Fats, Oil and Grease

Bill Gefroh

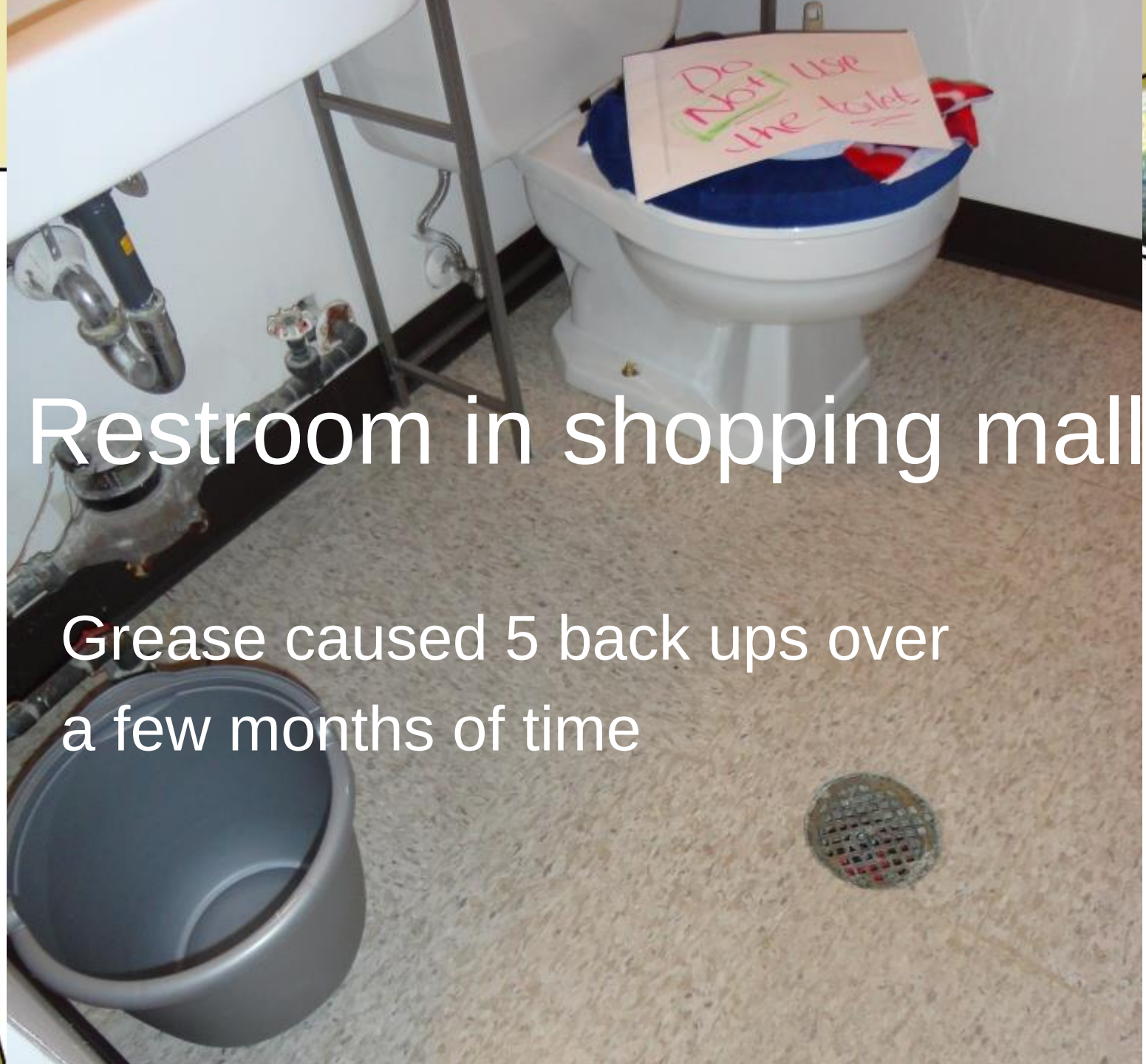
City of Bismarck

Why Start a FOG Control Program?

- Prevent/reduce sanitary sewer overflows
  - FOG build-up is typically the number one cause of public and private sewage spills
- Reduce operational and maintenance costs in the collections system
  - Grease enhances obstruction by combining with paper (non-dispersibles) tree roots, and hair which reduces pipe capacity requiring more jetting

Why Start a FOG Control Program?

- To decrease the organic loading (BOD) to the wastewater treatment plant and reduce related odors
  - Oil and grease hinders wastewater treatment
- Reduce commercial FOG at the source
- Standardize FOG practices
- EPA requirement

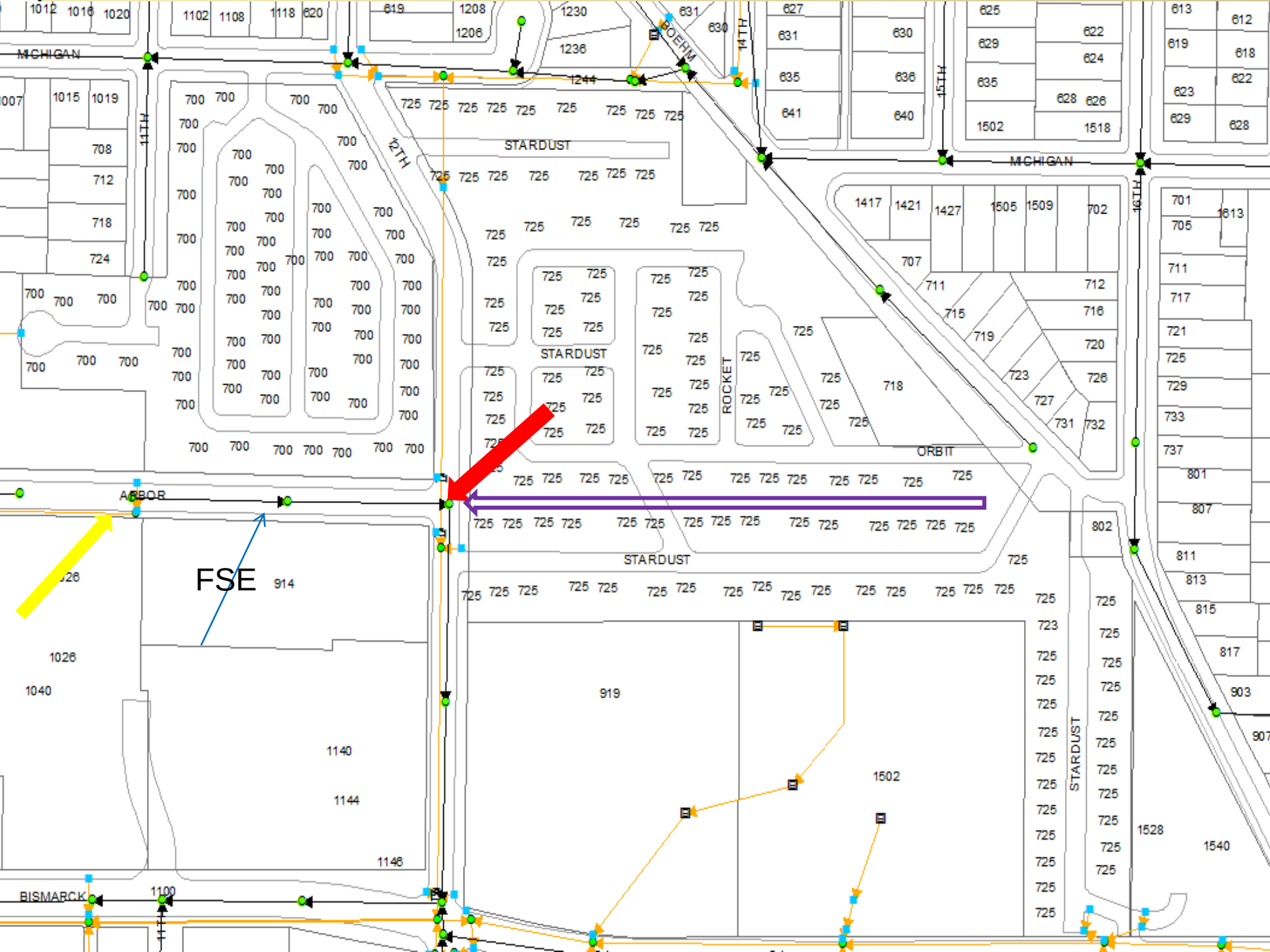


Restroom in shopping mall

Grease caused 5 back ups over a few months of time


rease out
r drain.


