Fats, Oils and Grease (FOG) Management & Control Program

MMS
MONITORING AND MANAGEMENT SERVICES

FOG Program Impacts

- Federal, State and Local Impacts
- Best reaction is proactive approach from Local Level
  - Wastewater Department
  - Building/Codes Department
  - Health Department
  - Stormwater

Local POTW

- Wastewater Department
  - SSOs
  - Sewer line cleaning, repair & replacement costs
  - Sewer Pumping Station equipment & maintenance impacts
  - WWTP equipment & maintenance impacts
  - Odors & contribution to hydrogen sulfide generation

Other Local and State Agencies

- Building Codes Department
  - Frontline of communication with new Food Service Establishments and existing facilities that undergo construction
  - FOG program awareness increases FSE awareness and grease control equipment installation requirements
- Health Department
  - Established authority for facility's ongoing operation
  - Helps prevent contact with wastewater due to kitchen sewer backups and SSO's
  - FSEs fear the Health Department

Questions to consider

- What is my basis (legal authority) for establishing a GMP?
- What is current decision making process for plumbing plans approval for new FSEs or existing FSEs that upgrade?
- What are requirements for grease control equipment installation?
- What agencies or city departments should I contact?
- How many FSEs do we have?

FEDERAL LEVEL
What is CMOM?

- C – Capacity
- M – Management
- O – Operation
- M – Maintenance of sanitary sewer collection systems

Guide to Collection & Transmission System Management, Operation, and Maintenance Programs (Version 1.0) –from EPA Region 4

- Under "Operations Programs" section…
  - Pretreatment Program
  - Corrosion Control Program
  - Fats, Oils, and Grease Program
  - Private Haulers Program

SSOs caused by FOG discharge of a Nondomestic User

Distinguish between POTW system SSO or private SSO.

Commercial or Residential?

Before we start discussing FOG program components, we need to define some things we will be discussing

- Brown Grease
- Yellow Grease
- Triglycerides
- FSEs
- Grease Interceptors
- Grease Traps

Food Service Establishment's fats, oils & grease - 2 Types…

- "**Yellow**" **grease:** inedible and unadulterated spent FOG removed from FSE. Major source of yellow grease is deep frying. Put this type grease in the grease recycle bins, normally at the back of the FSE.
- "**Brown**" **grease**: floatable FOG, settled solids and associated wastewater retained by grease interceptors and grease traps.

Automated grease recycle container overflow due to faulty level indicators

"Yellow" Grease (in recycle bin) ultimate uses:

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

Will mention grease recycle bins later in inspection portion of presentation

Defining Fats, Oils & Grease (FOG)

FOG: Organic polar compounds derived from vegetable/plant or animal sources that are composed of long chain triglycerides

Triglyceride: 3 fatty acid molecules with one glycerol

Glycerol: also referred to as glycerin; syrupy, trihydroxy alcohol (1,2,3 propanetriol) that exists in natural oils as the base

*Review Partially Hydrogenated Vegetable Oils

Water and Oil Density

SUBSTANCE	lbs./gallon
Water	8.34
Peanut oil	7.62
Olive oil	7.66
Soybean oil	7.73
Corn oil	7.69
Cocoa butter	8.04
Coconut oil	7.67
Sesame oil	7.66

Water has higher density than oil so the oil will be on top of the water.

Key Elements of FOG Program

- EPA CMOM Policy Document
  - Legal Authority
  - Plan Review & Design Standards
  - Inspections
  - Permitting / Control Mechanisms
  - Enforcement
  - Communication
  - Performance Measures
  - Public Education
  - Information Mgt. System

Legal Authority

- Sewer Use Ordinance
  - General and Specific Prohibitions
    - Prevent obstruction to the sewer system / POTW
    - Refer to FOG Ordinance or FOG Management Policy
- FOG Ordinance or Department FOG Management Policy
- Approved by City Attorney
- Example FOG Management Policy can be viewed at:

www.nashville.gov/water/environmental_compliance.htm
(Section II: Grease Mgt.)

