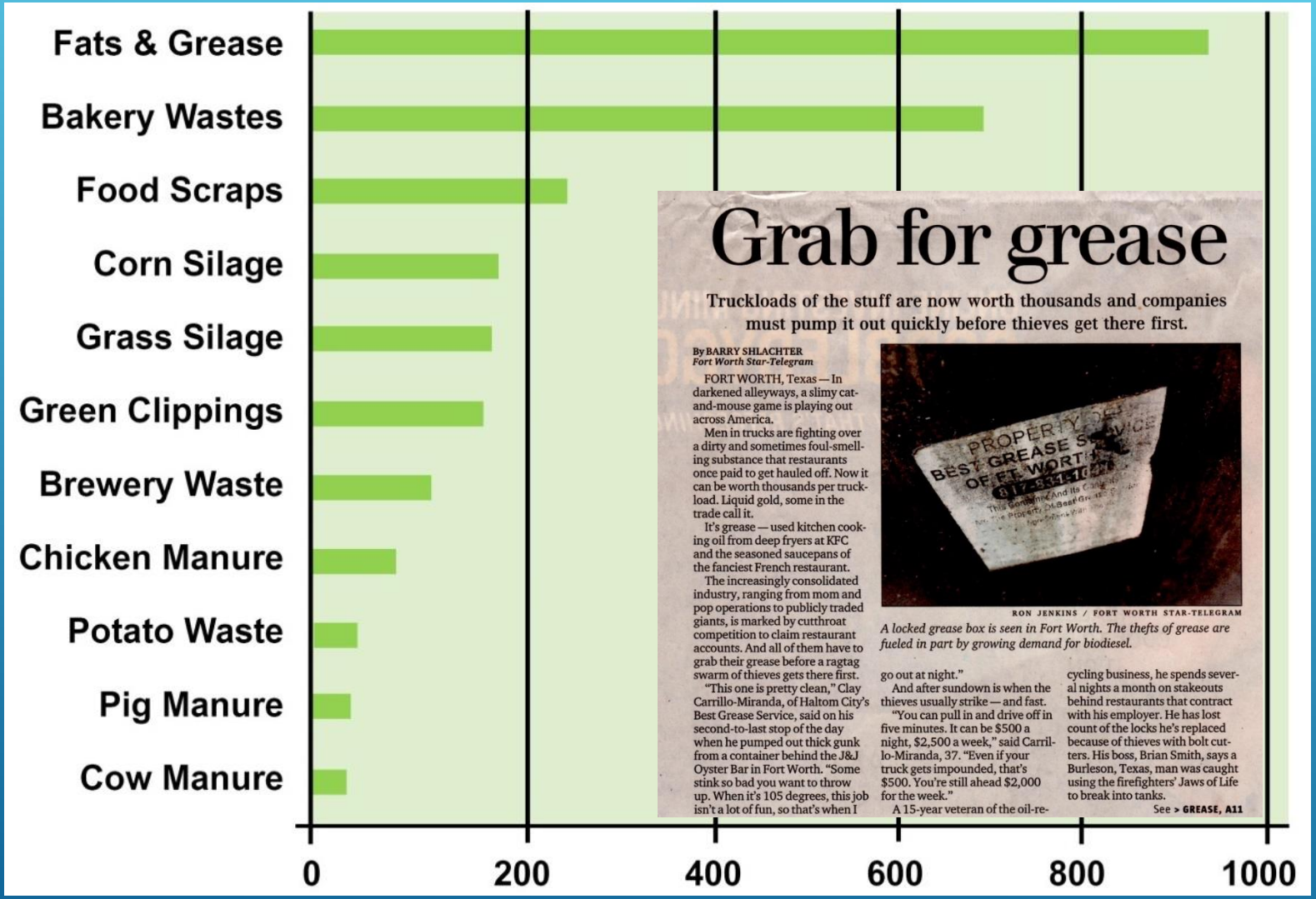
# PREFERRED PUMPER TRAINING AND OUTREACH

- Worked with pumpers to develop best maintenance standards
- Published standards on the Preferred Pumper web site
- Meet with individual pumpers on a rotating basis during municipal monthly meetings
- Provide training to new pumpers

# MUNICIPAL STANDARDS

- Follows up with FSE if pumper notes a deficiency in a pump-out report
- When a deficiency is noted, FOG inspector coordinates with pumper and FSE manager to be on-site at next pump-out to verify deficiency
- Participates in regional Preferred Pumper meetings to keep informed and provide assistance to other municipal members
- www.preferredpumper.org

# YELLOW GREASE AS A COMMODITY




## Grab for grease

**Truckloads of the stuff are now worth thousands and companies must pump it out quickly before thieves get there first.**

By BARRY SHLACHTER
*Fort Worth Star-Telegram*

FORT WORTH, Texas — In darkened alleyways, a slimy cat-and-mouse game is playing out across America.

Men in trucks are fighting over a dirty and sometimes foul-smelling substance that restaurants once paid to get hauled off. Now it can be worth thousands per truckload. Liquid gold, some in the trade call it.

It's grease — used kitchen cooking oil from deep fryers at KFC and the seasoned saucepans of the fanciest French restaurant.

The increasingly consolidated industry, ranging from mom and pop operations to publicly traded giants, is marked by cutthroat competition to claim restaurant accounts. And all of them have to grab their grease before a ragtag swarm of thieves gets there first.

"This one is pretty clean," Clay Carrillo-Miranda, of Haltom City's Best Grease Service, said on his second-to-last stop of the day when he pumped out thick gunk from a container behind the J&J Oyster Bar in Fort Worth. "Some stink so bad you want to throw up. When it's 105 degrees, this job isn't a lot of fun, so that's when I go out at night."




RON JENKINS / FORT WORTH STAR-TELEGRAM

*A locked grease box is seen in Fort Worth. The thefts of grease are fueled in part by growing demand for biodiesel.*

And after sundown is when the thieves usually strike — and fast.

"You can pull in and drive off in five minutes. It can be $500 a night, $2,500 a week," said Carrillo-Miranda, 37. "Even if your truck gets impounded, that's $500. You're still ahead $2,000 for the week."

A 15-year veteran of the oil-recycling business, he spends several nights a month on stakeouts behind restaurants that contract with his employer. He has lost count of the locks he's replaced because of thieves with bolt cutters. His boss, Brian Smith, says a Burleson, Texas, man was caught using the firefighters' Jaws of Life to break into tanks.

See > GREASE, A11

**PRICE AS OF Nov 3, 2023**
**40¢ - 50¢ PER POUND**

WSA
a project of pprc.org

# GRESHAM WWTP
# ANAEROBIC DIGESTER
# FOG RECEIVING STATION



## Grease-Zilla Turn-key FOG-to-Energy System Scalable for WWTP with anaerobic digester

WSA
a project of pprc.org

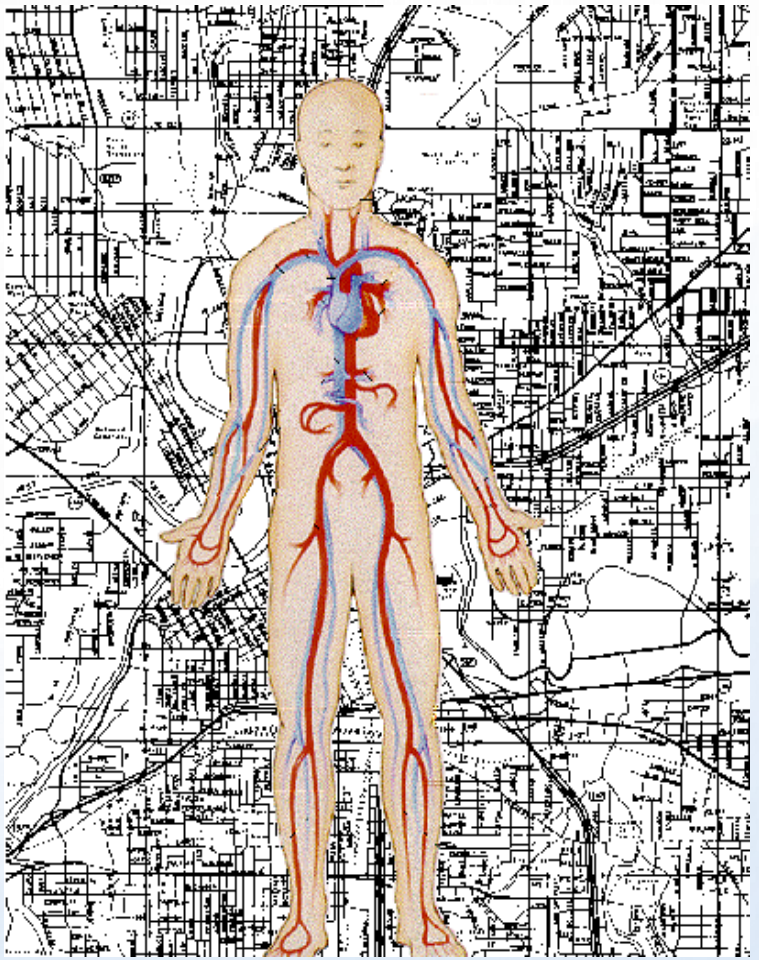
# GREASE IS LIKE CHOLESTEROL

CITIES HAVE BEEN ON A HIGH FAT DIET FOR FAR TOO LONG.

WE HAVE BLOCKED ARTERIES.

CITIES HAVE SPENT MILLIONS ON ANGIOPLASTY.

CITIES SPEND MILLIONS EVERY YEAR TO COMBAT THE ONGOING PROBLEM.



**If we don't change our diet and follow an exercise program, the problem <u>will</u> persist.**

# FOG-Related Questions

???

