Trimming the Fat (Part 2) – Over a Decade of Progress

City of Worcester, MA
Fats, Oil, and Grease (FOG) Program

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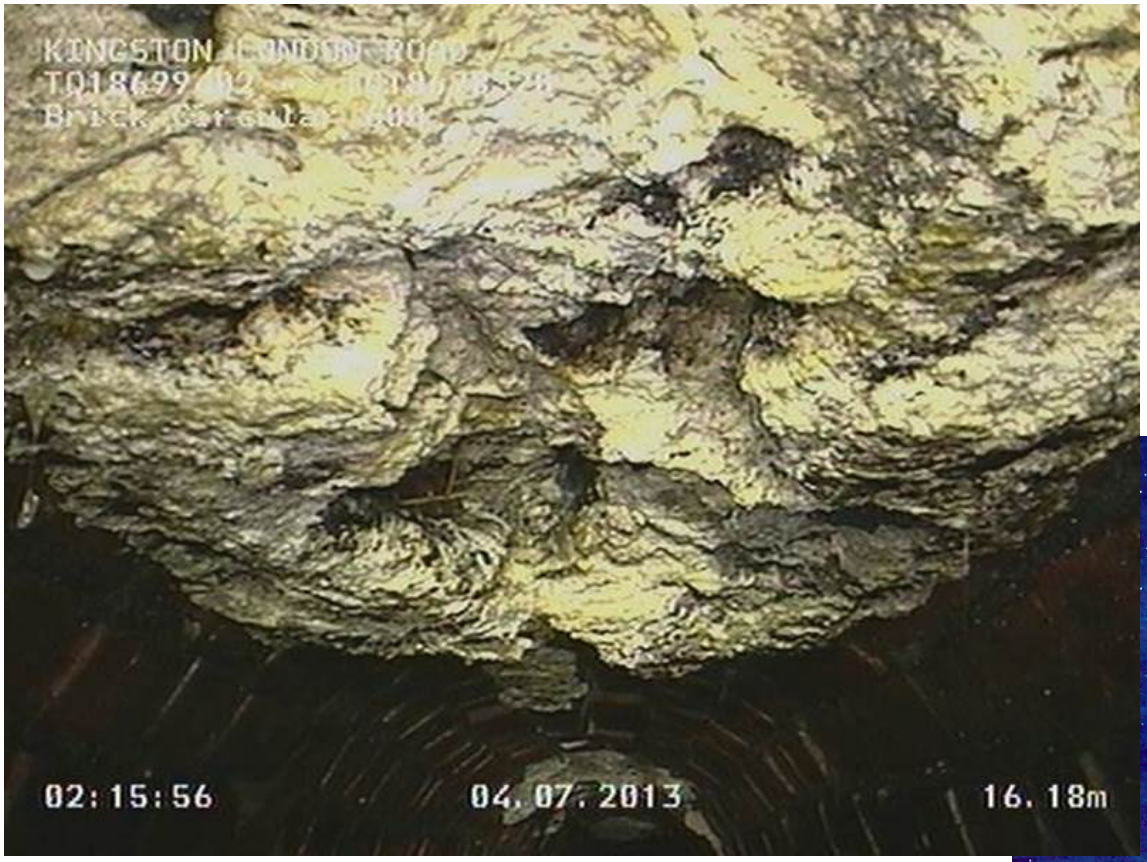
Presentation Goals

- Effects of grease in a sewer system
- Understand the risks associated with Sanitary Sewer Overflows (SSOs)
- Importance of a FOG program in preventing SSOs
- Steps required to successfully implement a FOG Program
- What we learned over a decade

Is there a problem?



FATBERG AHEAD!!!!

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Fatberg

From Wikipedia, the free encyclopedia

A **fatberg** is a congealed lump in a sewer system formed by the combination of non-biodegradable solid matter such as wet wipes with grease or cooking fat.[1][2] They have become an increasing problem in recent years, with the combination of aging Victorian drains and the rise of disposable (so-called flushable) cloths.

Contents [hide]
1 Description
2 Etymology
3 Notable cases
4 See also
5 References

A dried section of the Whitechapel fatberg, on display at the Museum of London

Description [edit]

Notable cases [edit]