GREASE CONTROL EQUIPMENT

Identification of two basic types

Grease Interceptor

or "Outside, underground tank"

Grease Trap

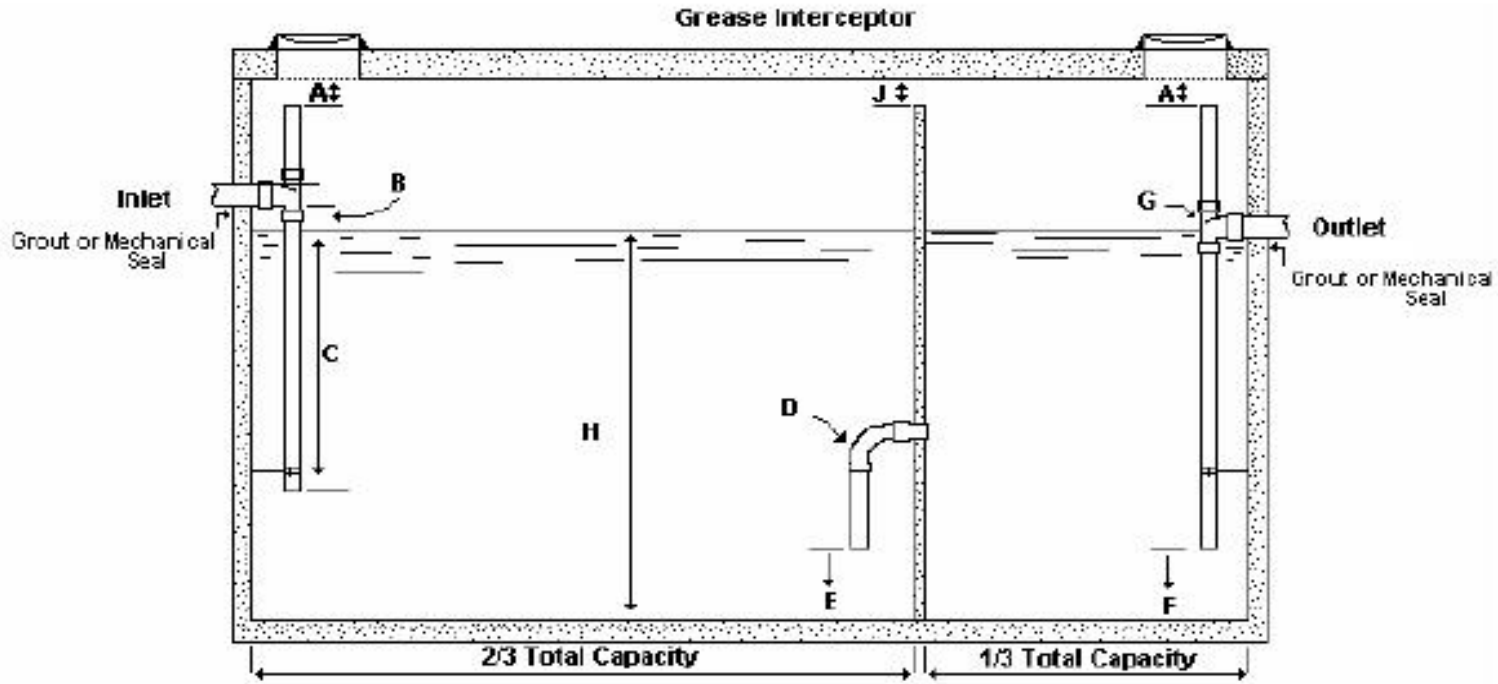
or "Inside, under-the-sink units", "floor traps", and "outdoor floor traps"