WSA
a project of pprc.org

Ed Gilmore

11 years Restaurant Owner

20 years, Source Control Specialist, Clackamas County, Oregon
Industrial Pretreatment, FOG, P2 and Septage programs

Currently Trainer, Western States Alliance, PPRC

Bachelor of Science, Biochemistry, Portland State University

# CONTAMINANTS OF EMERGING CONCERN (CEC) AND PUBLICLY OWNED TREATMENT WORKS (POTWS)

# WHAT ARE CONTAMINANTS OF EMERGING CONCERN?

- Contaminants of emerging concern are chemicals and toxics found in waterbodies that may cause ecological or human health impacts and they are not currently regulated.
- Treatment plants cannot always remove these contaminants.
- Cleaner raw water = lower treatment costs and fewer public health risks


westernstatesalliance.org/emergingcontaminants

# AFTER ATTENDING THIS SESSION, YOU WILL:

1. Understand the public health and environmental concerns of CECs
2. Understand the connection between indoor CEC use, pathways to the sewer, and subsequent impacts to your agency
3. Have thorough information about specific CECs:
   - unwanted/expired pharmaceuticals
   - pesticides
   - fluorinated compounds (PFAS)

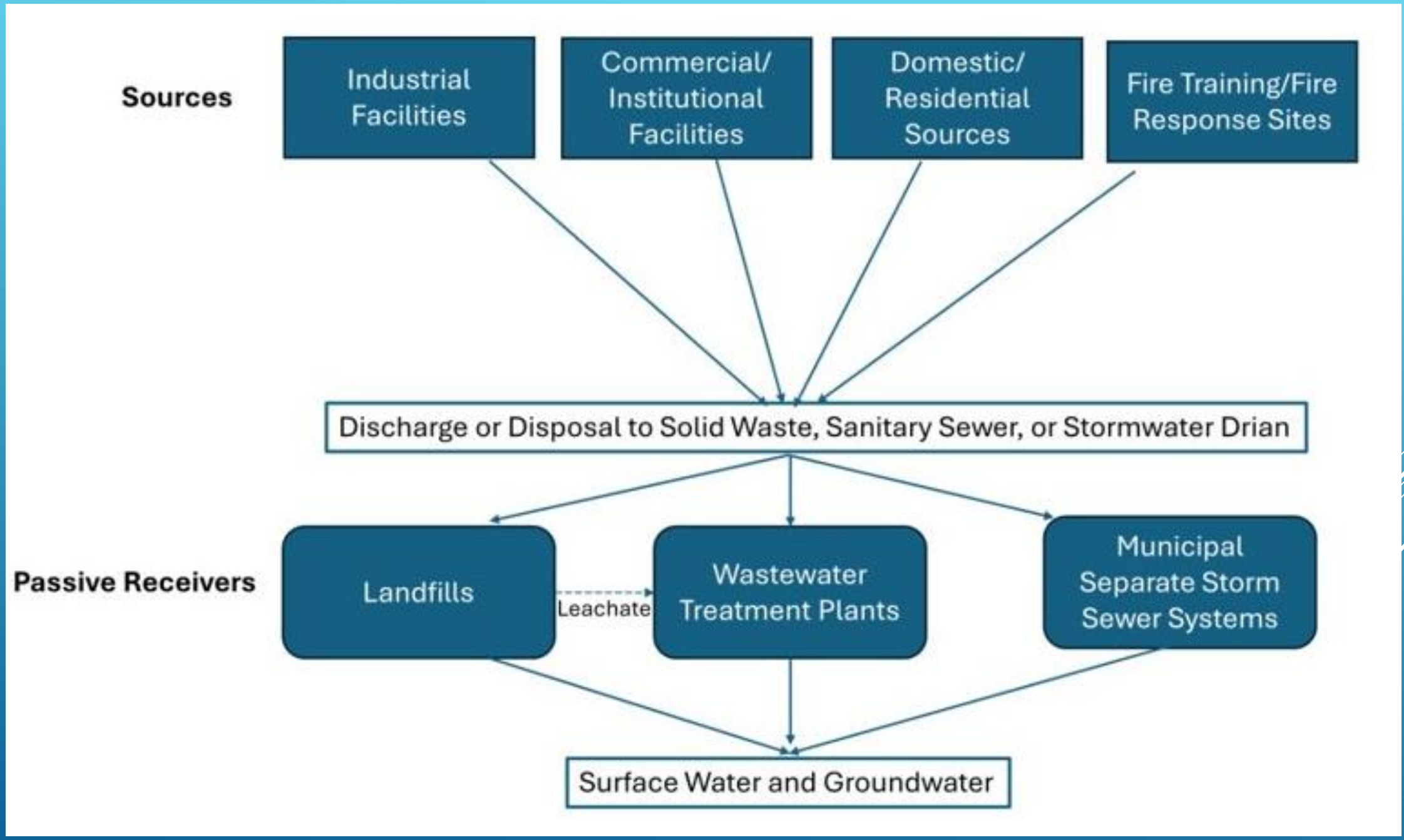
# CECS INCLUDE CHEMICALS THAT MIGHT NOT BE COMPLETELY TREATED OR DESTROYED AT YOUR POTW

Example classes that might not be completely treated or destroyed

- Heavy metals
- Pharmaceuticals
- Pesticides
- Ortho-Phthalates
- Halogenated compounds
  - Brominated fire retardants
  - Fluorinated nonstick and water-repellent products (PFAS)

Types of ecosystem harm

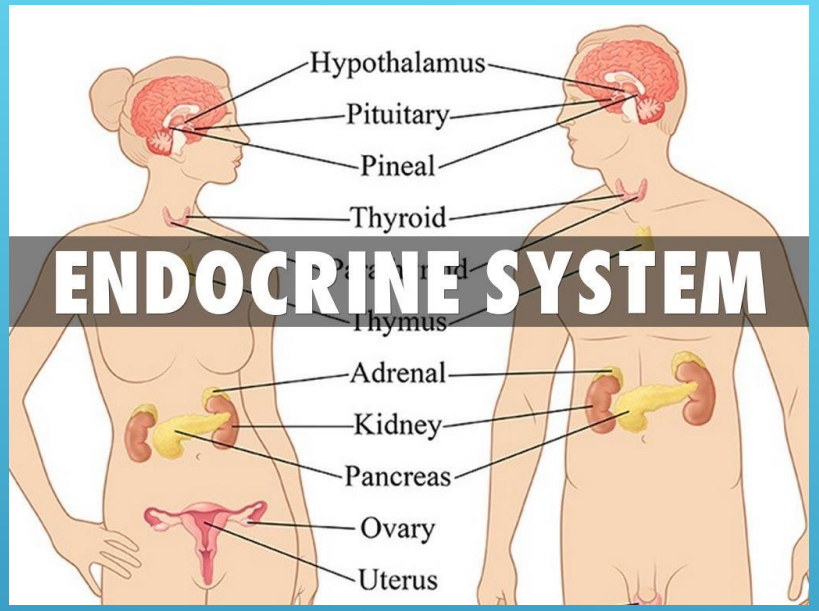
- Acute toxicity
- Chronic toxicity
- Endocrine disruption

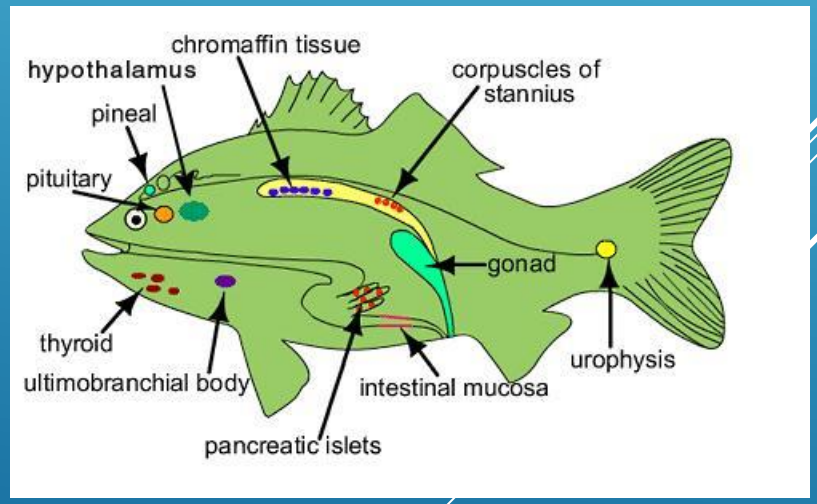

Sources
Industrial Facilities
Commercial/ Institutional Facilities
Domestic/ Residential Sources
Fire Training/Fire Response Sites
Discharge or Disposal to Solid Waste, Sanitary Sewer, or Stormwater Drian
Passive Receivers
Landfills
Leachate
Wastewater Treatment Plants
Municipal Separate Storm Sewer Systems
Surface Water and Groundwater

# Indoor chemical use transfers to fresh water

# THE ENDOCRINE SYSTEM

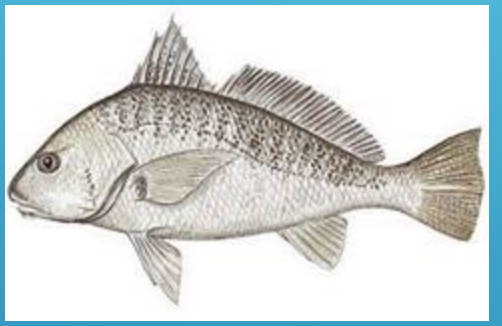
- Regulates hormones
  - Estrogenic (feminine)
  - Androgenic (masculine)
  - Thyroidal
- Responsible for metabolism, growth, reproduction



# MEDICATIONS ARE BEHAVING AS ENDOCRINE DISRUPTORS IN WATERWAYS

- SSRIs (antidepressants)
  - induce spawning in shellfish
- Calcium channel blockers (lowers blood pressure)
  - dramatically inhibit sperm activity in Atlantic croaker
- Clofibrate (lowers cholesterol)
  - cause high production of estrogen in juvenile zebra fish at concentrations present in Chesapeake Bay



# EXAMPLES OF ENDOCRINE DISRUPTING CHEMICALS

| Category | Examples |
| --- | --- |
| Prescription and non-prescription drugs | birth control pills, steroid-based medications, chemotherapy medications, blood pressure meds, anti-depression meds… |
| Household products | detergents, surfactants, plasticizers, some personal care products and their breakdown products |
| Industrial chemicals | Styrenes, mercury, lead, dioxins and furans, PCBs, fire retardants |
| Fungicides | hexachlorobenzene, maneb, tributyltin |
| Herbicides | 2,4-D, 2,4,5-T, atrazine |
| Insecticides | carbaryl, chlordane, dieldrin, lindane, parathion |
| Animal husbandry products | steroid-based supplements to increase milk, egg & meat production |

# Pharmaceutical Disposal

- Never flush down a toilet
- Always remove your name & personal info
- Permanent Collection Sites
- Periodic Take Back Events
- Trash (NOT preferred…)
  - Empty from container; crush and mix with other trash (e.g., pet waste, food waste) to make unusable

# URBAN INDOOR PESTICIDES


Image credit: Tammy Qualls

# PESTICIDES CAN HARM THE ENVIRONMENT AND BE COSTLY

Pesticides are currently found in wastewater

They can

- Interfere with wastewater treatment processes
- Cause adverse impacts to receiving waters (such as a river, bay, or ocean)
- Create permit compliance issues
- Expose cities to the potential for third party lawsuits under the Federal Clean Water Act (CWA)
- Impact costs to recycle water and/or ability to reuse biosolids

*Meanwhile, local governments are prohibited from restricting pesticide use.*

# NON-AGRICULTURAL USES OF PESTICIDES ARE UBIQUITOUS

- Structural and landscape insecticides and herbicides
- Antimicrobial/ fungicides
- Industrial biocides
- Pesticides added to non-pesticide products, like building paint
- Disinfectants for drinking water and wastewater
- Pesticides for pet parasite control


Image credit: Tammy Qualls

Sources: CDPR databases, Moran et al. (2020)

# Antimicrobials – what are they?

## EPA DEFINITION

*An **antimicrobial pesticide** is intended to **disinfect, sanitize, reduce, or mitigate growth or development** of microbiological organisms or protect inanimate objects, industrial processes or systems, surfaces, water, or other chemical substances from contamination, fouling, or deterioration caused by bacteria, viruses, fungi, protozoa, algae, or slime.*