Outlet plugging was lending to flow restriction
and was causing sewer backup


MICHIGAN
STARDUST
ROCKET
ORBIT
ANN ARBOR
BISMARCK
FSE
914
919
1026
1040
1140
1144
1146
1502
1528
1540


Sewer back-up, picture after jetting pipe


Gate City Bank
Hancock Fabrics
HOBBY LOBBY

Why Develop a FOG Program? Continued

- Code of Federal Regulations
  - General

403.5 (a)(1) National pretreatment standards: Prohibited discharges. “A user may not introduce into a Publicly Owned Treatment Works any pollutant which causes Pass Through or Interference”

  - Specific

403.5 (b) “In addition, the following pollutants shall not be introduced into a Publicly Owned Treatment Works: (3) Solid or viscous pollutants in amounts which will cause obstruction to the flow in the Publicly Owned Treatment Works resulting in interference”

How to Get Started

- Adopt Uniform Plumbing Code in city ordinance
- Commercial wastewater discharges are regulated by Industrial Pretreatment Program
- Survey of food service establishments (FSEs)
- Work with other City Departments, Haulers, FSEs and automotive facilities
- Identify and implement FOG best management practices

FOG Program Objectives

- Require grease removal devices for new Class One FSEs
- Have all FSEs incorporate Best Management Practices (BMPs)
- Require servicing and documentation of grease removal devices (GRD)
- Help create/locate a FOG outlet
- Identify current practices
- Perform a FOG study


Problems from FOG


DANGER
EXIT


CAUTION


AG-GATOR 3000
13
14
11


Primary Clarifier Scum Pit


Lift Station Wet well


5

Understanding the Spatial Formation and Accumulation of Fats, Oils, and Grease Deposits in a Pilot Sewer Collection System

Christopher Cyril Sandeep Dominic[1] , Megan Szakasits[2] , Dr. Joel Ducoste[1]
[1]- Department of Civil and Environmental Engineering, North Carolina State University
2- Department of Chemical Engineering, North Carolina State University

Objective:

To quantify the amount of spatial variation in fats, oils, and grease (FOG) deposit formation and accumulation in a pilot-scale sewer collection system.

Materials and Method:

The pilot-scale sewer system consists of different pipe configurations (i.e., straight pipes and manholes), obstructions (i.e., root intrusions) and pipe deformation (i.e., pipe sag) as shown in Figure 1.

Figure 1: Schematic of pilot-scale sewer system

- The system is operated three times daily to simulate the peak hour flows in restaurants and continued for 1 month.
- Water, vegetable oil, and calcium salts flows through the system at 1 gpm, 9 mL/min and 45 mL/min, respectively . The feed rates of oil and calcium were calculated based on a typical sewer concentration of 200 mg/L (restaurant discharge) and 50 mg/L (background wastewater concentration), respectively.
- Two experiments were conducted at acidic (pH 10)
- There was significant difference between the two pH conditions. Even though both the conditions generated solids, the higher pH condition produced significantly more solids accumulation.
- Samples were scrapped from different sections of the system and sent for FTIR-ATR analysis. The FTIR analysis confirmed that the solids are indeed calcium based fatty acid salts (Figure 4).

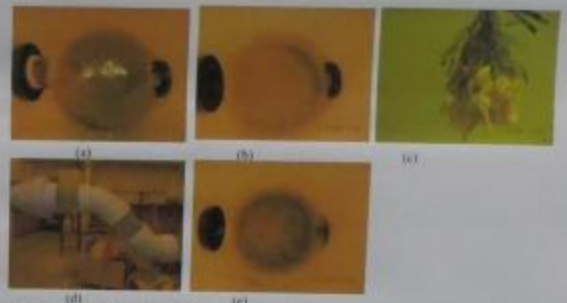


Figure 2: Accumulation of solids due to Calcium Hydroxide in various parts of the sewer system. (a) Manhole 1; (b) Manhole 2; (c) Root Intrusion; (d) Pipe sag; (e) Manhole 3.

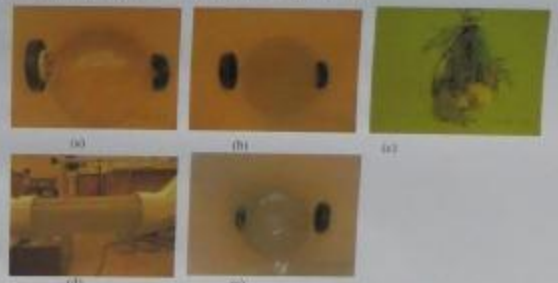
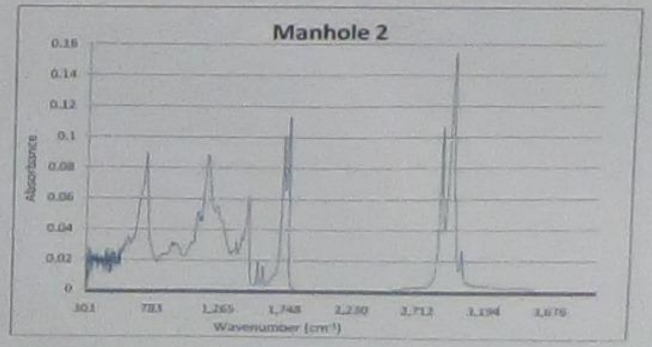


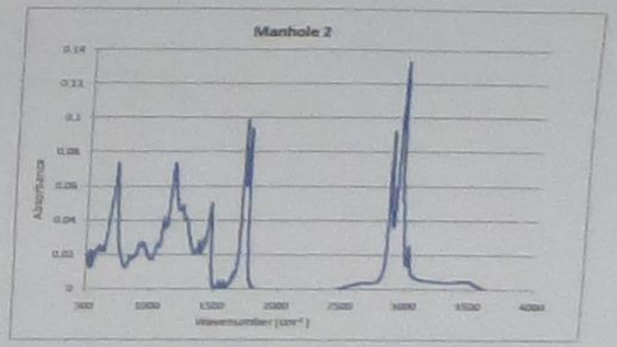
Figure 3: Accumulation of solids due to Calcium Chloride in various parts of the sewer system. (a) Manhole 1; (b) Manhole 2; (c) Root Intrusion; (d) Pipe sag; (e) Manhole 3.

(d) (e)

Figure 3: Accumulation of solids due to Calcium Chloride in various parts of the sewer system. (a) Manhole 1; (b) Manhole 2; (c) Root Intrusion; (d) Pipe sag; (e) Manhole 3.



(a)



(b)

Figure 4: FTIR analysis of solids formed in the pilot sewer system due to (a) Calcium Hydroxide; (b) Calcium Chloride.

Preliminary Conclusions:

From the experiments conducted, it suggests that if calcium hydroxide is released at the concrete pipe surface in the presence of FOG, then there may be the potential for alkali hydrolysis of FOG to occur and enhance the formation of insoluble calcium salts of fatty acid.

Future Work: Tests are being conducted with FOG released with free fatty acids at neutral pH to assess the impact of pre-hydrolized FOG.

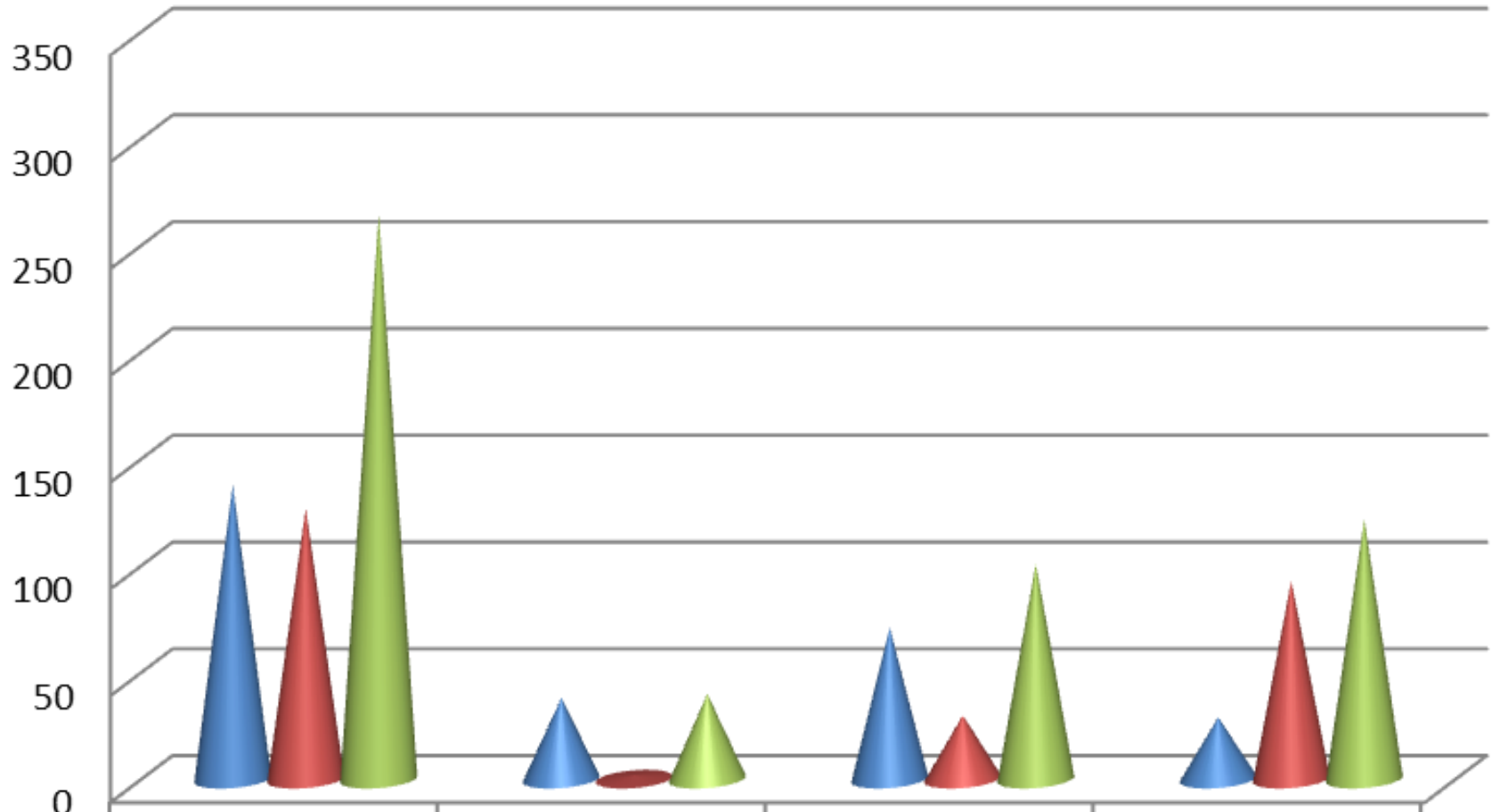
Acknowledgement: This research is funded by EPA STAR grant 83426401