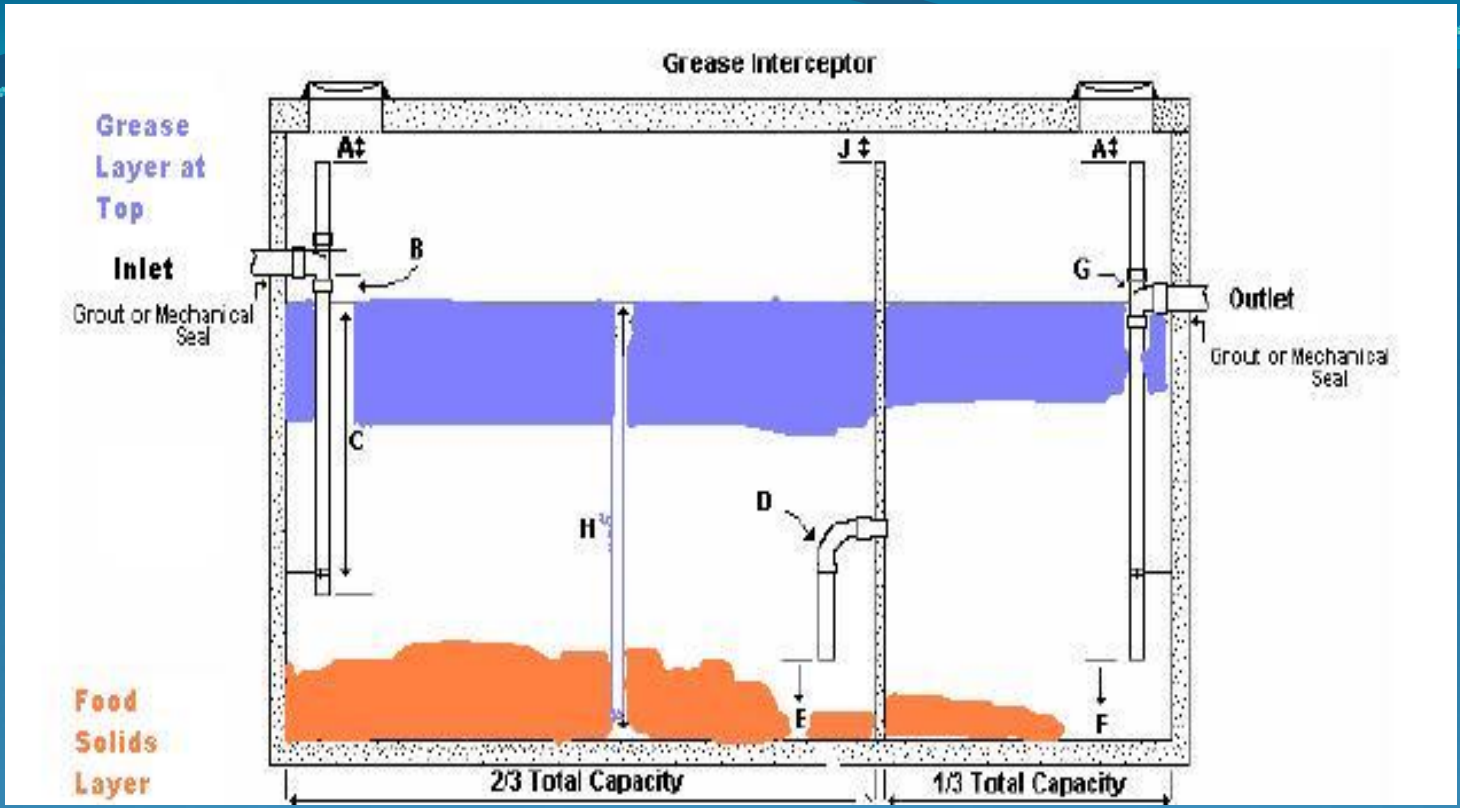
Plan Review & Design Standards

- There are dozens of grease interceptor and grease trap sizing formulas – most of which are not very good.
- Recommend adopting minimum grease interceptor sizes for types of food service establishments (FSEs)
  - Example: Fast Food Facilities- 1,000 gallons; Full Service Restaurants- 1,500 gallons; Prisons, hospitals- 2,000 gallons.
- Select a sizing formula that uses fixture units and the size of pipe
- Details on the design, installation and maintenance of the interceptor should be in the FOG Mgt. Policy or FOG Ordinance.