# FOR YEARS WE WERE CONCERNED ABOUT TRICLOSAN AND TRICLOCARBAN IN ANTIMICROBIAL SOAPS

But then… the industry gave us a regrettable substitution:
Quaternary Ammonium Compounds

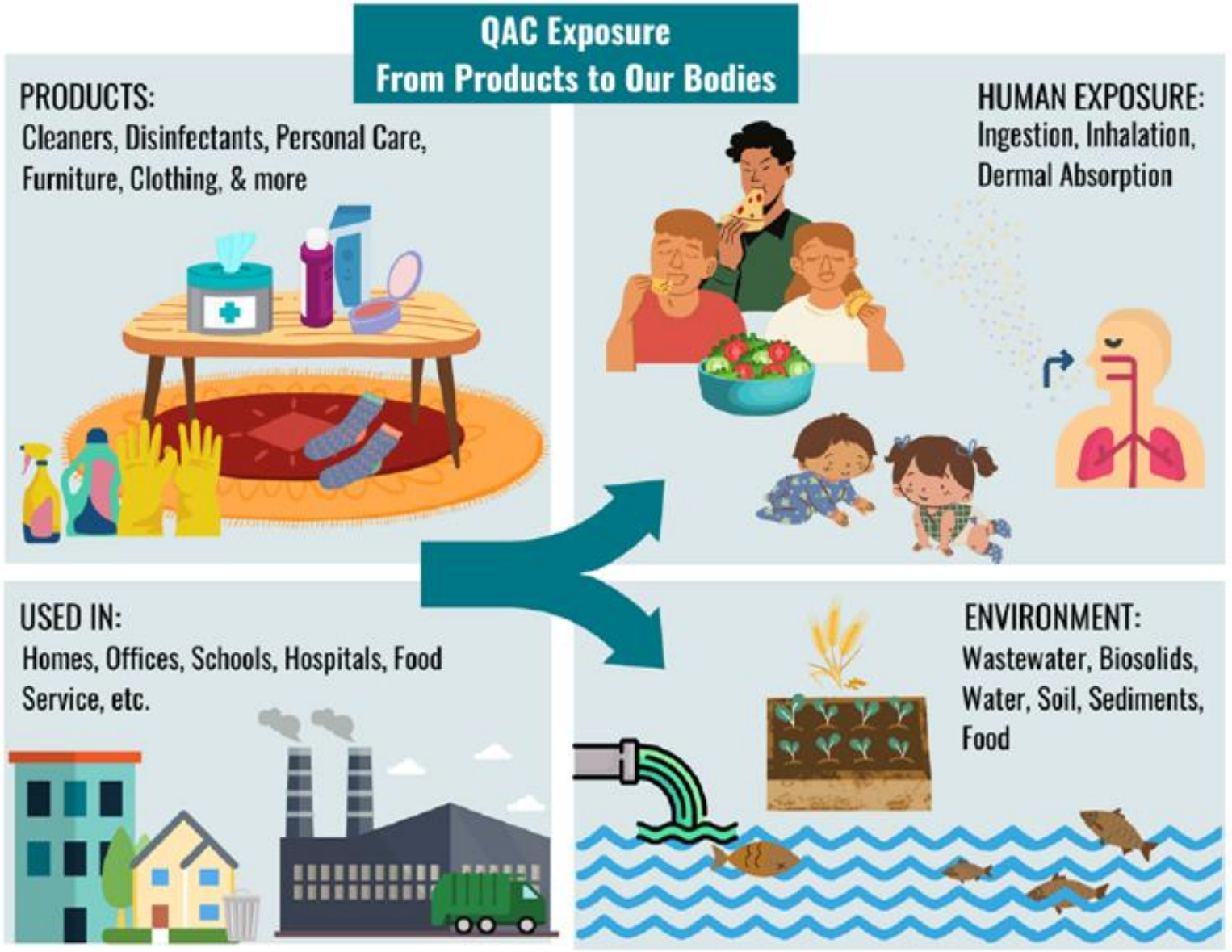



**Figure 1.** QAC exposure routes from products and other sources, via pathways indoors and outdoors.

Environmental Pollution 235 (2018) 814–824

# SAFER ALTERNATIVES TO QAC PRODUCTS





Safer Disinfectant Options:

- Ethanol, isopropanol (isopropyl alcohol)
- Hydrogen Peroxide
- L-Lactic Acid,
- Citric Acid

**Use the right product for the surface!**

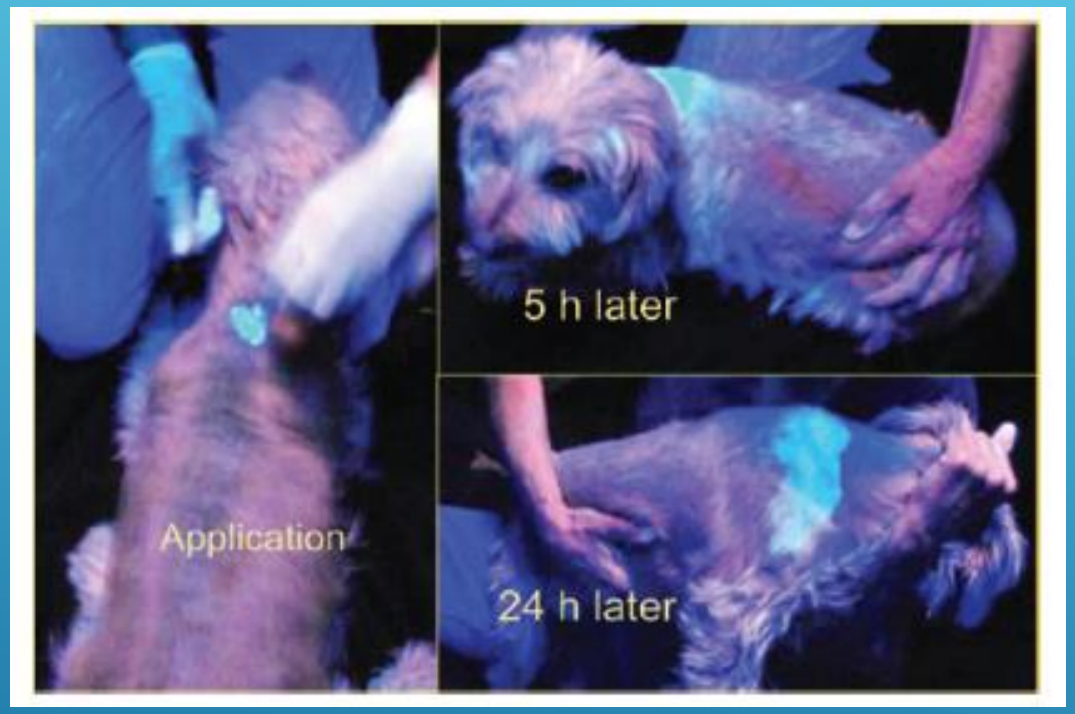
**Cleaning is different from sanitizing and disinfecting**

https://oshce.uw.edu/sites/default/files/documents/FactSheet_Cleaning_Final_UWDEOHS_0.pdf

# ANOTHER PESTICIDE SOURCE: ON-PET AND INDOOR FLEA/TICK CONTROL

*Dall-E created image by Alessandra Moyer, SF Bay Regional Water Board*

# TOPICAL TREATMENTS DO NOT REMAIN ON THE PET




Researchers incorporated a fluorescent dye into the spot treatment to photograph the spread.

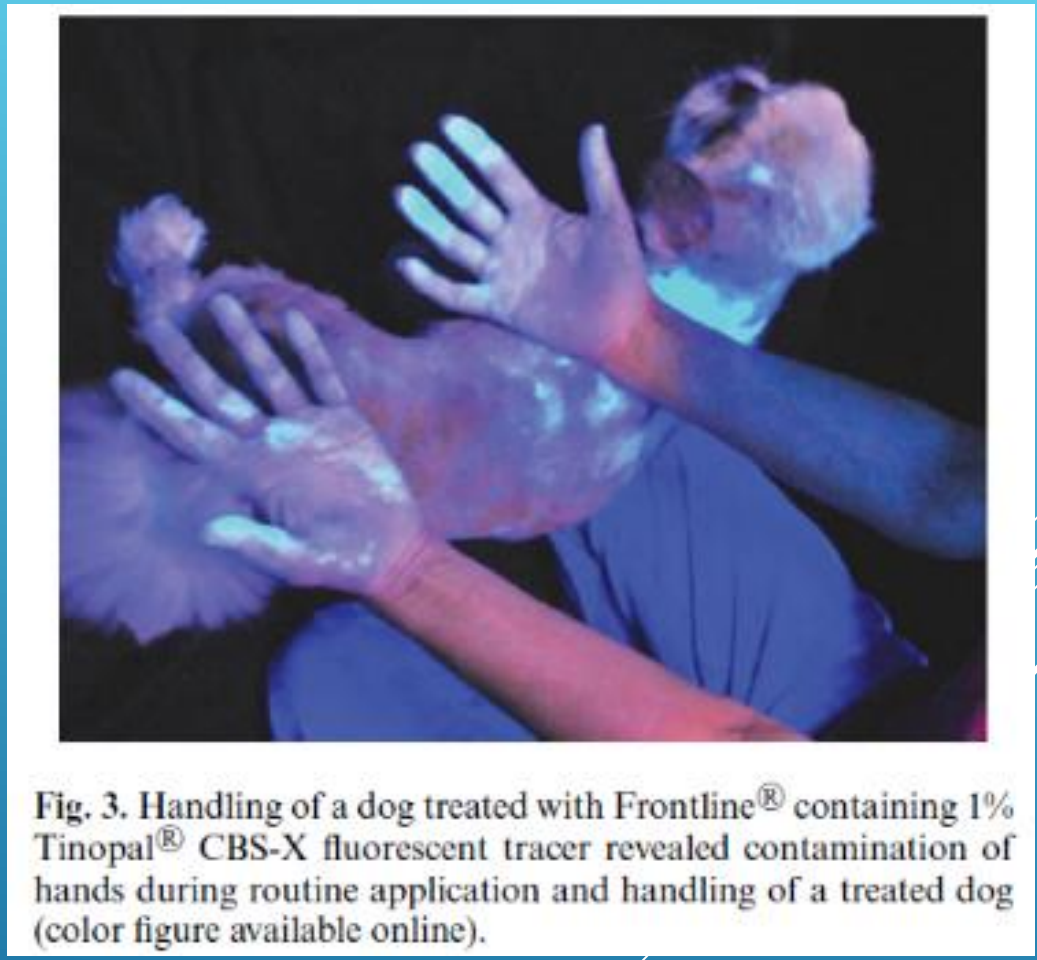


Fig. 3. Handling of a dog treated with Frontline® containing 1% Tinopal® CBS-X fluorescent tracer revealed contamination of hands during routine application and handling of a treated dog (color figure available online).

"Fate and Distribution of Fipronil on Companion Animals and in Their Indoor Residences Following Spot-On Flea Treatments," Bigelow Dyk, M., et al., J. of Env Science and Health, Part B, 2012, Vol 47, pp 913-924.