Private Lift Station
Before FOG Program

How we Identified FOG Sources

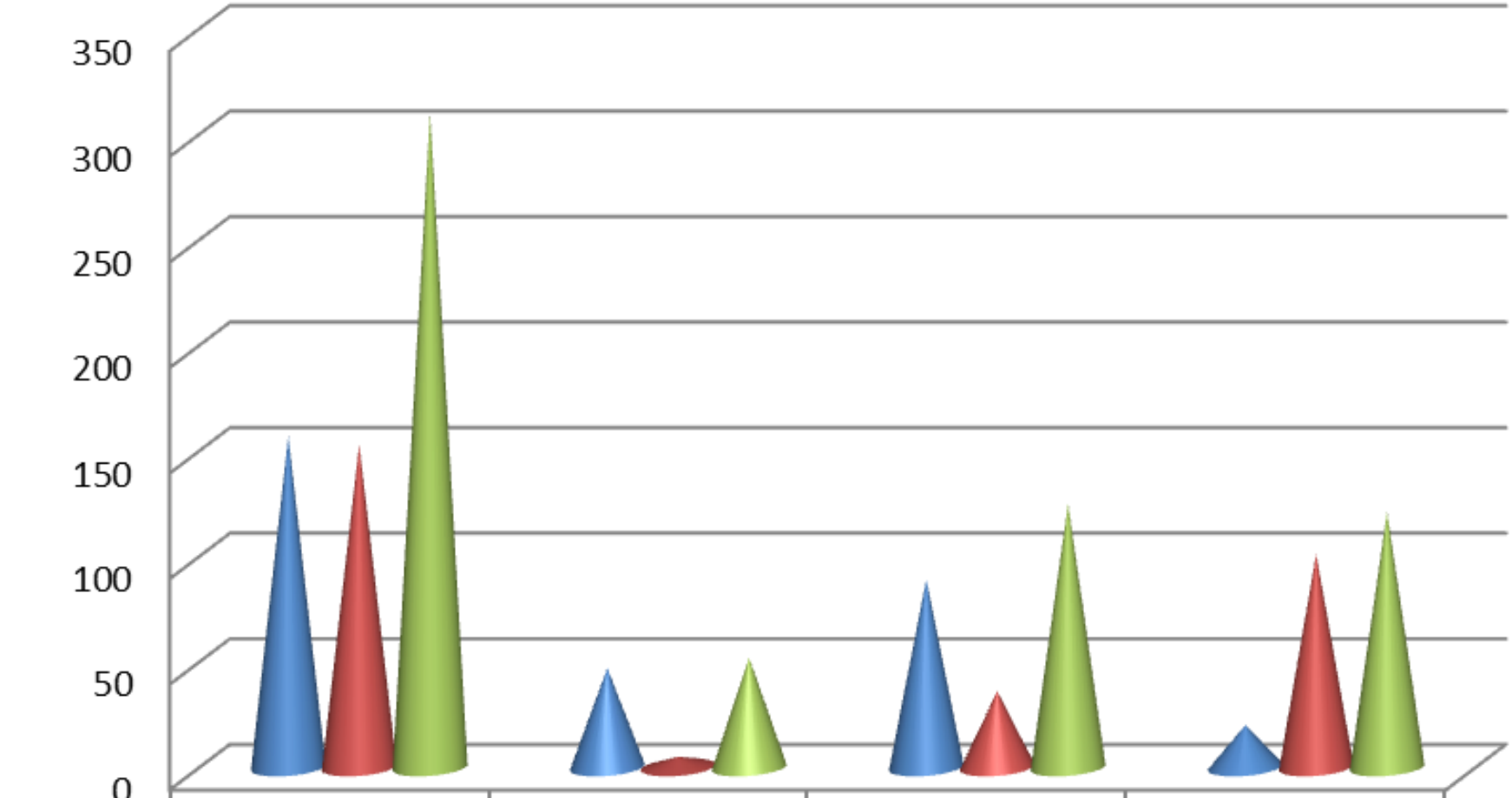
- 2004 FSE Survey
- Yearly Industrial Waste Survey
- Wastewater Collection Staff
- Sanitary Sewer Inspections
- Restaurant Health Inspectors

~ 2010



	FSE	Grease interceptor	Grease Trap	No Grease Removal Device
Class I	138	38	71	29
Class II	127	2	30	93
Total	265	40	101	122

2016



	FSE	Grease interceptor	Grease Trap	No Grease Removal Device
Class I	157	47	89	20
Class II	153	5	36	101
Total	310	52	125	121

Food Service Establishment Classification

Class I FSE

- Any establishment where a grill, deep fry unit, broaster, wok or grease producing process. Restaurants, hotel kitchens, hospitals, school kitchens, factory kitchens, cafeterias, clubs and some convenience stores

Class II FSE

- Any establishment using only a heat-producing device, such as a microwave, conventional oven, toaster oven, hot dog rotisserie, etc.
- Any FSE that prepares and/or serves meals 2 or fewer times per week such as churches
- Satellite FSE where primary food preparation is conducted offsite or initial preparation of foods does not occur

Bismarck FOG Ordinance

- New Class 1 FSEs have to install a GI
  - All new FSEs have to submit plumbing plans
- Existing Class 1 FSEs shall install grease interceptors when
  - Structural remodel the kitchen area and plumbing
  - Cause excessive grease accumulation in the sanitary sewer

How does the FOG Control Ordinance affect FSEs?

- Best Management Practices (BMP's) are required
- Require new Class I FSEs to install grease interceptors
- Grease removal devices must be properly maintained
- All FSEs must install screens on all drains (including garbage grinders)
- Ban use of enzymes, chemicals or biological agents intended to flush/clean grease traps or interceptors
- Documentation of maintenance of grease removal devices and training of employees

Summary of Program Implementation

- Survey the collection system problems
- Survey the FSEs
- Work with the FSEs and internal resources
- Educate the FSEs and the public
- Develop short-term and long-term goals
- Take action
- Need to perform inspections to verify compliance

Current Progress

- Numerous FSEs were grandfathered from having to install a grease interceptor, however many are now being required to install grease traps
- Identified 142 automotive facilities for oil control, 93 have sand traps

Sources of F
(FOG

What is required?

1. Installation of drain screens.
2. Segregation and collection of waste cooking oil.
3. Disposal of food waste.
4. Employee Training
5. Kitchen Signage
6. Grease Removal Device Maintenance


SS-300
MAY 21 2008


JUL 8 2008


JUL 2 2008


15 1:44PM


ISE
MAY 30 2008


ON
OFF
JUN 2 2008


LG
cingular
MAR 27 2008


APR 11 2008


shing
JUL 24 2008


Power Soak
Power Soak
SEP 11 2008


No screens can add to plugging problems

What is required?