Based on field experience, this grease interceptor design has worked best.

** Tell about example of interceptor installed backwards*





Main components: Inlet T, Midwall Baffle, Outlet T

The top layer is the FOG layer, bottom layer is food solids layer

Normally, the food solids layer will be 1x to 2x the FOG layer, unless the FSE cooks/prepares chicken, fish, or rice, then the food layer may be 3x to 4x the FOG layer. Thus, some FSEs may need to pump more often than others.

*The 25% rule should be observed: When the FOG layer and Food Solids layer are 25% or greater than the depth of the tank then it needs to be pumped. Why? Reduced removal efficiency, and shortcircuiting.

INSPECTIONS

Review the example FSE inspection form handout

Sometimes you cannot access interceptor Manhole!

And sometimes you may not be able to find interceptor manhole…

INSPECTION Checklist

- Facility Information
- Education of FSE
- Grease Control Equipment Information
- Downstream Manhole Inspection
- Comments
  - Education emphasis
  - Corrective Action
  - Warning
  - Noncompliance Notification

Inspector equipment

- MH pullers (w/ pry bars, or large screwdrivers)
- Badge/ ID for clear recognition
- Flashlight
- Digital Camera
- pH meter or pH paper
- Safety vest
- Wrench to open cleanouts
- Long blade shovel, pole, or tube to check FOG depth
- Road Safety Cones
- Gloves
- Sanitary Wipes, paper towels
- Clipboard
- Storage area in vehicle for shovel, MH pullers (bag, pipe)

INSPECTIONS - Materials

- Brochure or information sheet or letter is critical
  - Will save time on explanation if you have picture of interceptor and trap, BMPs, contact information and other info
  - Allows the FSE something to refer to after you leave.
- Inspection Sheet
  - Leave copy of inspection sheet with FSE

Review of example brochures and handouts

Kitchen Equipment & Menu

- Deep Fryers, Wok, grill, numerous pots for cooking, etc… indicate FOG potential vs a facility with just a hot dog roller or steamer for deli sandwiches
- What is on their menu?
- Most FSE managers will automatically say "We don't have any grease"

Major FOG sources:

90% of FOG discharged to the sewer system is from:

*3 Compartment Pot wash sink

*Floors

*Pre-rinse sink to dishwasher

If the FSE has a pre-rinse sink to the dishwasher, then there will only be 1% to 2% of the total FOG discharged to the sewer coming from the dishwasher. Many cities have in their FOG Mgt. Policy to not have the dishwasher connected to the grease interceptor. This is due to high temperatures (130 to 180*F), soaps and surfactants that can allow FOG to pass through the interceptor.

Recon – things to look for before you talk to the FSE owner/manager

FOG dumping & spills

Notice black area at the top of the wood fence

Notice black area along the guard rail

Black area on concrete pad and behind concrete pad

FOG dumping & spills

FOG dumped over fence and over 1 ft deep, going down hill to tributary

FSE with no Recycle Container…
Just take out back and dump in storm sewer

150 yds downstream the grease is seen in the small tributary

Vent Hood FOG impacts

Visual Observations

- Check for location of sewer clean out covers, construction activities/pavement repair.
  - This gives you indication of the location of the FSE sewer line and if they have had recent sewer problems.

Outdoor Mop Sinks

Gutter discharging to mop sink: Inflow & Infiltration

Uncovered Mop Sinks cause I/I to sewer system and many times the mob sinks are upstream of the grease interceptor. Outdoor mop sinks should be covered.

"Type" of FSE: Practices dictate FOG discharge

- Pizza Hut produces heavy FOG
- Papa Johns produces minimal

Review Menu Items at FSE

Grease Interceptors

1000 gallon interceptor is approximately 8’ x 4’ x 4’

Proper Interceptor access

NOTE: Some 2 or even 3 MH accesses still are not over outlet T

Outlet T of Interceptor

Two outlet Ts on left have FOG residual in them. Outlet T below is clear. Some FOG residual can be in outlet T but it should not be a lot. If FOG in outlet T, then need to verify outlet T length, also check downstream manhole because likely will have moderate FOG impact.