- 6 August 2013: A fatberg roughly the size of a bus that weighed 15 tonnes (17 tons), consisting of food fat and wet wipes, was discovered in drains under London Road in Kingston upon Thames, London.[14][15]
- 1 September 2014: A collection of waste, fat, wet wipes, food, tennis balls and wood planks the size of a Boeing 747 aeroplane was discovered and cleared by sanitation workers within a drain beneath a 260-foot (80 m) section of road in Shepherd's Bush, London.[16][17]
- 3 September 2014: The sewerage system beneath Melbourne, Australia was clogged by a large mass of fat, grease and waste.[18]
- January 2015: As part of a campaign against drain blocking, Welsh Water released a video showing a fatberg in drains in Cardiff.[19]
- April 2015: A 40-metre-long (130 ft) fatberg was reported as having been removed from underneath Chelsea, London. It took over two months to remove the fatberg, and the damage it had caused was estimated to cost £400,000 to repair.[20]
- July 2015: A 120-metre-long (390 ft) fatberg was discovered in the city of Welshpool in mid-Wales.[21]
- January 2016: Blockage from a fatberg near Newcastle, New South Wales, Australia damaged the Eleebana sewage pumping station. The fatberg "weighed about one tonne (1.1 tons) and took four hours to remove" by crane.[22]
- September 2017: A 250-metre-long (820 ft) fatberg weighing over 140 tonnes (150 tons) was found under Whitechapel, London.[23] Even with workers working seven days a week at a cost of £1 million per month, officials said it could take as much as two months to destroy it.[24][25] Two pieces of this fatberg were cut off on 4 October 2017 and, after several weeks of drying, displayed at the Museum of London from 9 February 2018 as part of the museum's City Now City Future season.[26][27]

Sanitary Sewer Overflows

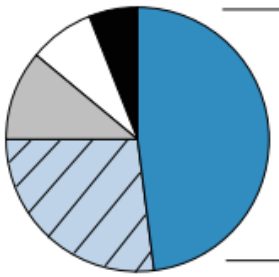
- Sanitary Sewer Overflows (SSOs) are discharges of raw sewage from the sewer system

Sanitary Sewer Overflows

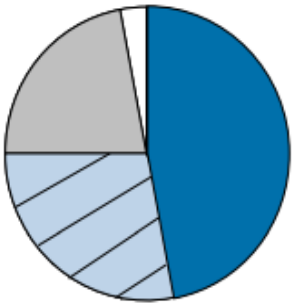
- Expose the public to dangerous pathogens
- Contaminate local waters
- Damage the environment
- Costly clean-ups and/ or fines
- Damages public confidence

What Causes SSOs?

- In 2004 the EPA released a report to Congress showing that blockages are responsible for 48% of all reported SSOs, and 47% of the blockages were a result of FOG



Causes of SSO Events	Percent
Blockages	48%
Wet weather and I/I	26%
Mechanical or power failures	11%
Line breaks	10%
Miscellaneous	5%
Total	**100%**



Causes of Blockage Events	Percent
Grease	47%
Grit, rock, and other debris	27%
Roots	22%
Roots and grease	4%
Total	**100%**

Source: *EPA's Report to Congress on CSOs and SSOs*

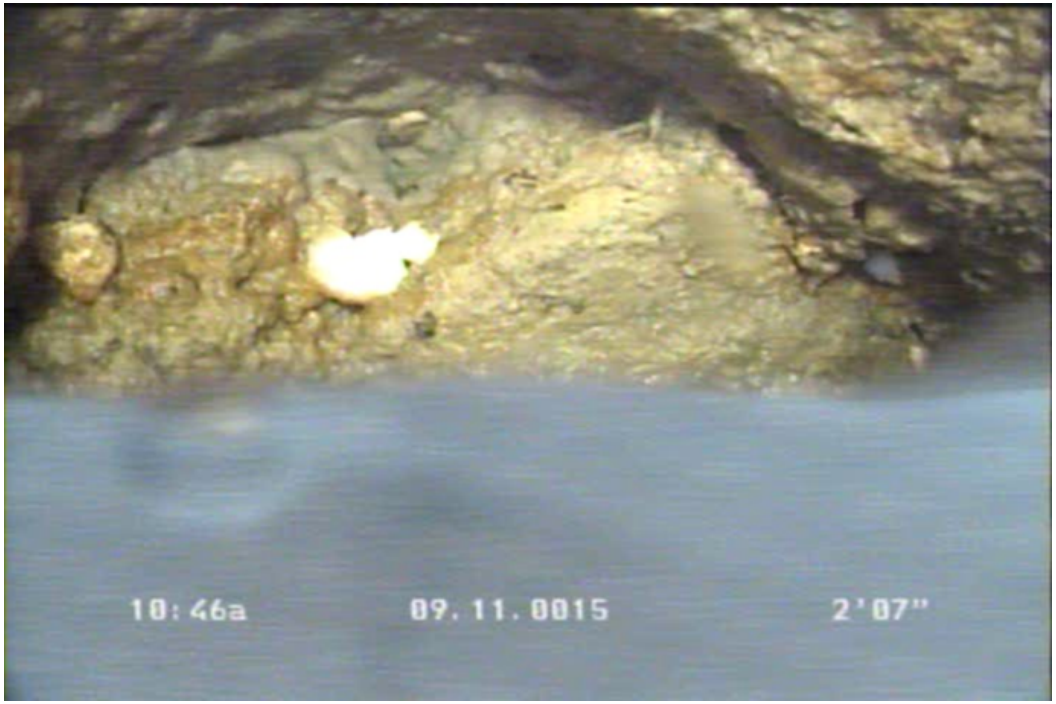
Identifying the Issues
(System Clues)