1. Installation of drain screens.
2. Segregation and collection of waste cooking oil.
3. Disposal of food waste.
4. Employee Training
5. Kitchen Signage
6. Grease Removal Device Maintenance


180704
RYKOFF-SEXTON
INTERNATIONAL
IMPORTED
Pineapple
TIDBITS IN JUICE
MAR 2 2010


Pouring grease down the drain adds to
Plugging problems

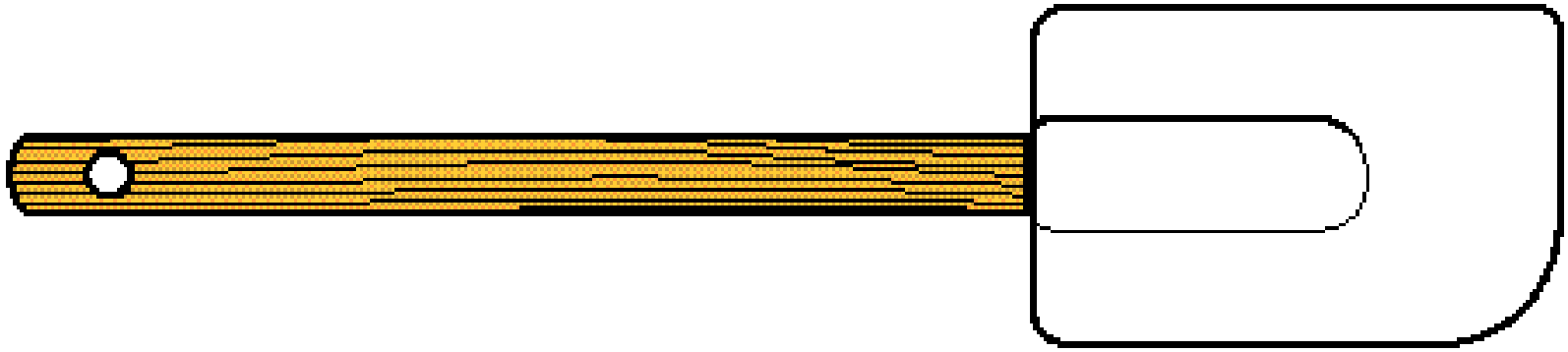
GREASE
ONLY

What is required?

1. Installation of drain screens.
2. Segregation and collection of waste cooking oil.
3. Disposal of food waste.
4. Employee Training
5. Kitchen Signage
6. Grease Removal Device Maintenance

Choose Your Weapon!

The Rubber Spatula



Your First & Best Defense

DRY CLEAN UP- Scrape Out Excess

What is required?

1. Installation of drain screens.
2. Segregation and collection of waste cooking oil.
3. Disposal of food waste.
4. Employee Training.
5. Kitchen Signage.
6. Grease Removal Device Maintenance.

Documentation

City of Bismarck Fats, Oils and Grease BMP Video Viewing Log Sheet

Business:_____

Date	Employee Name (Print)	Employee Name (Signature)*

**My signature indicates that I have watched the City of Bismarck's Video on Best Management Practices for controlling Fats, Oils, and Grease which enter the City's wastewater treatment system.*

What is required?

1. Installation of drain screens.
2. Segregation and collection of waste cooking oil.
3. Disposal of food waste.
4. Employee Training
5. Kitchen Signage
6. Grease Removal Device Maintenance

Keep grease out of your drain.

A drainage service message brought to you by the
Bismarck Department of Public Works

www.bismarck.org


Grease
Menace
Keep grease
out of your
drain.
Oasis
ECOLAB
Oasis
ECOLAB


Keep grease
out of your
drain.

What is required?

1. Installation of drain screens.
2. Segregation and collection of waste cooking oil.
3. Disposal of food waste.
4. Employee Training
5. Kitchen Signage
6. Grease Removal Device Maintenance

City of Bismarck Industrial Pretreatment Program 11/05

Bismarck

Grease Trap Maintenance Log Sheet

Business:_____ **Trap ID**_____

Date	Manager Supervising Cleaning	Employee Cleaning Trap	Grease Layer in Inches	Bottom Layer in Inches	How was waste disposed of?
10-27-07	Tom	Walts Plumbing			
2-7-08	Tom	Walts Plumbing			
5-23-08	Tom	Tom	~~1~~	~~1~~	Grease Barrel
10-2-08	Walts	Walts	1 1/2		"
3-6-09	Tom	Tom	1 inch	~~0~~	"
9-1-09	Walts	Walts	1/2 inch	approx ~~1~~/4 inch	" Barrel any grease


SO, I'M JUST SITTING HERE AND THE WHOLE DANG THING EXPLODES!
I'M JUST AS SURPRISED AS YOU ARE.

Grease Trap

- Grease Trap
  - Located in the kitchen area or basement
  - Small in size
  - Require frequent cleanings
  - Less efficient at removing total FSE grease?

Grease Trap Sizing Criteria

Rate of flow, gpm	Grease retention capacity, lbs.	Maximum allowable fixture volume in gallons
20	40	50
25	50	62.5
35	70	87.5
50	100	125

The volume of the fixtures connected to the grease trap should not exceed two and one half times the flow rate in gallons per minute of the grease trap.

Plumbing Code

1014.2 Hydromechanical Grease Interceptors.

1014.2.1 Plumbing fixtures or equipment connected to a Type A and B hydromechanical grease interceptor shall discharge through an approved type of vented flow control installed in a readily accessible and visible location. Flow control devices shall be designed and installed so that the total flow through such device or devices shall at no time be greater than the rated flow of the connected grease interceptor. No flow control device having adjustable or removable parts shall be approved. The vented flow control device shall be located such that no system vent shall be between the flow control and the grease interceptor inlet. The vent or air inlet of the flow control device shall connect with the sanitary drainage vent system, as elsewhere required by this code, or shall terminate through the roof of the building, and shall not terminate to the free atmosphere inside the building.

Plumbing Code

1014.2.2 The total capacity in gallons (L) of fixtures discharging into any hydromechanical grease interceptor shall not exceed two and one-half (2-1/2) times the certified GPM (L/m) flow rate of the interceptor as per Table 10-2.

For the purpose of this section, the term "fixture" shall mean and include each plumbing fixture, appliance, apparatus, or other equipment required to be connected to or discharged into a grease interceptor by any provision of this section.

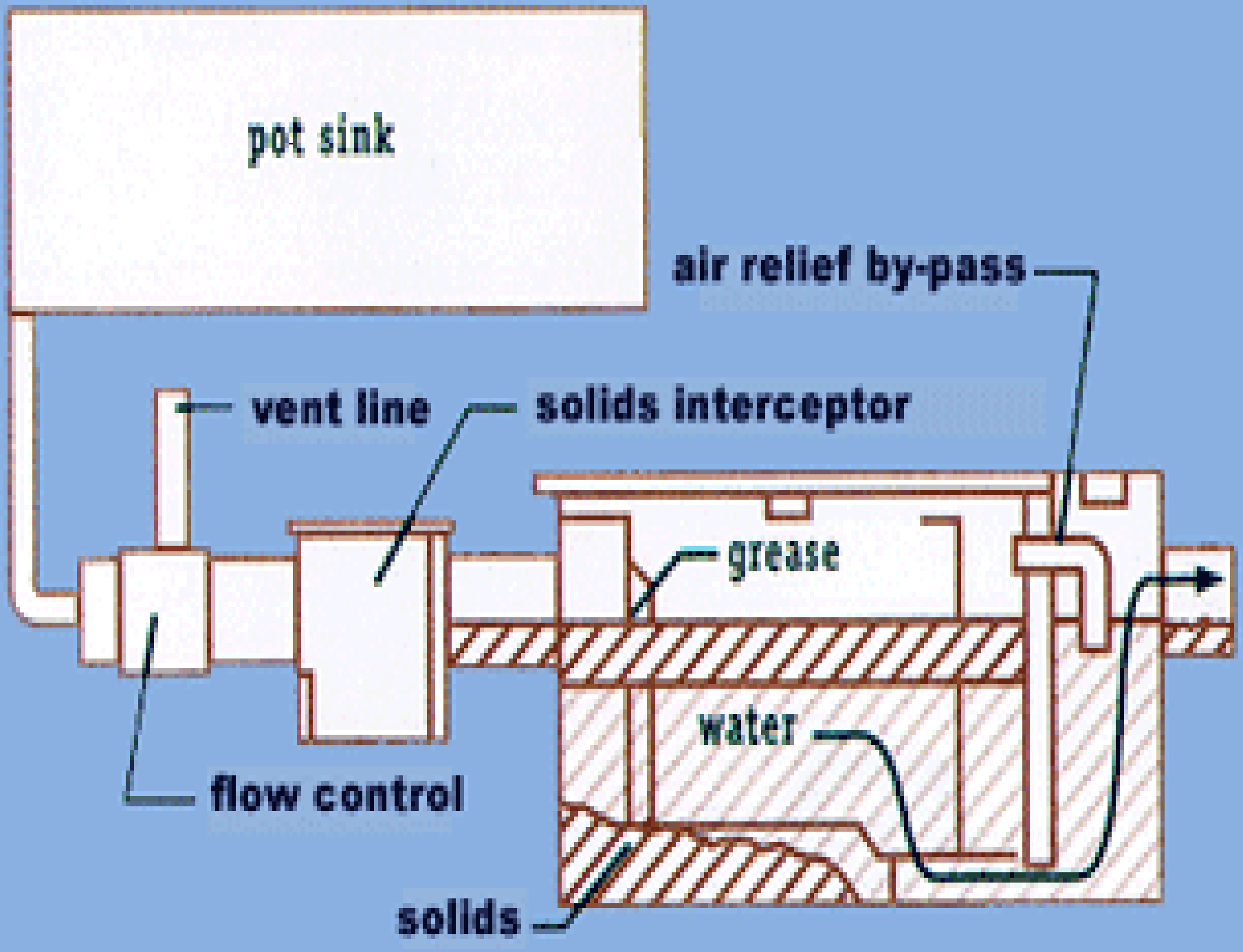
1014.2.3 A vent shall be installed downstream of hydromechanical grease interceptors in accordance with the requirements of this code.