Most important part of interceptor!

Outlet Ts – NOT CORRECT

Outlet Ts can be too short, allowing shortcircuiting. Some rely on baffle in front of outlet pipe but this is not efficient for FOG control

Flexible outlet Ts attached to wall: NOT ACCEPTABLE

Flexible material (SD-35 plastic) attached to wall in interceptor will eventually be floating in interceptor

Best policy is for no outlet T to be attached to the wall of the interceptor

Inlet T

No inlet T (picture at left), allowing FOG buildup in front of discharge pipe.
NOTE: Remind FSE mgrs to notify employees not to wash or sweep straws, stirrers, plastic bags into drains. Many times employees will remove floor drain covers during washdown.

Proper schedule 40 PVC Inlet T ½ to 2/3 the depth of the tank (picture at right) prevents back-ups into FSE, and does not allow the influent wastewater to push the FOG layer down and allow shortcircuiting.

Midwall (or 2/3 wall) baffle with different designs

Single hole opening with 90 degree schedule 40 PVC sweep or PVC T is preferred.

Some interceptors have been installed backwards…one third compartment first, then two-thirds compartment.

Mid-wall Baffle (or 2/3 baffle wall)- deterioration. Will probably need interceptor certification to confirm deterioration or leaks (gravel in bottom of tank in many cases is indicator)

Baffle irregular, deteriorating

Interceptor deterioration, baffle wall collapse, leaking, and corrosion impact to public sewer

pH of wastewater in interceptor was 1.5 standard units.

Krispy Kreme pH adjustment system

Interceptor Certification

We will review grease interceptor certification program later, but one of the main reasons for the certification program is due to deterioration or leaking tanks.

Fiberglass and Plastic alternatives

Lack of adequate location has resulted in special plastic tanks being installed in basements or parking garages. Also, the pH of grease interceptor discharges ranges from 4.5 to 6.0 standard units. Some cities have allowed fiberglass and plastic tanks to be installed. If installed, you need to make sure that groundwater will not cause any to float and that the thickness will prevent any collapse to the structure.

A few cities have required installation of filters on the outlet T of the interceptor. This has been contested by some FSEs that have had wastewater back-ups in their kitchens, and has been questioned by some health department officials.

Cleaning Frequency for Grease Interceptors

- Depends on facility's service volume
- Depends on size of grease interceptor
- At a minimum, pump complete contents of interceptor every 90 days
  - Based on studies conducted for pollutant concentrations, depth of FOG layer and food solids layer effecting efficiency of interceptor
  - Some facilities will have to pump every 60 days or every 30 days
  - Make sure plumber and grease waste hauler leave the grease interceptor with all proper components…Outlet T, Inlet T, Midwall baffle sweep. Its not just about pumping the interceptor
  - For facilities that have excess flour, dough, batter…will need to pump interceptor more often. Observe the 25% rule.
  - Also, food grinders are definitely discouraged. They contribute to pipe blockages and fill up the interceptor with food solids and make it inefficient

Interceptor Pumping

- Pump complete contents of interceptor
  - WHY? Studies have shown that partial pumps of interceptors allow for food solids buildup that can cause shortcircuiting and increase in the tank deterioration, and decrease in pH. Pump and treat onsite vendors have been sampled and results show a pump back wastewater with concentrations ranging from 9,000 mg/L to 17,000 mg/L oil and grease.
- Pump at least every 90 days or as needed in order to meet the 25% rule (FOG layer and food solids layer combined are 25% or more of the total wastewater depth in the interceptor)

Cost of Interceptor Maintenance

- Example: FSE pumps 1500 gallon interceptor every 10 months. Thus, heavy FOG layer and food solids layer. This causes the grease waste hauler to spend much more time to clean which equals high cost (estimated $750 to $1500 for annual cleaning plus cost of sewer line jetting due to no regular maintenance)
- Versus 90 day cleaning…easier maintenance and prevention of FOG clog in private sewer lines. Cost estimate for cleaning every 90 days would be $250 to $350, which is less than the one time per year cost of cleaning.