- SSO
- Sewer Blockages
- Grease in Wetwells
- Routine Treatment
- Frequent Maintenance

Observed Sewer Conditions

Grease in the Sewer System = Problem Multiplier

- Makes existing issues worse
  - Rags
  - Roots



Observed Sewer Conditions

Observed Sewer Conditions

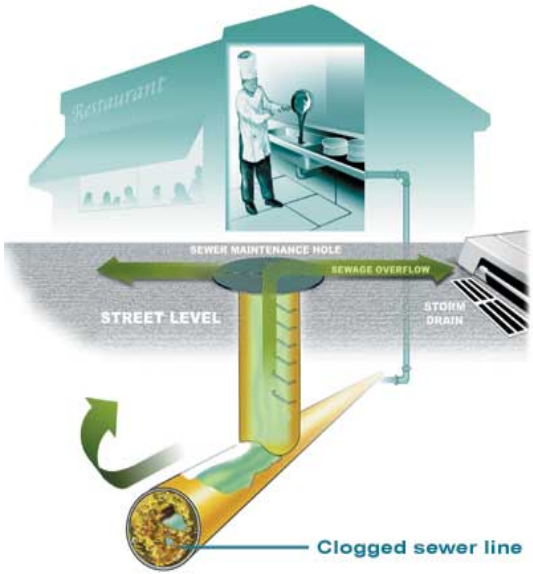
- Grease buildup causes:
  - Operational issues (pipes, siphons, pump stations)
  - Obstructions (rags and wipes bind with grease and clog pumps easier and faster)
  - Increased costs

Observed Sewer Conditions

Past Worcester SSOs

464 Reported SSOs (caused by blocked sewers between 2001 and 2017)

- 133 SSOs were caused by grease buildup
- Grease caused approximately 29% of Worcester's SSOs
- These problem areas are often in neighborhoods with many restaurants
- Worcester has over 1,300 Food Service Establishments (FSE) operating within their sewer system area

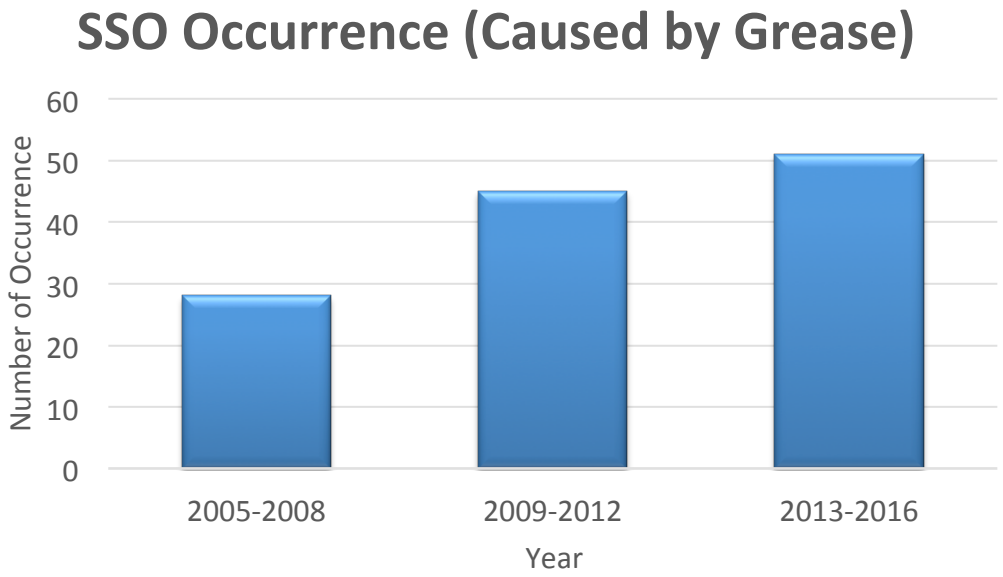


Background

- Initial FOG Program completed in 2005/06
  - Inspections Completed
  - Ordinance Updated
  - Educational Material Developed and Distributed