QUIET SYSTEM
333
Cascade
Cascade


JUL 24 2008


NIVEL LLENO
AUG 25 2008


QUIET SYSTEM
333
• 1/2 Horsepower
• 3 Year Warranty
Cascade
Cascade
SHINE SHIELD
Cascade

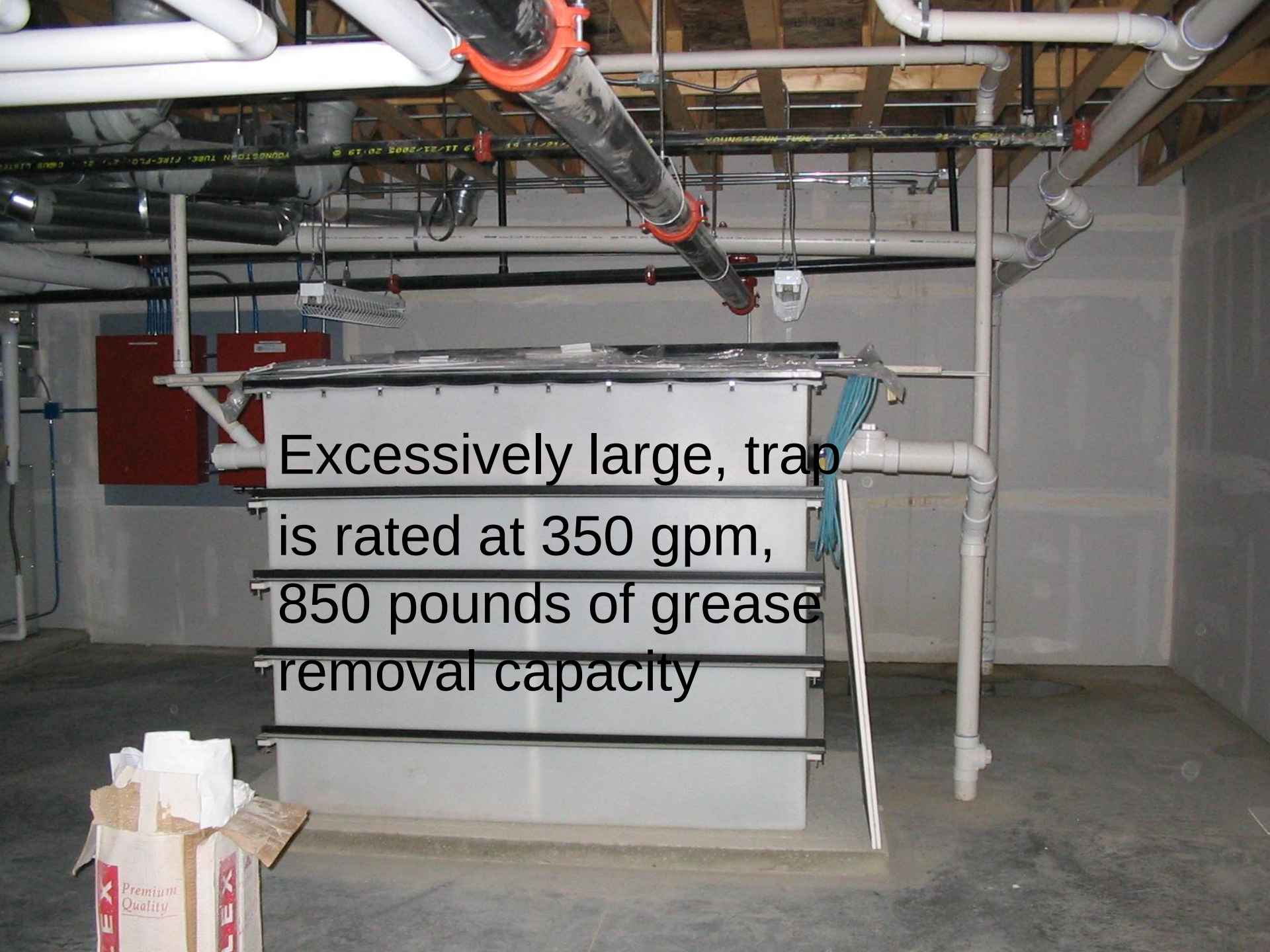

pot sink
air relief by-pass
vent line
solids interceptor
grease
water
flow control
solids

Grease Trap Recommendation

- Easy to open
- Easy to clean / removal of baffles
- Noncorrosive material
- Good availability of replacement parts
- Built in **flushing design** for removal of settleable solids
- FSEs should have an operation manual for their grease traps
  - Inspectors should understand grease trap types and their operation

Grease Trap Problems in Bismarck

- Missing flow control device
- Missing air intake, on wrong size or capped
- Removed baffles
- Installed backwards
- Leaking
- Many are undersized - one oversized
- Hooked up to a dishwasher or grinder
- A few FSEs were not aware of the presence and service requirements of grease removal devices
- Inaccessible to inspect
- Avoidance of using sinks with grease traps


Excessively large, trap is rated at 350 gpm, 850 pounds of grease removal capacity
Premium Quality

Grease Interceptor

- Grease Interceptor
  - Located outside of building, in ground
  - Larger in size (1,000 gallon typical size)
    - Will have to indicate a need beyond 500 gallons
  - Much less frequent servicing required
  - Efficient at removing grease from FSEs, all flows from the kitchen can easily go through a grease interceptor


Middle Baffle
DOWN


804


6 10:37AM

GB-250

Flow Rate:	100 gpm
Retained Grease:	1,076 lbs
Liquid Capacity:	250 gal
Removal Efficiency at the Rated Capacity:	92.9%
Cover Rating:	Class S
Nominal Inlet Size:	4"
Serial Number:	2013-9971

0 94922 78306 6

ASME A112.14.3 (Type C)
This unit has been certified and manufactured with an internal flow control system already in place. It does not require an external flow control fitting.

www.schierproducts.com 1-800-827-7119

UPC

C R

Certified to
ASME A112.14.3
CSA B481.1

Grease Interceptor Flows

- Kitchen wastewaters
  - All kitchen sinks
  - Floor drains
  - Mop sinks
  - Dishwashers and grinders (for interceptors only)
- No flow from bathrooms!

Grease Interceptor Requirements

- All classes of food service establishments are required to submit the drainage plumbing plans to the pretreatment coordinator for approval prior to obtaining a building permit.
- The size, type and location of each grease interceptor (GI) shall be approved by the pretreatment coordinator before installation.
- The location of the GI must be indicated on the Site Plan.
- Grease interceptors shall be constructed in accordance with plumbing code.
- Approved GI sizes range from 500 – 2,000 gallons in working capacity.

Grease Interceptor Requirements

- Baffle tees are required on the GI inlet, baffle wall and outlet.
- Baffle tees must be visible through the 24-inch manhole cover for inspection and cleaning.
- Venting of the GI from the GI cover is prohibited.
- The GI concrete compressive strength must be greater than 4000 psi.
- All GI must be designed and installed to withstand traffic loads.

Grease Interceptor Requirements

- Manhole covers shall be gastight in construction and have a minimum opening dimension of twenty-four (24) inches. Concrete covers are not acceptable. The access manholes shall extend at least to finished grade and be designed and maintained to prevent surface and ground water from entering the GI.
- The manufacturer must certify that the GI meets three criteria: water-tightness, physical dimensions, and strength.
- A **two-way cleanout** is required downstream of the GI.
- An inspection of the GI is required by the Building and Inspections department before covering.

HOW A GREASE INTERCEPTOR WORKS

A grease interceptor is a passive control device that is designed to help reduce fats, oils, greases, and solids from entering the sanitary sewer collection and treatment system. Grease interceptors hold the fats, oils, greases, and solids until they can be removed and disposed of by recycling, rendering, or land application.