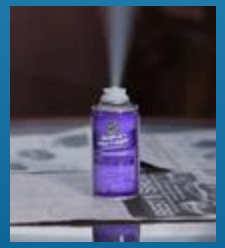
# On-Pet treatments (pesticides) transport to water bodies

Indoor pet flea control product

Washing of pets, hands, pet bedding, floors, carpets, and clothing

Transport to sanitary sewer system

Discharge to water body, recycled water, and/or biosolids



# PESTICIDES ARE GETTING INTO THE STORMWATER

- Nearly all streams had one pesticide exceeding aquatic-life benchmark
- Findings demonstrate transport from urban landscapes; link to impaired aquatic life

USGS science for a changing world

SCIENCE PRODUCTS NEWS CONNECT ABOUT

Latest Earthquakes

## USGS Studies the Impact of Insecticides on Northwestern Clackamas County Streams

By Communications and Publishing May 17, 2016

A new study found high concentrations of commonly used insecticides in streams running through the highly urbanized portion of Clackamas County.

PORTLAND, Ore. — A new study by the U.S. Geological Survey, published today in the Journal of Environmental Monitoring and Assessment, found high concentrations of commonly used insecticides in streams running through the highly urbanized portion of Clackamas County.

The levels found in streams flowing through the greater Portland metropolitan area during a September 2013 storm were above U.S. Environmental Protection Agency benchmarks to protect aquatic-life. The active ingredients of the insecticides detected included the chemicals bifenthrin, fipronil, malathion, breakdown products of DDT, and others.

Contacts

Office of Communications and Publishing

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Reston, VA 20192
United States

Ryan McClymont (Former

# INTEGRATED PEST MANAGEMENT (IPM)

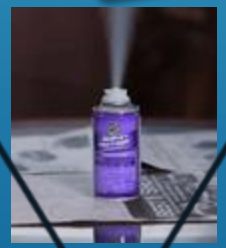
**Preventive measures (Preferred Option)**

http://npic.orst.edu/pest/homeipm.html

**Pet medications**

Orals/chewables

**Pesticides (last resort)**



https://www.k9ofmine.com/best-short-dog-leashes-for-training/

# BAY AREA TOOLKIT INCLUDES A FLYER TO HAND OUT AT VET OFFICES AND SHELTERS

## Prevent Fleas and Ticks

***Ask your vet if chewable flea and tick medications are an option for your pet.***

**Chewable flea and tick medications may be a preferable alternative to topical treatments.** Pesticides in spot-on treatments, collars, sprays, and foggers transfer onto you and indoor surfaces around your home. When washing pets, bedding, clothing, and your hands, these pesticides go down the drain and impact San Francisco Bay water quality.

**The best defense is a good offense.** Follow these tips to help reduce flea and tick problems before they start:

- **Fleas** - regularly vacuum floors, furniture, pet bedding and other fabrics. Use a flea comb dipped in soapy water to capture fleas.
- **Ticks** - regularly groom and inspect your pet for ticks and keep them out of tall grasses and shrubs during tick season.

For more information, visit baywise.org.

BACWA BAY AREA CLEAN WATER AGENCIES

## Prevención de pulgas y garrapatas

***Consulte a su veterinario si los medicamentos masticables contra pulgas y garrapatas son una opción adecuada para su mascota.***

**Los medicamentos masticables contra pulgas y garrapatas pueden ser una alternativa preferible a los tratamientos tópicos.** Los pesticidas que se encuentran en tratamientos tópicos, collares, aerosoles y nebulizadores se transfieren a usted y las superficies del interior de su hogar. Cuando baña sus mascotas, lava la cama para mascotas, la ropa y las manos, estos pesticidas salen por el desagüe y tienen un impacto en la calidad del agua de la bahía de San Francisco.

**La mejor defensa es un buen ataque.** Siga estos consejos para ayudar a reducir los problemas de pulgas y garrapatas antes de que comiencen:

- **Pulgas:** pase la aspiradora de forma regular por pisos, muebles, cama lecho para mascotas y otras telas. Utilice un peine para pulgas mojado en agua jabonosa para atrapar las pulgas.
- **Garrapatas:** acicale regularmente a su mascota y haga una inspección regular de su mascota para detectar garrapatas. Manténgala alejada de la hierba alta y de los arbustos durante la temporada de garrapatas.

Para mayor información visite baywise.org.

BACWA BAY AREA CLEAN WATER AGENCIES

# PHTHALATES

**What Are Phthalates?**

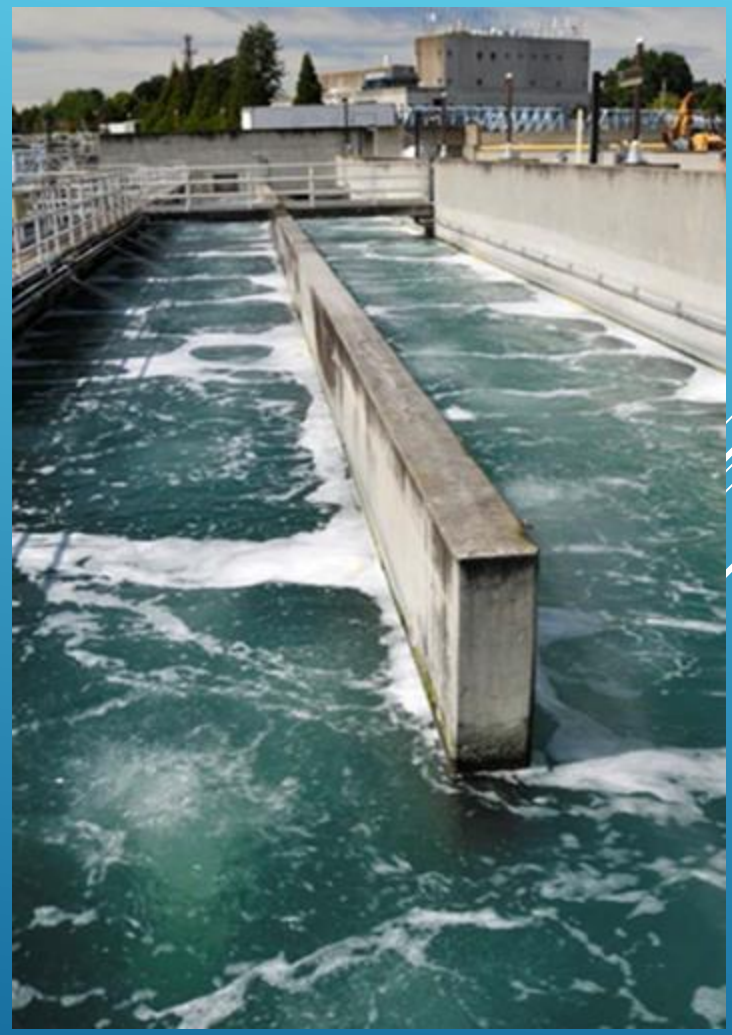
**What Types of Products Contain Phthalates?**

- household products like vinyl flooring, lubricating oils, shower curtains, toys
- **polyvinyl chloride ("PVC") materials,** such as plastic packaging, garden hoses, plastic pipes, wire and cable housings, and medical tubing
- Personal-care products such as soaps, shampoos, hair sprays, lotions, air fresheners, and nail polish.
  Source: (CDC, 2023)

- Also in public works related products - e.g., traffic cones, sealants, Thermoplast pavement marking

# WHY ARE PHTHALATES A CONCERN FOR WATER AND WASTEWATER?

- Water quality criteria
- Wide range of removal rates
- Found frequently in stormwater



# PER- AND POLYFLUOROALKYL SUBSTANCES (PFAS)

**PFAS** - per- and polyfluoroalkyl substances

- More than 12,500 PFAS compounds (aka "forever chemicals"), and some have been found to be extremely persistent, bioaccumulative and toxic to humans and wildlife
- Some of the most common include Perfluorooctane Sulfonate (PFOS) and Perfluorooctanoic Acid (PFOA), Perfluorobutanoic Acid (PFBS), a.k.a. C8