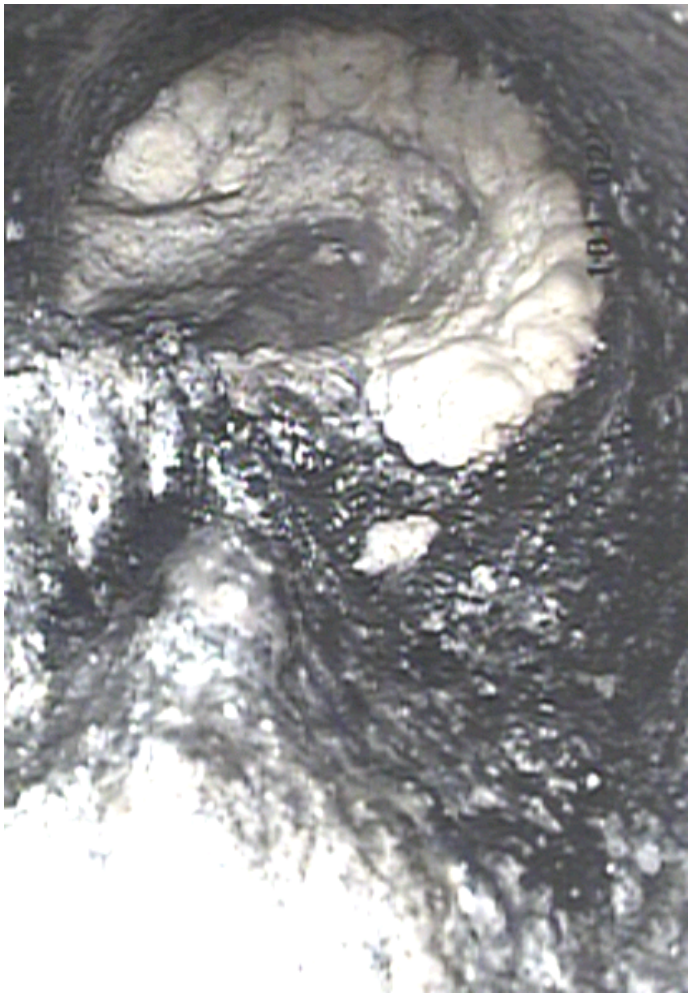
Past Worcester SSOs (cont.)

- Worcester has seen an increased number of occurrence of SSOs caused by grease since the FOG program first implemented in 2005/06



Sources of Fats, Oils, and Grease (FOG)

- Fats, Oils, and Grease are primarily generated during food preparation
- FOG enters the sewer system when kitchen equipment is washed or food and grease is flushed directly down the sewer drain
- FOG can be found in:
  - Meat Fats
  - Lard
  - Cooking Oil
  - Shortening
  - Butter and Margarine
  - Food Scraps
  - Baking Goods
  - Sauces
  - Salad Dressings
  - Dairy Products



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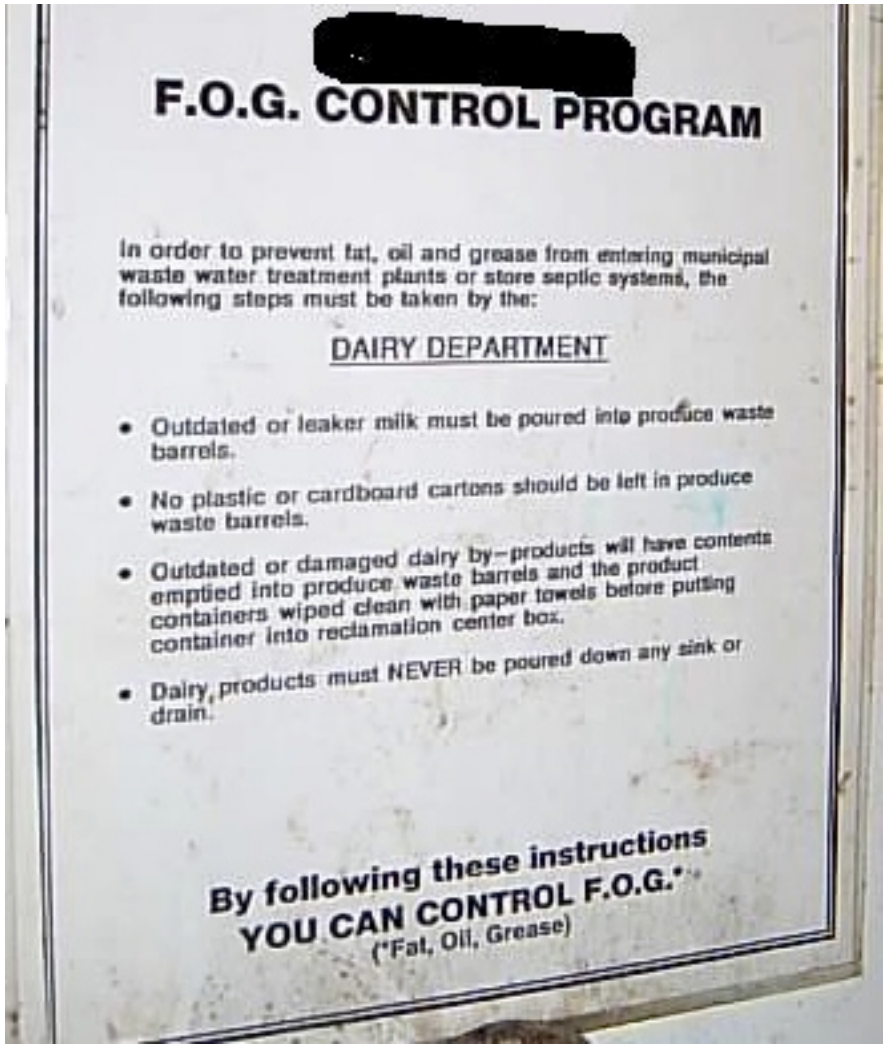
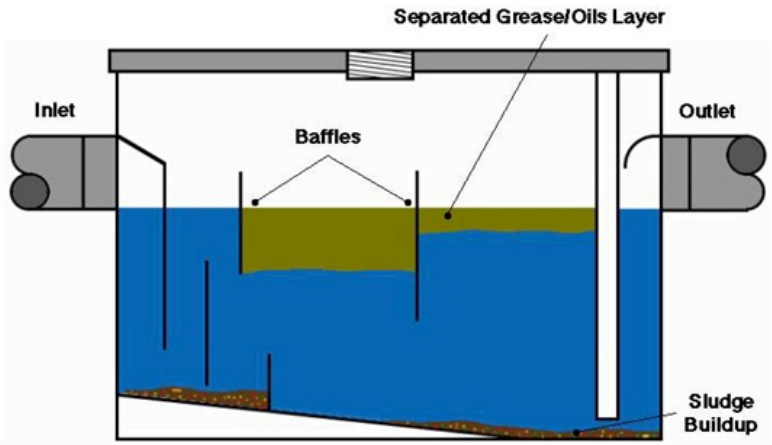
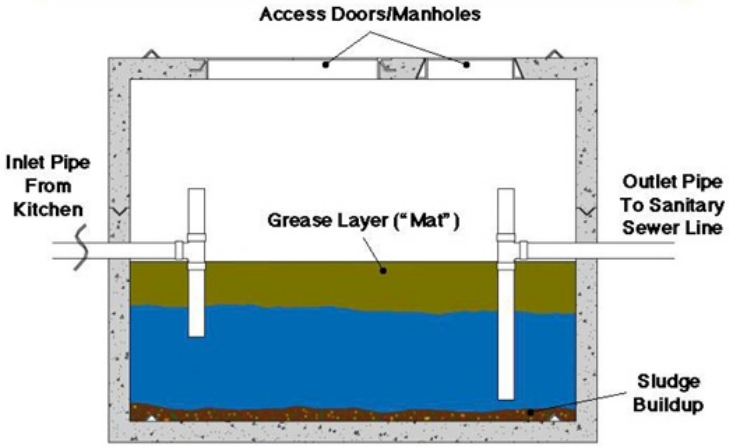