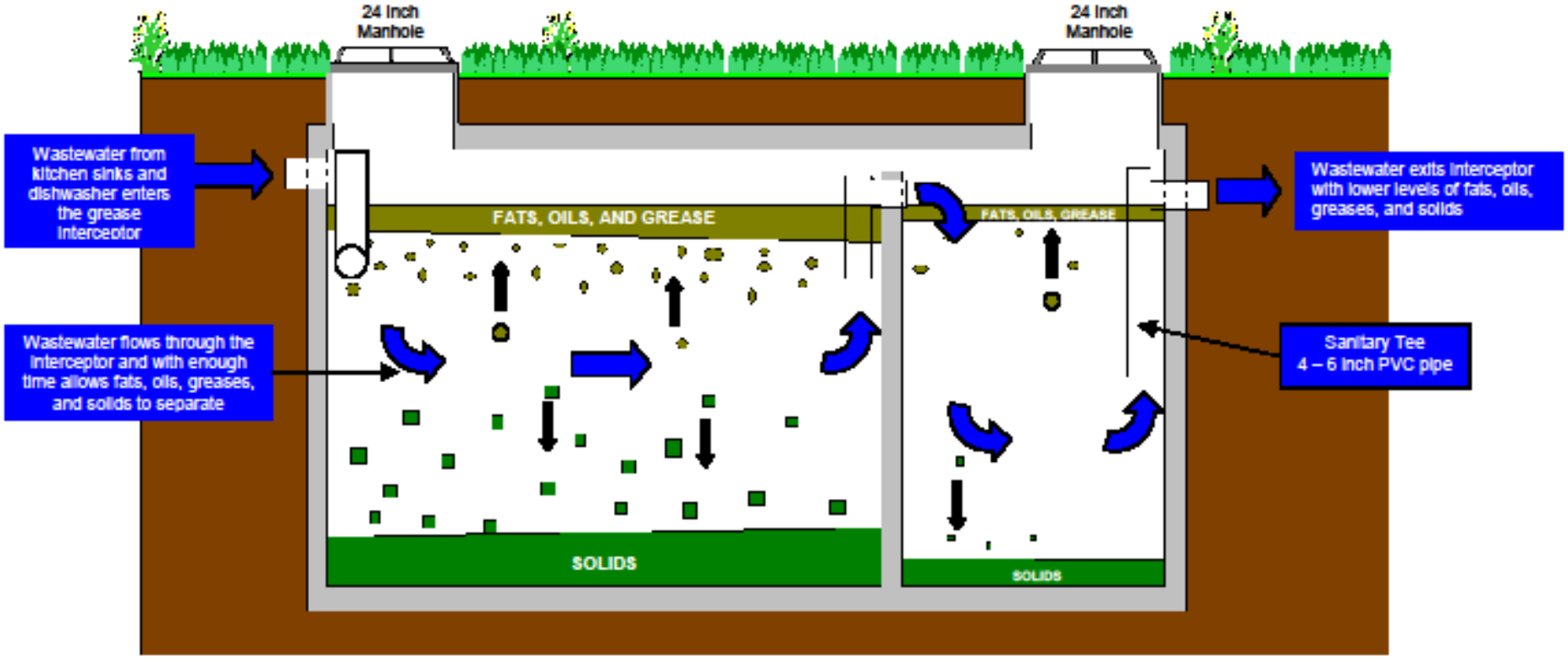


Illustration by:
Donald Smith
Town of Cary

- Grease interceptors allow wastewater flows to slow down
- With sufficient time fats, oils, greases, and solids separate from wastewater
- Fats, oils, and greases are less dense than water and float
- Solids are denser than water and sink
- Grease interceptors are designed in a variety of sizes, shapes, and constructed of various materials

Maintaining Grease Removal Devices

- The owner or lessee of the FSE shall, at its own expense, inspect, clean, and maintain the grease removal device in efficient operating condition at all times
- FSEs are required to track the maintenance of their traps and interceptors and to keep records for 3 years

FSE consequence for not servicing their grease removal device

1. Notice of Violation Letter – FSEs shall be given a seven day notice to perform the maintenance
2. Re-inspection Fee - $50 for each re-inspection
   - No fee will be charged for annual inspection
   - When FSEs are out of compliance they will given a notice to comply and will be charged for follow-up inspections, if they remain noncompliant
3. The City may order the work to be performed by an approved contractor
   - The cost of the work shall be billed to the FSE
   - If the FSE fails to pay the full amount of the bill, the outstanding amount may be assessed against the property where the maintenance was performed

Why stop using chemicals and enzymes?

- Little support for claims of biological activity
- Disinfectant usage is not conducive for necessary biological activity
- Emulsify solid grease and send it to the sewer
- Wide fluctuations in water temperature, and pH
- Lack of oxygen hinders aerobic bacteria

GREASE menace

Public Education


SPARE
OdaLog
H2S
Bismarck
Keep grease out of your drain.
Bismarck Public Works
Wastewater Division
www.bismarck.org
GREASE menace
A real PAIN in the DRAIN.
Keep grease out of your drain.
Bismarck Public Works
Wastewater Division
www.bismarck.org
MAY 13 2010

Businesses declare war on the Grease Menace.

Here's the battle plan:

- Make sure your kitchen drains have screens.
- Throw grease and table scraps in the trash; **not down the drain.**
- Train employees on proper grease disposal.
- Install and maintain properly sized grease interceptors.
- Contract with a waste hauler to recycle oil.

Bismarck

INDUSTRIAL PRETREATMENT PROGRAM
DEPARTMENT OF PUBLIC WORKS
CITY OF BISMARCK

PO Box 5503
Bismarck, ND 58502
Tel: 701-222-6618

www.bismarck.org

GREASE menace

How does the Grease Menace get into your sewer?

When you put cooking waste, like grease, oil and food scraps, down the drain, it clings to the sides of your sewer pipes. This **Grease Menace** clogs your pipes and causes sewer back-ups.

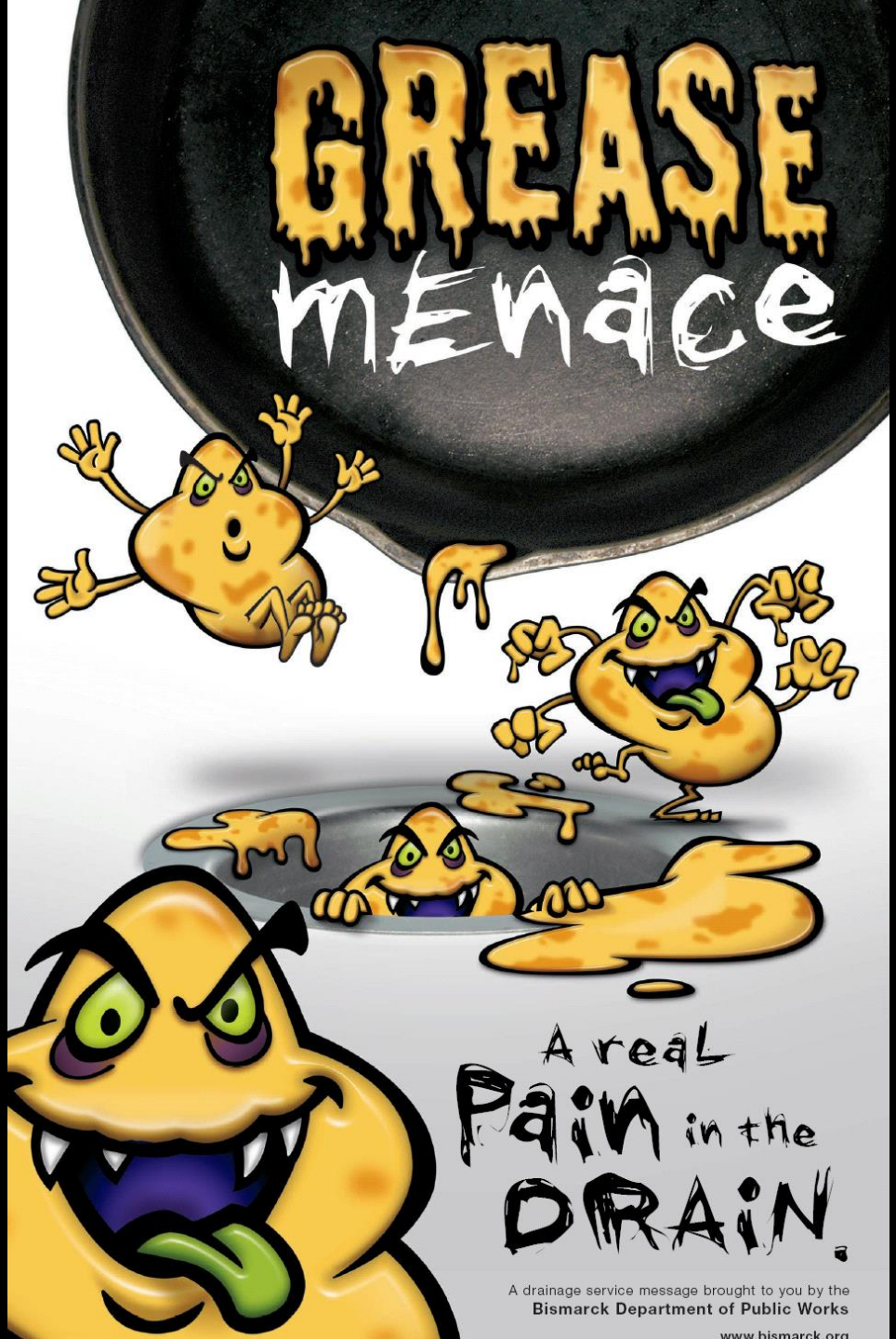
Grease is a menace to your sewer line.