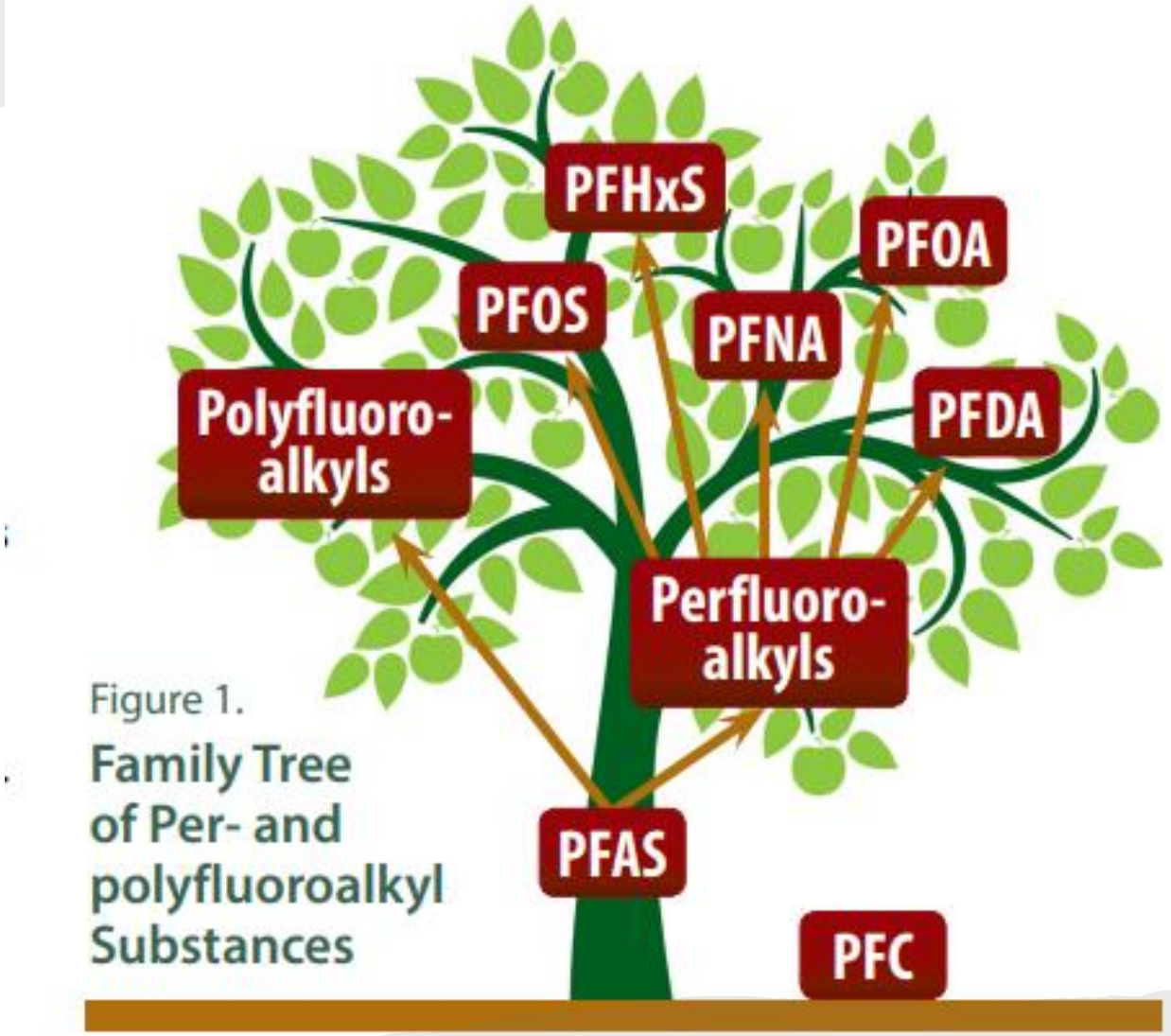
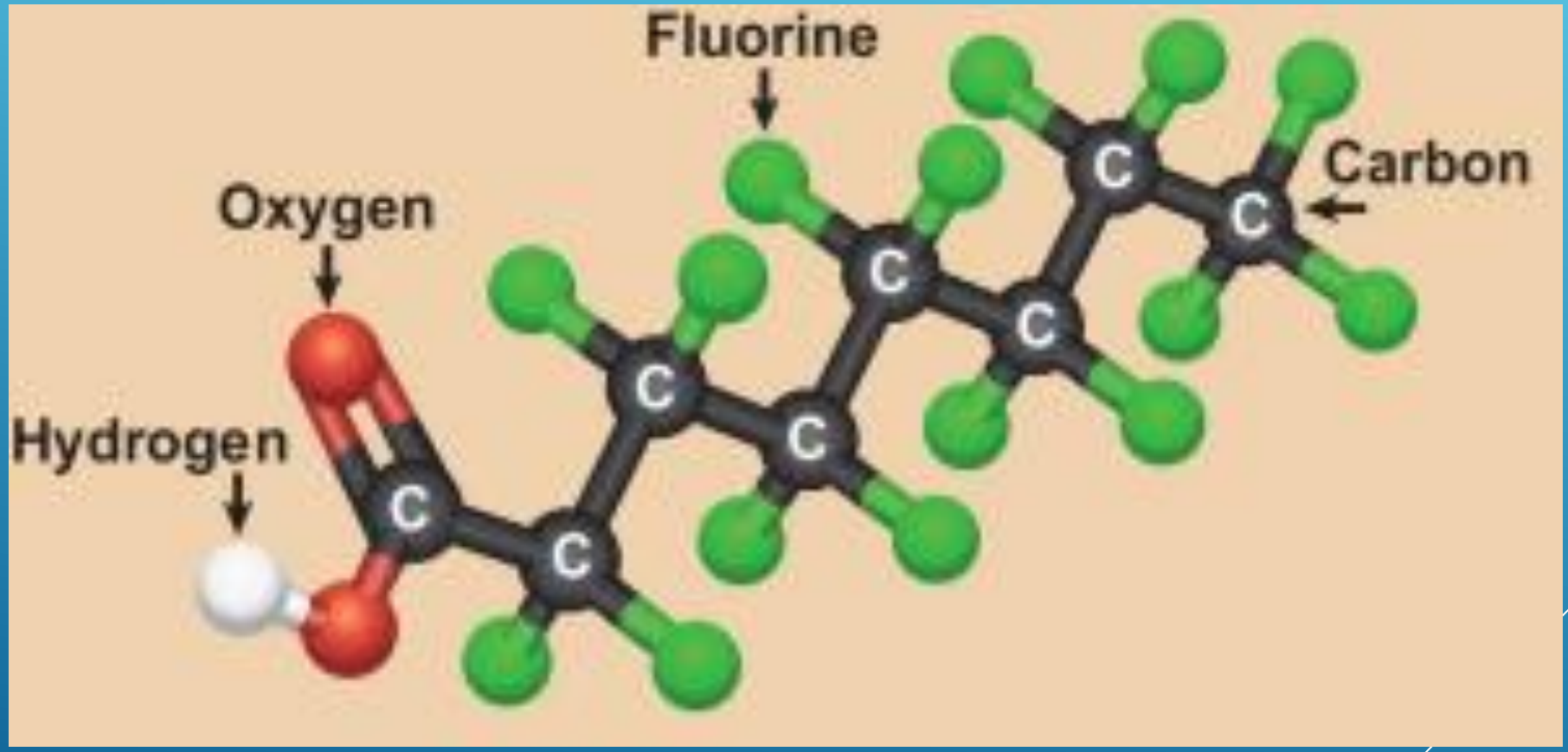



Figure 1.
Family Tree of Per- and polyfluoroalkyl Substances

# CHEMICAL STRUCTURE OF PFAS: C-8

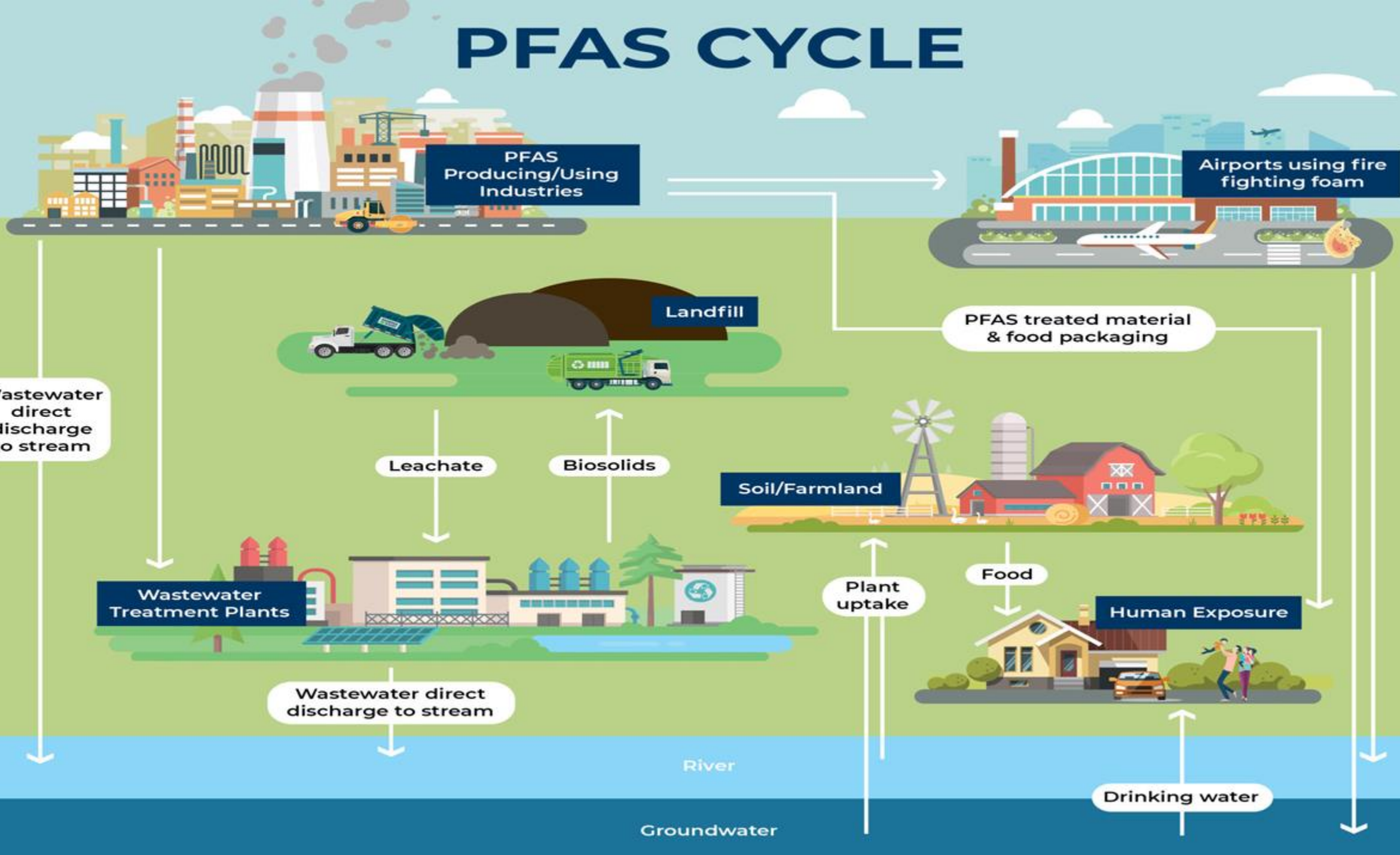


# HIGH LEVELS OF SOME PFAS CAN IMPACT HEALTH

1. **Increase cholesterol**
2. **Kidney cancer**
3. **Testicular cancer**
4. **Thyroid disease**
5. **Pre-eclampsia**

# Where are PFAS compounds commonly found?

# PFAS CYCLE


PFAS Producing/Using Industries
Airports using fire fighting foam
Landfill
PFAS treated material & food packaging
Wastewater direct discharge to stream
Leachate
Biosolids
Soil/Farmland
Wastewater Treatment Plants
Plant uptake
Food
Human Exposure
Wastewater direct discharge to stream
River
Drinking water
Groundwater

# PATRICK BRYAN, PPRC FOG TRAINER AND TECHNICAL PROGRAM MANAGER

*Stanislaus County, Hazardous Materials Inspector*
*County Of Fresno, NPDES Inspector*
*Municipal Interagency Training Coordinator*