Regular maintenance of interceptor will save time and money.

GREASE TRAPS

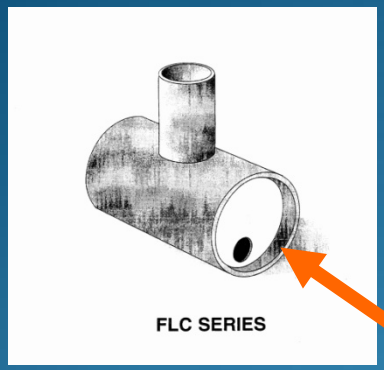
Undersink Trap

Floor Trap

Traps should only be allowed for small FSEs that serve deli foods or do not conduct any cooking.

Outdoor “floor” Traps

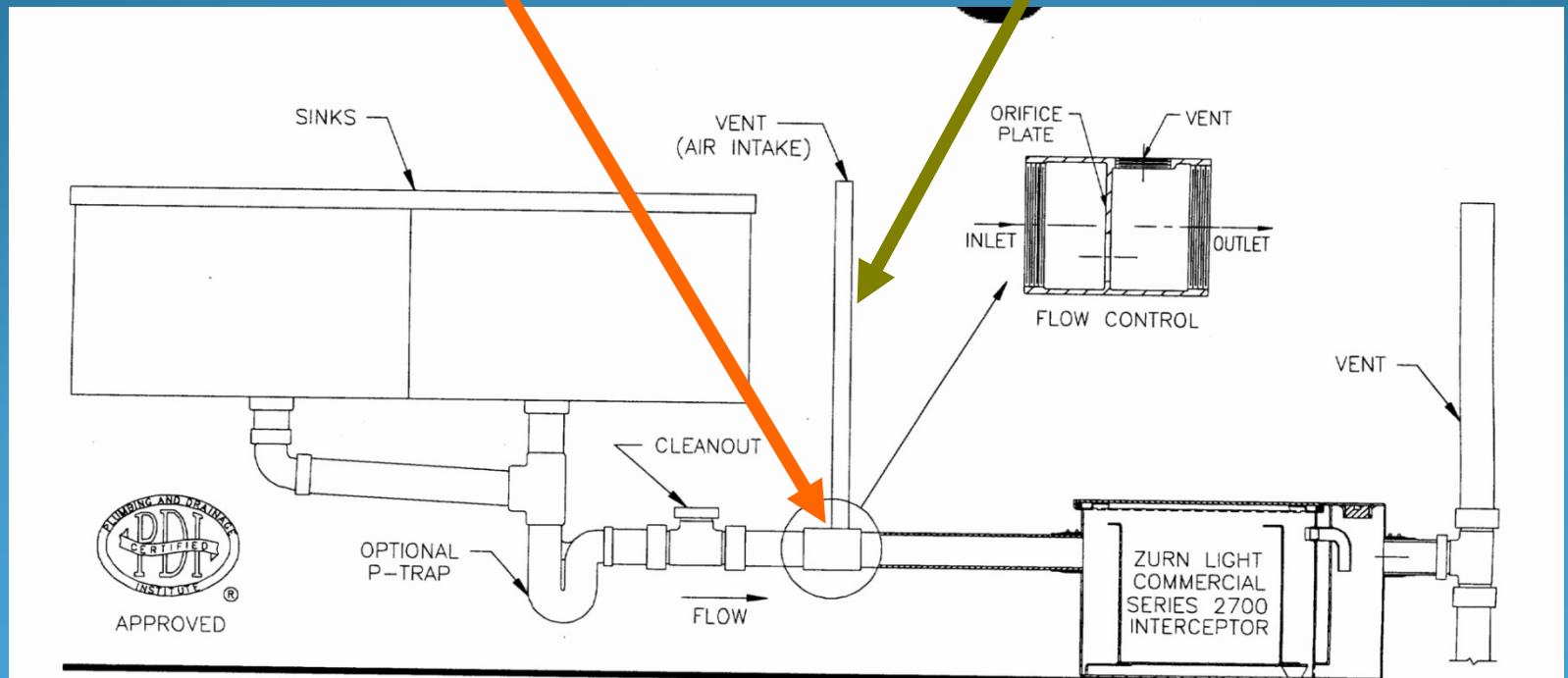
Trap installation problems



Inspections indicate that only 33% of traps are installed correctly with flow restrictor and vent pipe. Both of these components are critical for the proper operation of the trap.

Flow restrictor

Vent



Traps … limited effectiveness

Trap in basement with additives (enzymes) added before trap. Heavy FOG in downstream sewer line.

Outlet pipe of trap with no flow restrictor

Floor trap that has rusted. Many traps that have been installed in floors were never designed for below floor installation

Downstream sewer line impact…Slight, Moderate, or Heavy FOG

Identify FOG impact in sewer line. Note: Major impact may be 2 or 3 manholes downstream of FSE due to cooling of FOG

Communicate with Sewer System Cleaning and CCTV personnel

Consider slope of sewer pipe.

**Example of FSE discharging to Residential area*

Identify FOG impact. If moderate to heavy FOG then enforcement actions should be taken. Tracking of information should be in a database, and the sewer maintenance personnel should keep records of cleaning frequency.

Mobile Food Units

Records review

- Request to see the latest grease waste hauler pump manifest, or records for last year
  - If the FSE is not aware of requirement to keep records, many will have records at their “home office”
- The pump manifest should have:
  - FSE name and address
  - Date pumped
  - Time pumped
  - Volume pumped
  - Hauler name, address

BEST MANAGEMENT PRACTICES (BMPs)

- When BMPs are followed…they make a **HUGE** difference in the FOG wastewater discharge!
- BMPs can help Food Service Establishments meet SUO (city) Oil & Grease limitations
- BMPs help the Food Service Establishment prevent FOG blockages in their own sewer lines and in the city/utility sewer lines