Never pour grease down the drain. **Here's why:**

- It clogs your sewer line, resulting in an expensive visit from the plumber.
- It plugs city sewer lines and makes it harder to treat waste water. The cost of cleaning and repairs leads to higher sewer rates for you.
- It causes sewer back-ups which are hazardous to your health and harm the environment.

Fight the Grease Menace.

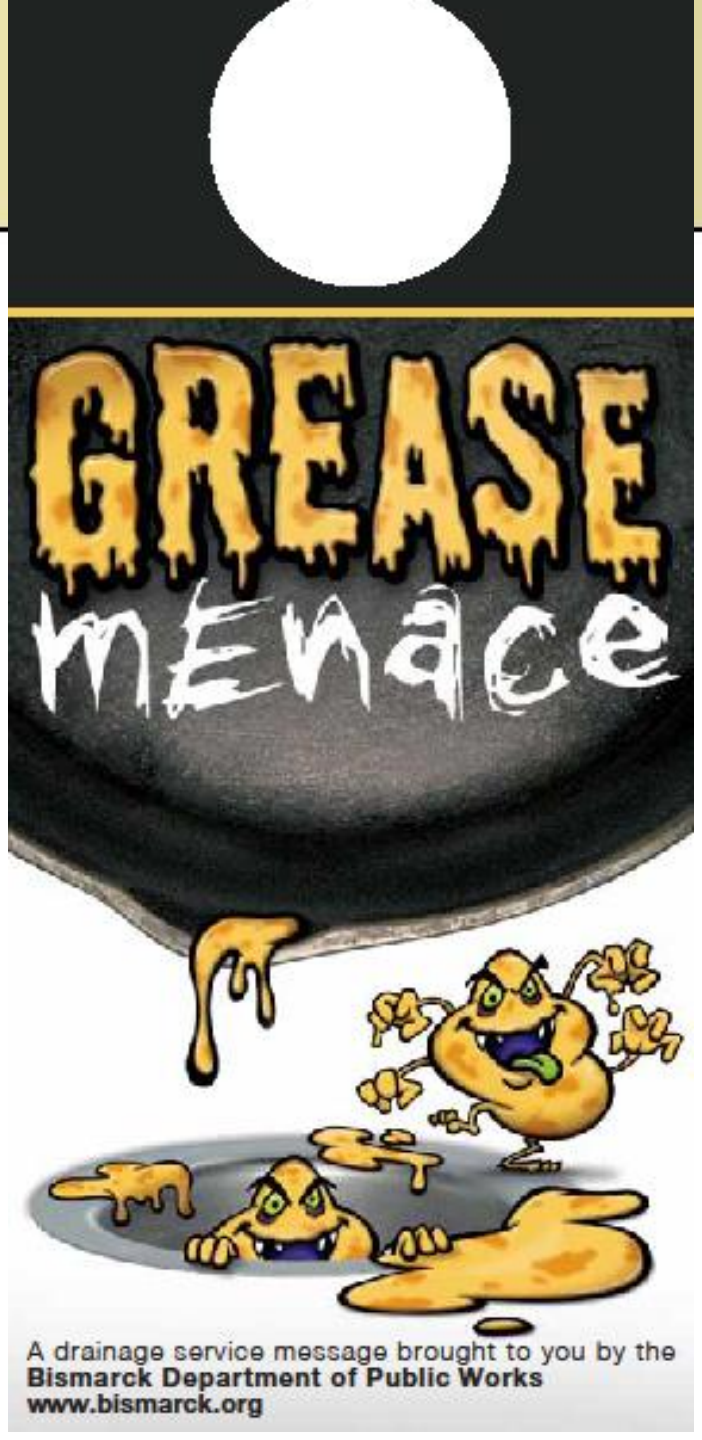
1. Pour grease from cooking into a can, let it cool, and throw it in the trash.
2. Throw food waste into the trash; not down the drain.
3. Recycle all used fryer oils. Residents can recycle oils at the Bismarck Public Works Building, 601 S. 26th St. Businesses must contract with a waste hauler.
4. If you are a food service establishment, you must clean your grease traps and interceptors regularly!


GREASE
MENACE
A real
Pain in the
DRAIN.
A drainage service message brought to you by the
Bismarck Department of Public Works
www.bismarck.org

Keep grease out of your drain.

A drainage service message brought to you by the
Bismarck Department of Public Works

www.bismarck.org


GREASE
menace
A drainage service message brought to you by the
Bismarck Department of Public Works
www.bismarck.org

GREASE MENACE

Bismarck

A drainage service message brought to you by
Bismarck Public Works • www.bismarck.org

The City of Bismarck needs your HELP!

The City is seeing a higher than normal accumulation of grease in the sewer pipes in your neighborhood which could lead to sewer back-ups.

How does the Grease Menace get into your sewer?

When you put cooking waste (grease, oil, food scraps) down the drain, it clings to the sides of the sewer pipes. This Grease Menace can clog the pipes and cause a sewer back-up.

Fight the Grease Menace

- The proper way to get rid of grease is to pour it into a tin can, let it cool, and then throw the can into the trash.
- Throw food waste into the trash; not down the drain.
- Recycle used fryer oils.

Residents can recycle used fryer oils at Bismarck Public Works, 601 S. 26th St. For more information call 355-1700.

Suburban Front

Suburban Back


Keep grease out of your drain.
A drainage service message brought to you by the
Bismarck Department of Public Works
www.bismarck.org
CITY OF BISMARCK
GREASE TASK FORCE
Keep grease out of your drain.

Industrial Pre-Treatment Program

Resources
View the Title 11.1 - Pretreatment Program Ordinance.

click here for FOG (fat, oil and grease) Brochure

City of Bismarck Fat, Oil and Grease Program (FOG)

1. Fats, oil and grease (FOG) clog private sewer lines and city sewer lines.
2. FOG clogs can cause sewer back-ups in homes and businesses.
3. FOG can harm the environment through sanitary sewer overflows and hinders sewage treatment.
4. Keeping FOG out of your sewer lines will reduce the need to call the plumber to your home.

Recycle used fryer oils at the Public Works Dept at 601 S 26th St

GREASE MENACE

Contact
Bill Gefroh
Industrial Pretreatment Coordinator

Ph: (701) 355-1763

Restaurant Users

Grease Interceptor Application
Grease Interceptor Maintenance Log
How a Grease Interceptor Works

Contact
Bill Gefroh
Industrial Pretreatment Coordinator

Ph: (701) 222-6584

City of Bismarck Grease Interceptor Requirements

1. All classes of food service establishments are required to submit the drainage plumbing plans to the pretreatment coordinator or designee for approval prior to obtaining a building permit.
2. The size, type and location of each grease interceptor (GI) shall be approved by the pretreatment coordinator before installation.
3. The location of the GI must be indicated on the Site Plan.
4. Grease interceptors shall be constructed in accordance with plumbing code. See Uniform Plumbing Code appendix H for GI design criteria.
5. Approved GI sizes range from 500 - 2,000 gallons in working capacity. The actual size will depend on the number of kitchen fixtures that are connected to the GI.
6. Baffle tees are required on the GI inlet, baffle wall and outlet.
7. Baffle tees must be visible through the 24-inch manhole cover for inspection and cleaning.
8. Venting of the GI from the GI cover is prohibited.
9. The GI concrete compressive strength must be greater than 4000 psi.
10. All GI must be designed and installed to withstand traffic loads.
11. Manhole covers shall be gastight in construction and have a minimum opening dimension of twenty-four (24) inches. Concrete covers are not acceptable. The access manholes shall extend at least to finished grade and be designed and maintained to prevent surface and ground water from entering the GI.
12. The manufacturer must certify that the GI meets three criteria: water-tightness, physical dimensions, and strength.
13. A two-way cleanout is required downstream of the GI.
14. An inspection of the GI is required by the Building and Inspections department before covering.

Household Users

How to Fight the Grease Menace

Throw it in the trash, not down the drain! You can significantly minimize your plumbing and sewer problems simply by limiting the things you pour down your drain.

The vast majority of sewer problems start as plumbing troubles inside the house. Most sewer problems result from slow drainage in sinks, floor drains, washer drains, or toilets. In severe cases, there may be a complete blockage and with it an expensive and unpleasant cleanup that must be paid for by the homeowner.