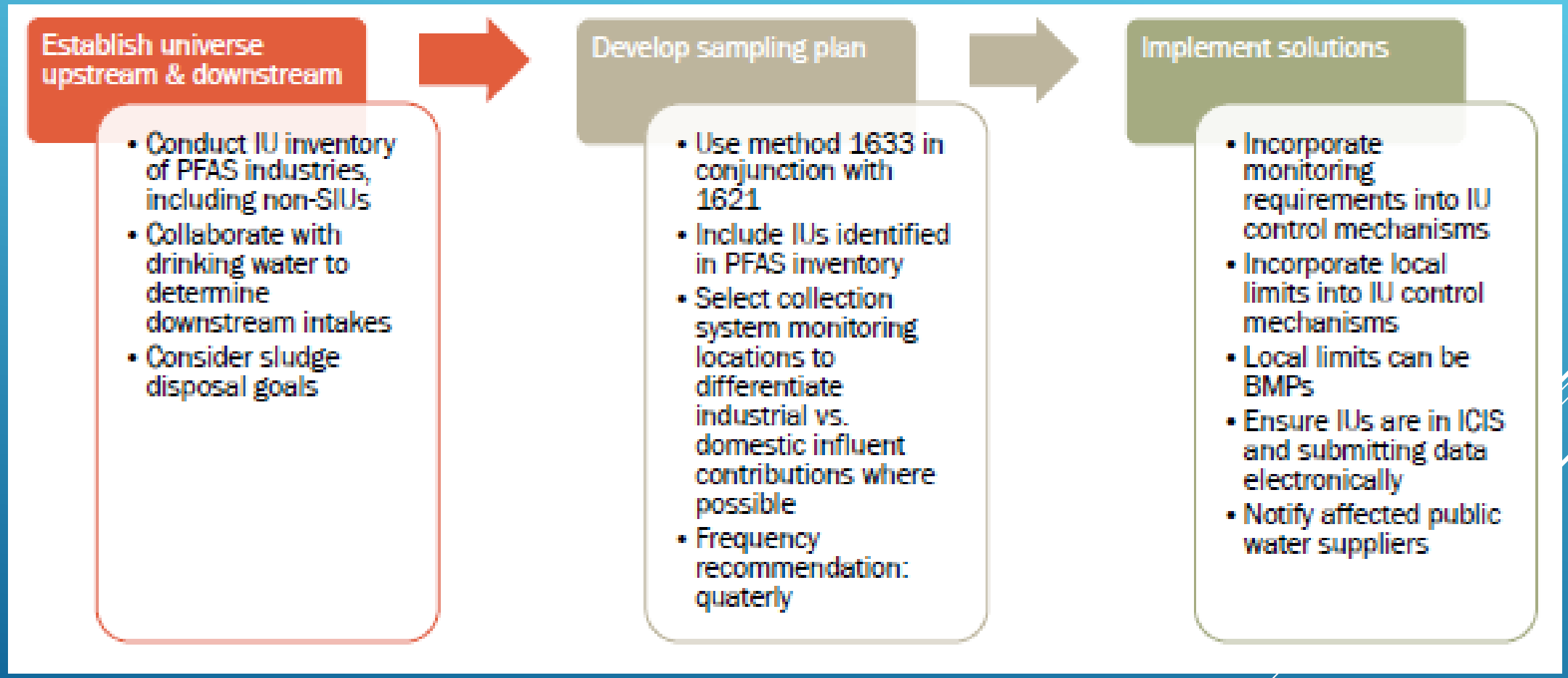
- EXPERIENCE SERVING AS A WASTEWATER AND STORM WATER INSPECTOR FROM THE COUNTY OF FRESNO, CALIFORNIA.
- BACKGROUND IN COMMERCIAL AND DEVELOPMENT PROGRAMS PATRICK UNDERSTANDS THE DISCONNECT THAT CAN OCCUR BETWEEN THE COMMUNITIES WE SERVE SUCH AS FOOD SERVICE ESTABLISHMENT'S (FSES), OTHER REGULATORY INSPECTORS/PROGRAMS AND WITHIN OUR OWN AGENCIES.
- BUILDING RELATIONSHIPS WITH INTERNAL DEPARTMENTS AND PRIVATE STAKEHOLDERS IS ESSENTIAL FOR A SUCCESSFUL FOG PROGRAM.

# EPA's Strategic PFAS Roadmap

Address PFAS in Clean Water Act permitting, analytical methods, water quality criteria & fish advisories (2022 & ongoing) through:

- Effluent Guidelines
- Sampling Methodology
- Analytical Methods
- Water Quality Criteria
- Funding

# EPA STRATEGIC PFAS ROADMAP – CWA & POTWS



# EPA ACTIONS TO ADDRESS PFAS

Key EPA Actions to Address PFAS | US EPA

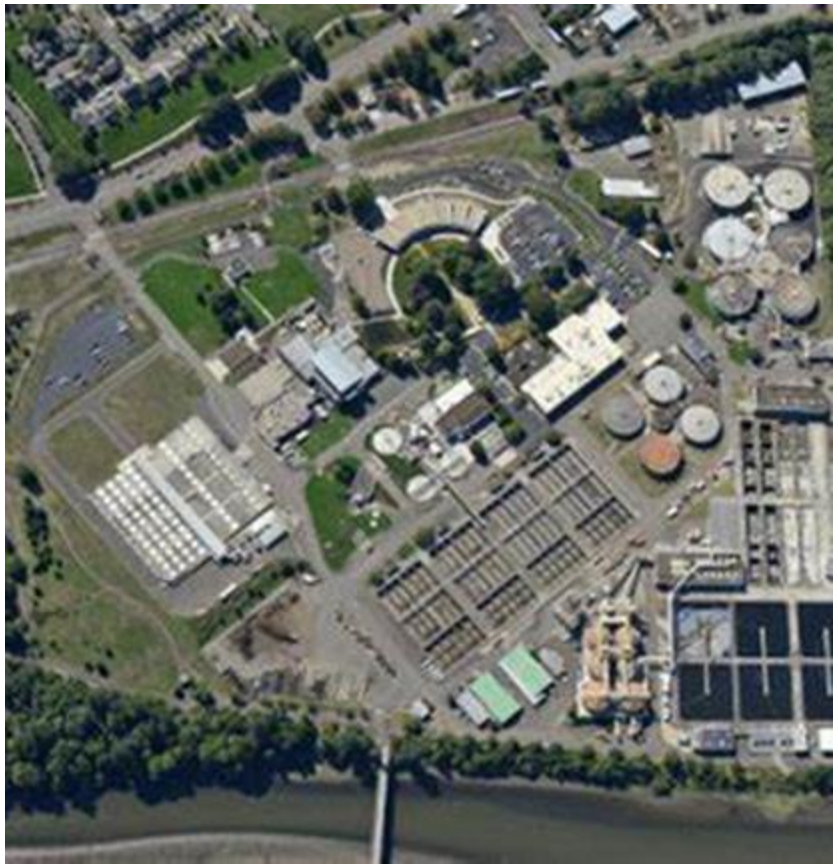
https://www.epa.gov/pfas/key-epa-actions-address-pfas

## $2 Billion in Bipartisan Infrastructure Law Funding for PFAS and Emerging Contaminants in Drinking Water

- In February 2023, EPA announced the availability of $2 billion from President Biden's Bipartisan Infrastructure Law to address emerging contaminants, including PFAS, in drinking water across the country. This investment, which is allocated to states and territories, will be made available to communities as grants through EPA's Emerging Contaminants in Small or Disadvantaged Communities grant program. These funds will promote access to safe and clean water in small, rural, and disadvantaged communities while supporting local economies.
    - Learn more about this funding.

# PROPOSED EPA PFAS POTW STUDY

- Purpose of study:
  - Identify categories of IUs discharging wastewater contaminated with PFAS.
  - Collect data on PFAS concentrations in domestic wastewater influent to POTWs.
  - Characterize PFAS currently being discharged from IUs and domestic sources.
  - Collect data on adsorbable organic fluorine (AOF) concentrations in wastewater.
  - Better understand PFAS pass-through in POTWs to biosolids and effluent.
- Estimated start: end of 2024, start of 2025



# PROPOSED EPA PFAS POTW STUDY

- EPA proposes to work with NACWA
- Conduct WWTP influent, effluent, biosolids, and up to IUs/WWTP paired sampling
  - Draft EPA methods 1621 and 1633
- ~2,000 WWTPs across the U.S.
- Flow > 14 MGD
- States providing comments to NACWA - NACWA comments to EPA
- EPA may require under CWA Section 308
- Larger WWTP Estimated Cost - Avg $20K to $25K/WWTP -

  WWTPs would be responsible for 100% of costs

# WHAT ANALYTICAL METHODS AND SAMPLING GUIDELINES TO USE?

- EPA has two test methods approved
  - EPA Method 1621 - Adsorbable Organic Fluorine
  - EPA Method 1633 - 40 individual PFAS compounds

- Various sampling guidelines in use
  - EPA
  - Interstate Technology Regulatory Council
  - New York
  - New Jersey
  - Michigan

**PFAS Analytical Methods Development and Sampling Research**

https://www.epa.gov/water-research/pfas-analytical-methods-development-and-sampling-research

# EPA PROPOSED AQUATIC LIFE CRITERIA

**Table 1. Draft Recommended Freshwater Aquatic Life Water Quality Criteria for PFOA and PFOS**

| Criteria Component | Acute Water Column (CMC)[1] | Chronic Water Column (CCC)[2] | Invertebrate Whole-Body | Fish Whole-Body | Fish Muscle |
|---|---|---|---|---|---|
| **PFOA Magnitude** | 49 mg/L | 0.094 mg/L | 1.11 mg/kg ww | 6.10 mg/kg ww | 0.125 mg/kg ww |
| **PFOS Magnitude** | 3.0 mg/L | 0.0084 mg/L | 0.937 mg/kg ww | 6.75 mg/kg ww | 2.91 mg/kg ww |
| **Duration** | 1-hour average | 4-day average | Instantaneous[3] | | |
| **Frequency** | Not to be exceeded more than once in three years, on average | Not to be exceeded more than once in three years, on average | Not to be exceeded more than once in ten years, on average | | |

[1] Criterion Maximum Concentration.
[2] Criterion Continuous Concentration.
[3] Tissue data provide instantaneous point measurements that reflect integrative accumulation of PFOA or PFOS over time and space in aquatic life population(s) at a given site.

The lowest value on this table is **8400 ng/l (ppt)** for PFOS chronic water column criterion

….the forthcoming Human Health Criteria likely to be much lower

# EPA Industrial Effluent Limitation Guidelines

**EPA's Plan 15 Summarizes New Rules and Studies Related to PFAS**

- ❑ Regulatory actions for:
  - o Organic Chemicals and Plastic Manufacturing
  - o Electroplating and Metal Finishing
- ❑ Effluent guidelines for Landfills
- ❑ Textile mills study
- ❑ No further PFAS action planned for:
  - o Electrical and Electronic Components
  - o Pulp, Paper, and Paperboard Manufacturing

# EPA'S FINAL DRINKING WATER MCLS

| Compound | Final MCLG | Final MCL (enforceable levels) |
|---|---|---|
| PFOA | Zero | 4.0 parts per trillion (ppt) (also expressed as ng/L) |
| PFOS | Zero | 4.0 ppt |
| PFHxS | 10 ppt | 10 ppt |
| PFNA | 10 ppt | 10 ppt |
| HFPO-DA (commonly known as GenX Chemicals) | 10 ppt | 10 ppt |
| Mixtures containing two or more of PFHxS, PFNA, HFPO-DA, and PFBS | 1 (unitless)<br><br>Hazard Index | 1 (unitless)<br><br>Hazard Index |

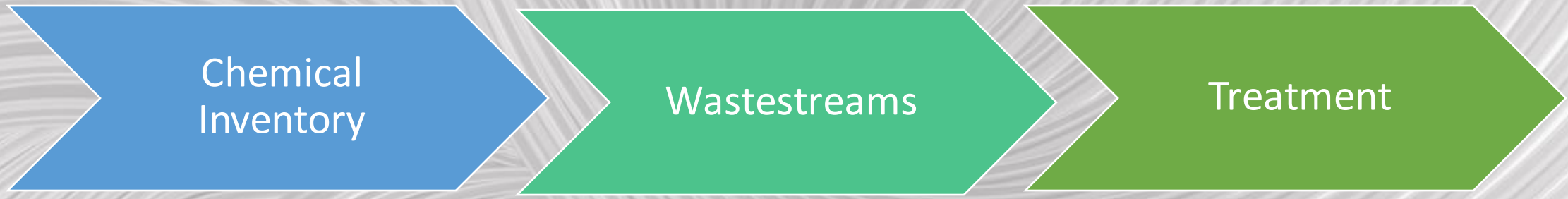
# IMPLEMENTATION STRATEGIES - POTWS & PRETREATMENT PROGRAMS

- Legal Authority
- Resources (training/implementation)/Funding (sampling budget increases?)
- Industrial User (IU) Inventory
  - Source Identification/Characterization, including existing Significant Industrial Users (SIUs)
- Industrial User Permits
  - Source Control/Waste Minimization
  - Monitoring of SIUs and IUs (PFAS 1633 and AOF 1621)
- Develop Local Limits and BMPs
- Non-Domestic Sources
  - Outreach/Education

# INDUSTRIAL USER SURVEY

- Expand to include IUs that have the potential to discharge PFAS
- Ancillary operations
- Historically used at site
- Pollution prevention/BMP educational opportunity
- Permit application as screening tool
- "Trust but verify"
  - IUs may not know if their products and materials contain PFAS - encourage them to contact vendors

# IU PERMIT APPLICATION REVIEW




- Safety Data Sheets
- Storage
- Containment

- Process
- Non-process
- Point of generation
- Characteristics

- End-of-pipe
- End-of-process
- Instream vs side-stream

# PFAS IN LUBRICATING OILS: USES COULD ENCOMPASS RANGE OF INDUSTRIES

PFAS are reportedly used as additives in automotive lubricant oils and hydraulic fluids, to reduce surface tension, prevent fires and evaporation.