BEST MANAGEMENT PRACTICES (BMPs)

- Recycle waste cooking oil. Put in approved oil and grease recycle container.
- Make sure you have grease control equipment (interceptor or trap) installed, regularly maintained and operating properly.
- “Dry Wipe” all pots, pans, plates and utensils prior to washing in pot wash sink or dishwasher
  - As much food, fat, oil and grease particles as possible need to be wiped off into solid waste containers

BEST MANAGEMENT PRACTICES (BMPs)

- Use strainers in sink drains to catch food scraps and other solids, and empty strainer contents into the trash.
- Post “NO GREASE” signs above the sinks
- Food grinders are discouraged since these will contribute to oil and grease discharge and also decrease the efficiency of the grease interceptor due to solids build up.

BEST MANAGEMENT PRACTICES (BMPs)

- Train and educate kitchen staff about grease control and its importance. Inform them on how they can have a positive impact on…
  - The Environment
  - Your facility's plumbing system

Permitting

- Issue FOG permit – normally 5 to 7 pages
- Issue a General Permit to FSEs
- Bottom line: how does a FSE know the regulations they must comply with?

National Restaurant Association

- Fats, Oils and Grease Control Program Tool Kit (September 2006)
  - Grease Control Equipment
  - Elements of Grease Control Programs
  - Best Management Practices
  - www.restaurant.org

Grease Control Equipment Certification Program

- Review handouts
  - Grease Interceptor Certification (Form A)
  - Grease Trap Certification (Form B)

Grease Waste Haulers and Plumbers attend the Grease Control Equipment Certification Class, view Powerpoint presentation and take a short 15 question test, then are issued Certification Cards.

Certification Program for interceptors and traps has been very successful for the cities that have implemented it. It makes grease waste haulers and plumbers responsible for identifying and reporting any problems with FSE grease control equipment.