FOG Management Equipment

The two most common types of equipment:



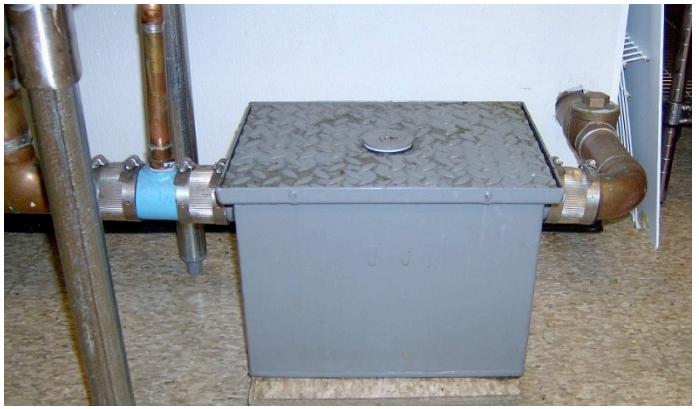
Grease traps



Interceptors

Grease Traps

- Traps are designed for rated flow that is 50 GPM or less
- Grease capacity can be up to 100 lbs
- Shall be opened and inspected at least once a week
- Automatic traps – provide self cleaning to remove FOG daily
- Manual traps – must be emptied when grease capacity is met (25% of total volume), or at least once a month



Grease Interceptors

- Large tanks located in the ground outside the facility
- Designed for rated flow that is greater than 50 GPM
- Cleaning required at least every three months

Regulations to Manage and Assist with FOG

1. State Plumbing Codes (248 CMR 10.09 and 310 CMR 15.00)
2. PDI (Plumbing & Drainage Institute)
3. Sewer Use Ordinance (City or Town)

Preliminary Investigation

- Review of Ordinances
- Field Inspection/Survey
- Database
- Education and Handouts
- Report on Findings

Inspection Program

Why do it?:

- Provides a starting point
- Inventory of Existing Facilities and Equipment
- Identify facilities that are not in compliance
- Identify frequency of maintenance
- Provides PR and Education

Inspection Program

What's Involved?:

- Notification to FSE
- Handouts and Education
- Data Collection (Interview with FSE representative)
- Identification of Amenities and Grease Equipment
- Inspect grease interceptor or trap to determine if any maintenance, repairs, replacement, or corrections are required
- Development of Database

Inspection Program

Facilities

- Restaurants;
- Cafeterias;
- Hotels;
- Hospitals;
- institutional facilities;
- Factories;
- Clubs;
- Bars where food is prepared and served; and
- All commercial kitchens; food and meat packing and processing establishments; super markets, bakeries, and other establishments where fats, oils and grease may be introduced into the building sanitary drainage system in quantities that can cause waste line obstruction or hinder sewage disposal