> A study determined concentrations and profiles of 13 perfluoroalkyl acids (PFAAs) determined in 18 automotive lubricants purchased in the United States, and PFAA concentrations increased by ~ 25-fold after the oxidation of lubricant extracts.

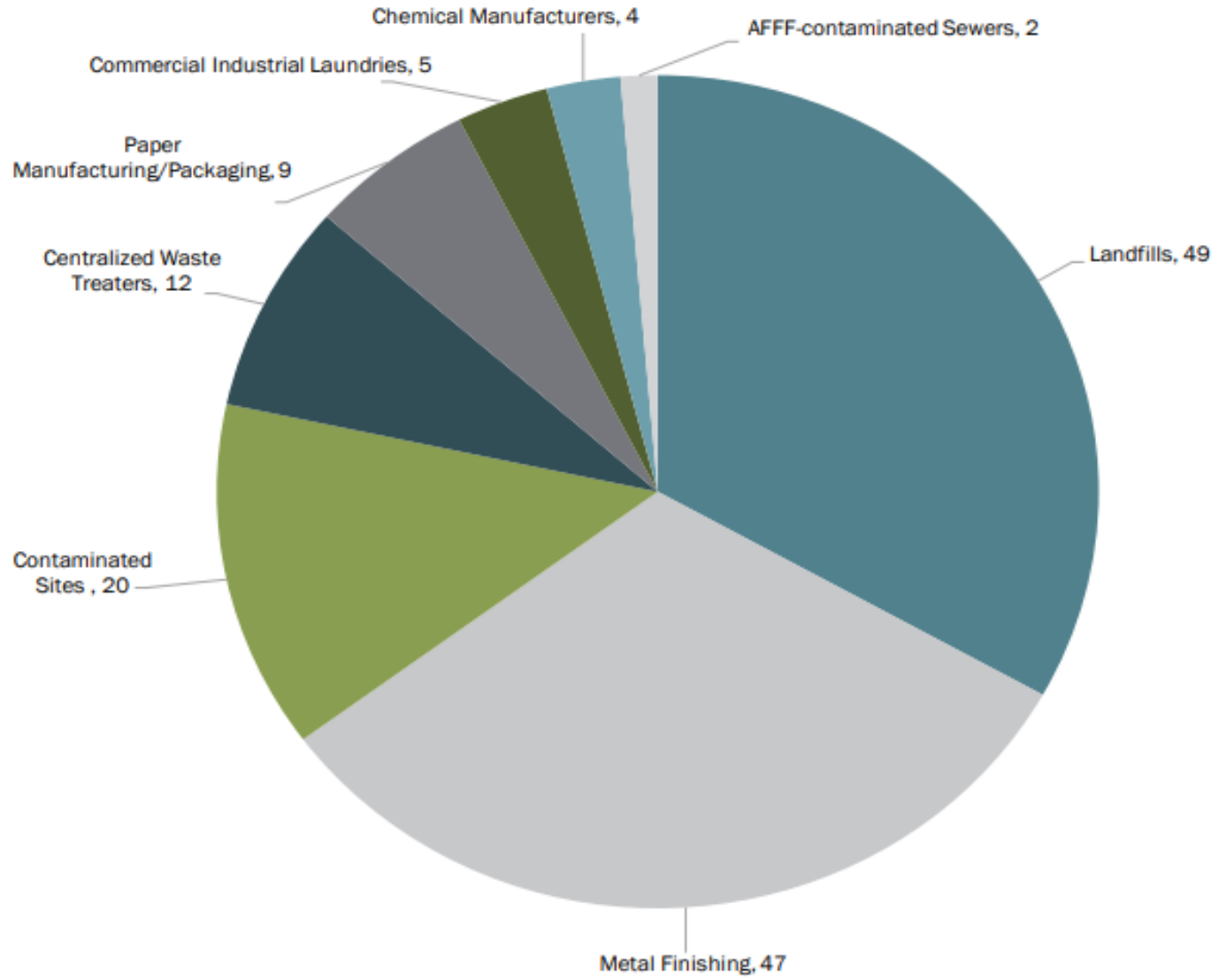
https://www.sciencedirect.com/science/article/abs/pii/S2352186420307240

# MICHIGAN PFAS INITIATIVE –

# INDUSTRIAL PRETREATMENT PROGRAMS

MICHIGAN IPP PFAS INITIATIVE: IDENTIFIED SOURCES OF PFOS TO MUNICIPAL WASTEWATER TREATMENT PLANTS

Figure 1. Sources of PFOS, Number by Type



# EXAMPLE PERMIT LANGUAGE IN NPDES PERMITS – NEW ENGLAND EPA (MASSACHUSETTS POTWS)

6. Beginning the first full calendar year after the effective date of the permit, the Permittee shall commence annual sampling of the following types of industrial discharges into the POTW:

- Commercial Car Washes
- Platers/Metal Finishers
- Paper and Packaging Manufacturers
- Tanneries and Leather/Fabric/Carpet Treaters
- Manufacturers of Parts with Polytetrafluoroethylene (PTFE) or teflon type coatings (*e.g.*, bearings)
- Landfill Leachate
- Centralized Waste Treaters
- Known or Suspected PFAS Contaminated Sites
- Fire Fighting Training Facilities
- Airports
- Any Other Known or Expected Sources of PFAS

Sampling shall be conducted using Method 1633 for the PFAS analytes listed in Attachment E. The industrial discharges sampled, and the sampling results shall be summarized and included in the annual report (see Part I.E.3).

**The Pollution Prevention Act defines "source reduction" as the most preferable option.**

- Source Reduction includes:
  - Equipment or technology modifications;
  - Process or procedure modifications;
  - Reformulation or redesign of products;
  - Substitution of raw materials; and
  - Improvements in housekeeping, maintenance, training or inventory control.

**These strategies become the basis for Best Management Practices (BMPs) which can be part of your local limits.**

# DEVELOP A BEST MANAGEMENT PRACTICES (BMP) PLAN

- Identify potential permittees: IUs and SIUs
- Are PFAS used at this facility?
- Have PFAS historically been used at this facility?
- If PFAS are present in the facility's discharge, consider the permit language to evaluate the usage.

# DEVELOP A BMP PLAN

Product substitution and replacement.

Good operating and housekeeping practices, such as:

- Maintaining accurate chemical inventory.
- Safe chemical storage.
- Replacement of contaminated equipment.
- Containing or reusing contaminated equipment
- Containing contaminated rinse water.
- Proper operation and maintenance.
- Emergency response plan.
- Employee education and training.
- Proper management/disposal of legacy PFAS chemicals.

# DEVELOP A BMP PLAN (CONTINUED)

- Solid waste disposal may be out of scope of NPDES but may be part of a holistic response.
- BMP plan should require an annual certification and maintenance of records.

# EPA PFAS POLLUTION PREVENTION STRATEGIES

EPA-833/F-23-008 July 2023


## Best Management Practices: Where to Start?

For some pollutants, developing numeric discharge limits may not be feasible.

The NPDES and Pretreatment regulations allow for Best Management Practices (BMPs) to be used in lieu of numeric, end-of-pipe limits in such instances. See 40 CFR 122.44(k) and 40 CFR 403.5(c)(4).

EPA has published guidance on implementing BMPs for NPDES and Pretreatment:

- EPA Guidance for Developing Best Management Practices https://www3.epa.gov/npdes/pubs/owm0274.pdf
- Chapter 9 of the NPDES Permit Writer's Manual https://www.epa.gov/sites/default/files/2015-09/documents/pwm_chapt_09.pdf
- Guides to Pollution Prevention: Municipal Pretreatment Programs https://www3.epa.gov/npdes/pubs/pretreatment_mun_guide.pdf
- Pretreatment Streamlining Rule Fact Sheet 7.0: Best

## PFAS in Industrial Wastewater

PFAS can be found in the wastewater discharges of certain industrial facilities subject to NPDES permitting or pretreatment requirements (U.S. EPA, 2021).

Permit writers and pretreatment coordinators are encouraged to include PFAS monitoring in permits for facilities where PFAS are suspected of being present in the discharge. For some facilities where PFAS are found, it may be appropriate to require permit limits. In some cases, numeric discharge limits based on treatment technologies using granular activated carbon, ion exchange resins, reverse osmosis may be appropriate, but for others, pollution prevention practices and BMPs may be more appropriate.

Permit writers and pretreatment coordinators have observed some of the following pollution prevention practices for industries in their state or service area.

### Chrome Finishing

PFAS can be found in the effluent discharged from chrome plating facilities due to the use of PFAS-containing chemical fume suppressants used primarily in hexavalent chrome plating operations. Many of these facilities discharge to wastewater treatment plants (U.S. EPA, 2009). According to EPA's Effluent Guidelines Program Plan 15 published in January 2023, preliminary investigations by EPA have indicated that some facilities may have the option of switching operations to trivalent chromium, which does not require the use of chemical fume suppressants, and that PFAS-free alternatives exist or are in development for processes which require hexavalent chromium (U.S. EPA, 2023). Additionally, because historic use of PFOS-containing fume suppressants is believed to be a legacy source of PFAS discharges, some agencies

# FEDERAL ACTIONS TO LIMIT PFAS IN PRODUCTS

EPA; Toxics Substances Control Act (TSCA)

- Robust review and regulation of new PFAS before entering the marketplace
- Reviewing previous decisions on PFAS uses
- Banning any future use of discontinued PFAS uses

Food and Drug Administration (FDA)

- **February 2024** - FDA that that grease-proofing materials containing PFAS are no longer being sold for use in food packaging in the U.S.

FDA, Industry Actions End Sales of PFAS Used in US Food Packaging | FDA

# **STATE PFAS-IN-PRODUCT RESTRICTIONS**: GOING UPSTREAM TO REDUCE AT THE ULTIMATE SOURCE

| **PFAS Product Type** | **# of states with restriction or ban** |
|---|---|
| Firefighting Foam | 17 |
| Children's products | 7 |
| Packaging – Food and Other | 12 |
| Personal Care Products | 7 |
| Textiles | 9 |

Source: www.saferstates.org

# PURCHASING POLICIES

- Massachusetts and Oregon ACWA PFAS-free Purchasing guides for state and local governments
- 7 easy pages; background, solutions, references
- 16 product categories

| That May<br>n PFAS | What to Ask Your Vendors | Massachusetts Statewide Contracts That Offer Safer Products |
|---|---|---|
| emicals,<br>ners and<br>for<br>carpet and<br>ters and<br>es, glass,<br>toilet bowls,<br>s, as well as<br>d metal | Ask vendors for cleaning products that are certified by:<br>• Green Seal, which eliminated all cleaning and personal care products with PFAS from its certified directory in 2022; or<br>• US EPA's Safer Choice Program, which never allowed PFAS as ingredients in its certified products, except for floor finishes. In addition, PFAS are no longer eligible for use in any Safer Choice-certified products.<br><br>*Note:* UL is in the process of updating its ECOLOGO standard for cleaning chemicals and may prohibit PFAS in its certified cleaners when it does so. | ***FAC118: Environmentally Preferable Cleaning Products, Programs, Equipment and Services***<br>Most non-disinfecting cleaning chemicals on this contract have one of these two certifications.<br><br>***FAC114: Environmentally Preferable Janitorial Services*** |
| le Food<br>re<br>ost often<br>lded fiber<br>ls, trays,<br>and portion<br>l as non-<br>wraps and | Ask vendors for (or check registries to find) disposable food service ware products that are certified by:<br>• Biodegradable Products Institute (BPI);<br>• Compost Manufacturing Alliance (CMA); or<br>• GreenScreen for Safer Chemicals<br><br>Compostable food service ware that are certified by BPI or CMA are tested to confirm they contain less than 100 parts per million (ppm) fluorine, which is designed to ensure they do not contain intentionally-added PFAS. | ***GRO40: Food Service Supplies and Equipment***<br>Compostable food service ware items offered on this contract must be certified by BPI or CMA, which do not allow intentionally added PFAS in products they certify. |

https://www.mass.gov/files/documents/2023/05/11/OSD%20PFAS%20Free%20Purchasing%20Guide.pdf

# PFAS POLLUTION PREVENTION OPPORTUNITY FOR AIRPORTS, MILITARY BASES, AND FIRE DEPARTMENTS

There are now dozens of Green Screen Certified fluorine-free alternatives to PFAS containing fire-fighting foam ("AFFF")

https://www.greenscreenchemicals.org/certified/products/category/firefighting

GREENSCREEN FOR SAFER CHEMICALS

- Class B foams for liquid fuel or chemical fires
- At a minimum, can be used for training purposes to minimize environmental harm
- FAA has now approved use of alternative foams
- Port of Seattle and City of Seattle using AFFF alternatives for live fires

https://airportimprovement.com/our-transition-fluorine-free-foam

# MINNESOTA PFAS INITIATIVE

BARR

**Evaluation of Current Alternatives and Estimated Cost Curves for PFAS Removal and Destruction from Municipal Wastewater, Biosolids, Landfill Leachate, and Compost Contact Water**

Prepared for
Minnesota Pollution Control Agency

MINNESOTA POLLUTION CONTROL AGENCY

May 2023

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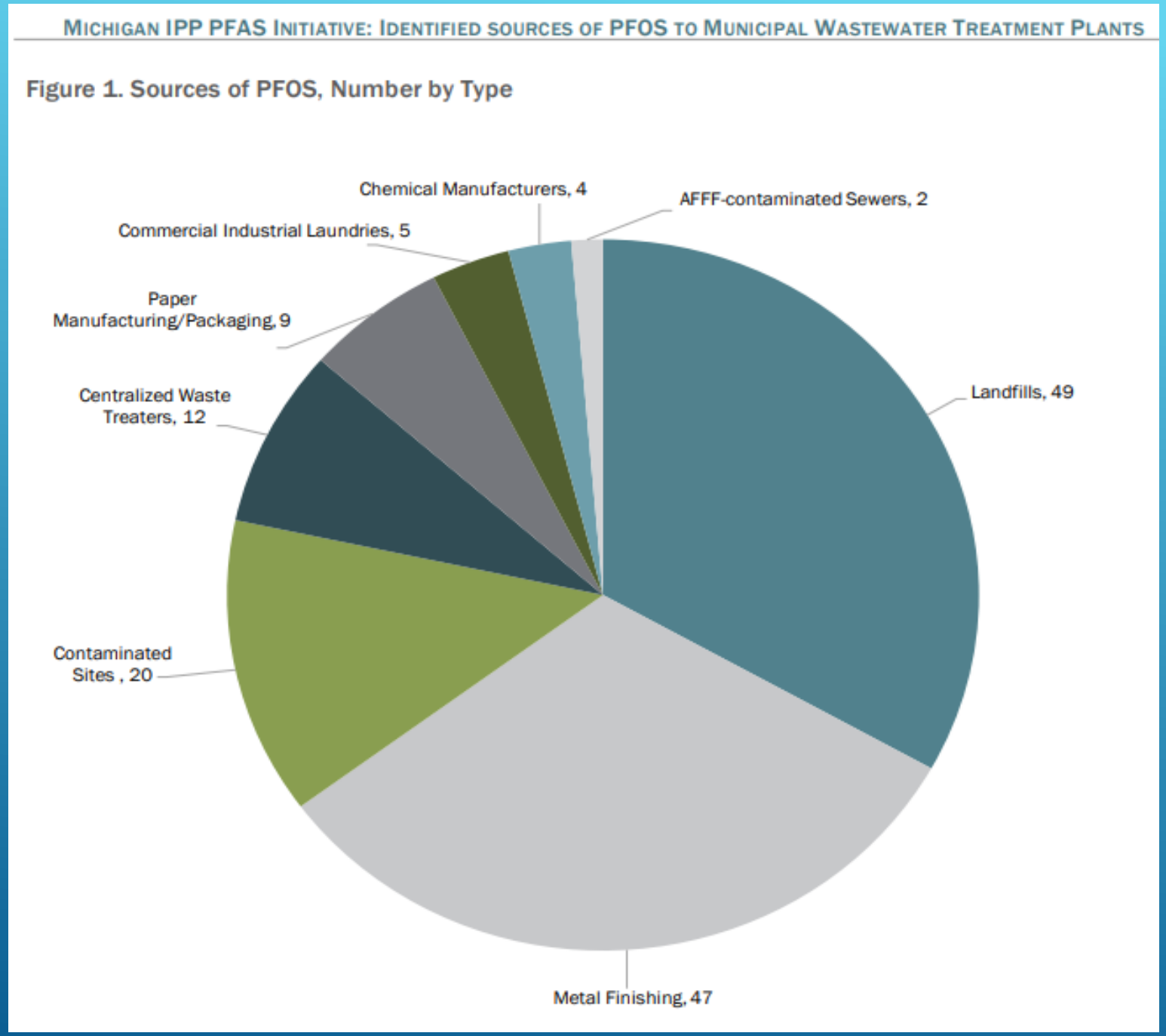
# PFAS SEPARATION TECHNOLOGIES

## FULL SCALE WITH A HIGH DEGREE OF COMMERCIALIZATION INCLUDING MUNICIPAL WASTEWATER

| Technology | Technology description |
|---|---|
| Nanofiltration NF)/Reverse Osmosis (RO) Membrane Separation | PFAS separated into a concentrate stream by physical separation via high-pressure membranes |
| Foam Fractionation | PFAS stripped from liquid phase as foam using fine air bubbles |
| Granular Activated Carbon (GAC) | PFAS sorbs to hydrophobic GAC surface in a fixed-bed pressure vessel. |
| Reactivated GAC | Similar to virgin GAC, PFAS sorbs to the hydrophobic GAC surface in a fixed-bed pressure vessel. |
| Colloidal Activated Carbon | PFAS sorbs to colloidal activated carbon particles in aqueous suspension |
| Ion Exchange Resins (SingleUse Media) | PFAS attaches to resin via surface charge interactions in a fixed bed pressure vessel. |
| Ion Exchange Resins (Regenerable Media) | PFAS attaches to resin via surface charge interactions with resin support material in a fixed-bed pressure vessel |
| Modified Clay | PFAS attaches to clay minerals, sometimes modified, via surface charge interactions. Media is in a fixed bed pressure vessel |
| Ion Exchange Resin Solvent Regeneration | A proprietary solvent brine solution removes PFAS from the IX media by targeting removal of the ionic head and desorption of the fluorinated carbon tail from the media |

# U.S. MILITARY REMEDIATION

- Ft. Leavenworth – granular activated carbon filtration of groundwater
- Camp Pendleton – will implement granular activated carbon filtration
- Former Wurtsmith Air Force Base (MI) – cleaning up PFAS contamination




# MICHIGAN PFAS INITIATIVE – WASTEWATER TREATMENT PLANTS AND BIOSOLIDS STUDY (2021)

## Partnerships – "common interests"

- National Association of Clean Water Agencies (NACWA)
- Association of Clean Water Administrators (ACWA)
- Water Environment Federation (WEF)
- Water Research Foundation (WRF)
- American Public Works Association (APWA)
- American Water Works Association (AWWA)
- Rural Water Utilities Association (RWUA)
- Other Local/State Utility Associations
- Health Departments (State)
- Drug and Other Takeback Program Participation
- Public Health and Environmental Non-Profits focused on "upstream" P2

# WHAT CAN WE DO TO HELP?

- ❖ Build Awareness
- ❖ Educate the Public
- ❖ Get Involved
- ❖ Eliminate Availability
- ❖ Reduce Demand


- Please complete the course evaluation -satisfaction survey form
- Information supports on-going training
- USED TO CONFIRM CEU COMPLETION

# EVALUATION – SATISFACTION SURVEY FORM

EPA FOG Training Satisfaction Survey

WSA
a project of pprc.org

# Emerging Pollutants Questions ???

WSA
a project of pprc.org

# Services Available Through EPA WaterTA


Communities can submit a request for TA: https://www.epa.gov/water-infrastructure/forms/water-technical-assistance-request-form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THANK YOU FOR ATTENDING

EPA FOG Training Satisfaction Survey

This training was developed under a Cooperative Agreement awarded by the U.S. Environmental Protection Agency (EPA) to the Pacific Northwest Pollution Prevention Resource Center (PPRC). It has not been formally reviewed by EPA.

WSA
a project of pprc.org


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