Plumbing fixtures

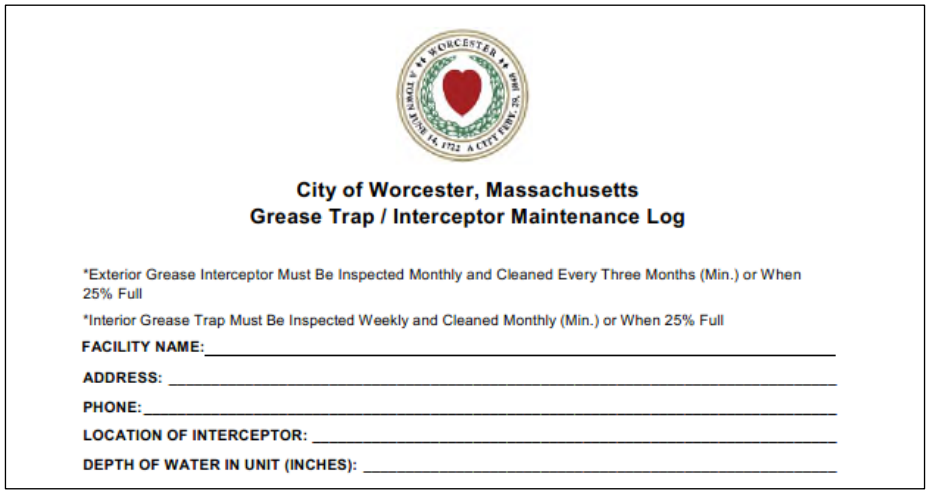
- Pot sinks (with bowl depths exceeding ten inches);
- Scullery sinks (with bowl depths exceeding ten inches);
- Floor drains;
- Floor sinks;
- Automatic dishwashers regardless of temperature;
- Pre-rinse sinks;
- Soup kettles or similar devices;
- Wok stations; and
- automatic hood wash units

Sewer Use Ordinance

- The City of Worcester requires that all food service facilities must have a grease trap or grease interceptor
  - FSE solely responsible for cleaning and maintenance
  - Inspection by City officials to assure proper cleaning and maintenance
  - Grease traps and interceptors must be properly sized to function correctly

Maintenance Requirements

- All traps must be inspected weekly and cleaned at least monthly
- All interceptors must be inspected monthly and cleaned at least every 3 months
- A log book of all maintenance must be kept



City of Worcester, Massachusetts
Grease Trap / Interceptor Maintenance Log

*Exterior Grease Interceptor Must Be Inspected Monthly and Cleaned Every Three Months (Min.) or When 25% Full

*Interior Grease Trap Must Be Inspected Weekly and Cleaned Monthly (Min.) or When 25% Full

FACILITY NAME: _____

ADDRESS: _____

PHONE: _____

LOCATION OF INTERCEPTOR: _____

DEPTH OF WATER IN UNIT (INCHES): _____

Administrative Enforcement

- Provide a written notice if the grease interceptor or trap requires any maintenance, repair, replacement, or corrections. The facility shall have 90 days to correct all deficiencies
- Issue a Notice of Violation (NOV), if failure to:
  - proper maintain the grease interceptor or trap in accordance with the City Ordinance
  - report significant changes in operations, or wastewater constituents, and characteristics
  - maintain a file of records on site at all times
  - provide logs, files, records, or access for inspection or monitoring activities
    - Failure to provide access includes not having the necessary tools onsite and within clear view or grease traps to allow for quick access
  - Discharge of grease into the sewer system in excess of 100 mg/L or resulting in sewer blockage

Inspection Program

Notification and Handouts:

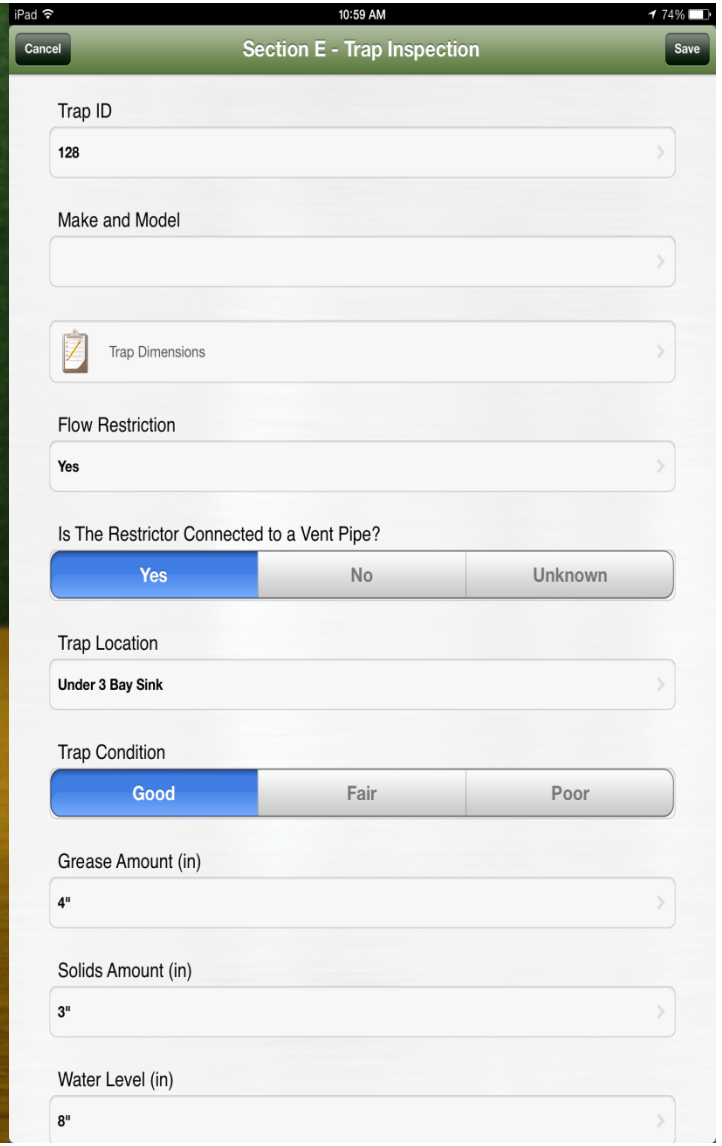
- FOG Do's and Don'ts
- Over the Sink Sticker
- WEF Pamphlet
- How to Clean Grease Trap
- Maintenance Log

Inspection Program

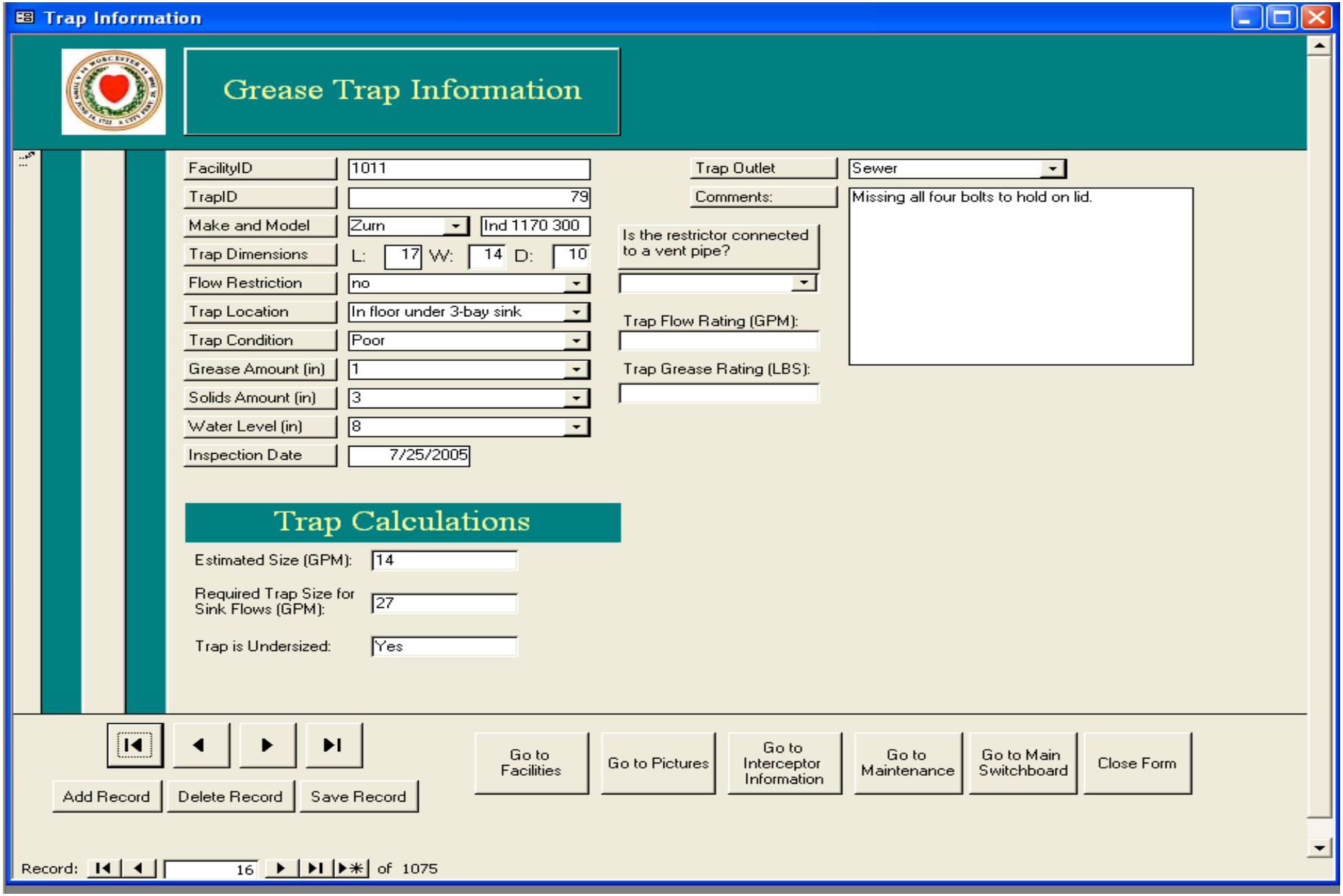
Tools & Equipment:

- Tools (socket set, hex wrench, screw drivers, gloves)
- Sampler (Sludge Judge)
- Camera
- Tablet PC
- Forms

FOG Database



FOG Database



Grease Trap Violations

City of Worcester, MA

Facility Name

Address

Premise ID 37179

Facility ID 775

Facility Has a Grease Trap: ☑

Facility Requires a Larger Trap: ☑

Facility Requires Additional Trap ☑

Trap ID	Estimated Size of Trap	Required Trap Size (gpm) For Existing Sink Connections	Trap is Undersized
470	19	24	Yes

Amenities Requiring Grease Collection	Connected to a Trap	Trap ID
1 Mop Sink	☐	470
1 3 Bay Sink	☑	470
1 Floor Drains	☐	470

Facility Name

Address

Premise ID 31871

Facility ID 708

Facility Has a Grease Trap: ☑

Facility Requires a Larger Trap: ☐

Facility Requires Additional Trap ☑

Trap ID	Estimated Size of Trap	Required Trap Size (gpm) For Existing Sink Connections	Trap is Undersized
216	29	8	No

Amenities Requiring Grease Collection	Connected to a Trap	Trap ID
1 Mop Sink	☐	216
1 Floor Drains	☐	216

Grease Equipment Violations

- Equipment violations prior to 2006:
  - No. of Undersized Grease Traps: 426 (53%)
  - No. of Minor Inadequacies: 125 (16%)
  - No. of Facilities Needing Additional Traps: 524 (66%)

- Equipment violations following Program:
  (between 2006 and 2015)
  - No. of Undersized Grease Traps: 131 (11%)
  - No. of Minor Inadequacies: 49 (4%)
  - No. of Facilities Needing Additional Traps: 43 (4%)

Grease Equipment Violations

Worcester

- Lack of Maintenance:
  - Missing Maintenance Logs (62%)
  - Cleaning Violations (>75%)

Then and Now

Then and Now

Then and Now

Then and Now

Now


ORTANT
terceptor Shall
d Thoroughly
Regular And
Failure To Do

What to Expect

- Significant pushback after implementing FOG policies
- After ordinance, cleaning frequency was an issue
- Need policy for follow-up inspections and fines/enforcement
- Restaurant Associations

Education

- Mindful of cleaning traps regularly
- Awareness of current ordinance and requirements

Education

Residential grease disposal and education

FOG Maintenance Issues

- Monthly Trap Maintenance:
  - 5,500 lbs. of FOG not captured annually
- Bi-Weekly Trap Maintenance:
  - 600 lbs. of FOG not captured annually
- Grease traps/interceptors are not effective enough as the only treatment of FOG

Lessons Learned

- Be Pro-Active
- Interdepartmental Responsibilities
- Regulations
- Public Education
- Ongoing Process (Maintenance and Continued Inspections)
- Other Methods

Worcester Sewer Operations

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transform your environment

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thank you

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Observed Sewer Conditions

- Many manholes in the City are "twin" manholes.
- Blocked sewers lead directly to SSO conditions.

meals per day. If the average amount of FOG produced per meal is 0.035 pounds per meal or customer, then the FSE is producing 17.5 pounds of FOG per day. If they are open everyday then they would produce 122.5 pounds of grease each week, 525 pounds per month and 6,300 pounds per year. Let's consider the ramifications:

Let's say the FSE has a 35 GPM/70 pounds capacity hydromechanical grease interceptor (HGI). 70 pounds total capacity divided by 17.5 pounds of grease produced each day means the HGI should be pumped out every four days assuming the device is 100 percent efficient to its operational capacity. If we assume that the interceptor meets its certified efficiency of 90 percent that would mean that a properly sized HGI being maintained correctly would bypass seven pounds of grease in four days and would therefore have retained 63 pounds.

Now lets say the FSE is having the HGI

Inspection Program

Why do it?:

- Sewer Blockage – caused of SSOs

Could lead to

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Past Inspection Program Findings

- The Good…

Past Inspection Program Findings

- The Bad…

Past Inspection Program Findings

- The Ugly…

FOG Database

Contains records for all FSEs:

- Facility and operator information, and general activities
- Type and size of all FOG generating amenities
- Type and size of FOG collection equipment with picture
- Maintenance practices

FOG Database

- Generates Reports on Facilities':
  - Inspection Status
  - Violations
  - FOG Generating Amenities
  - Wastewater Flow Amounts

FOG Database

Benefits for the City:

- Tool to identify grease contributors
- Link with GIS
- Permanent Record
- Tracking Tool