Here are some things you don't want to put down the drain:

- **Never pour grease down sink drains or into toilets!** Too often, grease is washed into the plumbing system, usually through the kitchen sink, which will stick to the inside of sewer pipes. Over time, the grease can build up and block the entire pipe. Pour grease into a can (an empty coffee can works great). Keep it in the refrigerator so the grease can solidify and then dispose of it in the trash.
- **If you are deep frying a turkey**, Bismarck residents can recycle the used oil at the Public Works Dept. (601 S 26th St) during normal office hours. Be sure the oil is in a tightly capped plastic container.
- **Use your garbage disposal sparingly!** Never use your garbage disposal as a substitute for the trash can. Scrape grease and food scraps from trays, plates, pots, pans, utensils, grills and cooking surfaces into a can or the trash for disposal. Be especially careful with pasta, potatoes, and other starchy foods. Starch and water make paste, which can plug pipes. Be even more careful with what goes down the kitchen drain if you don't have a disposal. Put strainers in sink drains to catch food scraps and other solids, and empty the strainers into the trash for disposal.
- **Never flush baby diapers down the toilet!** Even if large objects like this make it to the sewer main (if you're that lucky) they can cause blockages in the sewer main, or plug city pumps.
- **Never plant trees over your sewer service line!** Roots are the leading cause of service line blockages. If you have any roots in your sewer service line, the grease, food waste, and large objects just mentioned are even more likely to cause blockages.
- **Never dump kitty litter down the drain!** Many of these products contain clay which will narrow the opening of your sewer pipe. Eventually it may plug your sewer pipe.
- **Use sewer pipe cleaning chemicals carefully and sparingly!** Follow label instructions closely to avoid dangerous fumes, skin and eye injury, and pipe and fixture damage. Proper care of your home sewer pipes will decrease the need for chemicals. Fats, oils, and greases aren't just bad for your arteries and your waistline; they're bad for sewers, too.

The maintenance of internal plumbing and sewer service lines is the responsibility of the **property owner**. The City is responsible for maintenance of sewer mains only. If sewage is actually flowing into your home through a floor drain, immediately contact the City at (701)

Grease Menace Price Tag

- PSA, TV & Radio Shows, Web Space – Free!
- 3 Billboards - $525 total
  - $175 each, guaranteed 1 month display
- 1 Vehicle Wrap – $2,000
- 1000 Posters and 23,000 Pamphlets – $4,995
  - Including all original artwork
- Total Cost - $7,520
- Not dumping grease down the drain – Priceless!

Inspections

FOG Best Management Practices

- Each drain in the kitchen must have a screen
- Used cooking oils must be recycled
- Food wastes shall be placed in the trash, not down the drain
- Employee training
  - Dry wipe pots and pans
  - How to use grease absorbing products
  - How to recycle used cooking oils
  - View City of Bismarck video on Fats, Oils and Grease control
- FOG control practices shall be posted in food preparation and dishwashing areas

Grease Control Program Inspection Report

Industrial Pretreatment Program
Wastewater Treatment Plant
P.O. Box 5503
Bismarck, ND 58506
222-6618

Inspection Date	Last inspection
Business Name	Telephone
Street Address	Report Received by
Contact Person	Title

1. Drains — Screen: — Size:
   - Grinder: Yes / No — Yes / No _____
   - Pre-Rinse — Yes / No _____
   - Triple Comp. — Yes / No _____
   - Double Comp. — Yes / No _____
2. Segregation and collection of waste cooking oil: Yes / No
3. Proper disposal of food waste: Yes / No
4. Employee training documented:
   - Training upon hire: Yes / No
   - Training yearly: Yes / No
5. Kitchen signage posted: Yes / No
6. Grease Removal Device (GRD) Maintenance: Trap / Interceptor
   - GRD: Yes / No Size / Model of GRD: _____
   - Service frequency:_____ Serviced by _____ Last serviced_____
   - GRD Cleaning Documented: Yes / No
     - Comments on cleaning _____

Report reflects City Ordinance

Inspection Results

___ This facility is currently **in compliance** with the requirements of The City of Bismarck's FOG Control ordinance (Chapter 11.1-04) as found at http://www.bismarck.org/uploads/doc_Title_11.1_-_Pretreatment_Program.pdf

___ This facility is **NOT in compliance** and has _____ days to meet the requirements. Continued violations may resul in escalating enforcement actions by the City.

Inspected by _____ : Comments_____

_____

Inspection Results

___ This facility is currently **in compliance** with the requirements of The City of Bismarck's FOG Control ordinance (Chapter 11.1-04) as found at http://www.bismarck.org/uploads/doc_Title_11.1_-_Pretreatment_Program.pdf

___ This facility is **NOT in compliance** and has _____ days to meet the requirements. Continued violations may result in escalating enforcement actions by the City.

Used motor oil recycling at Landfill


FAT, OIL &
GREASE ONLY!

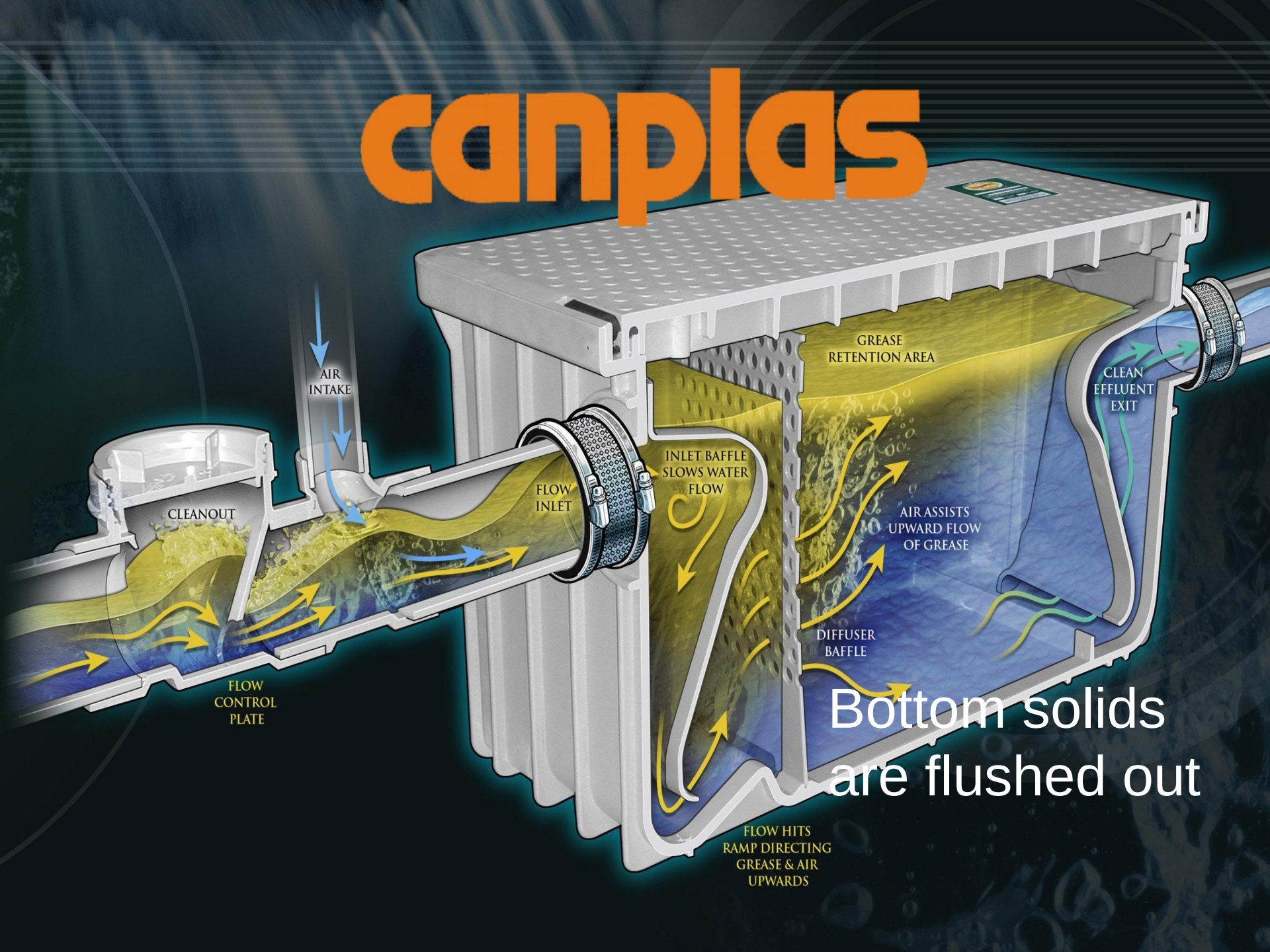

Wildcat


938G
CAT

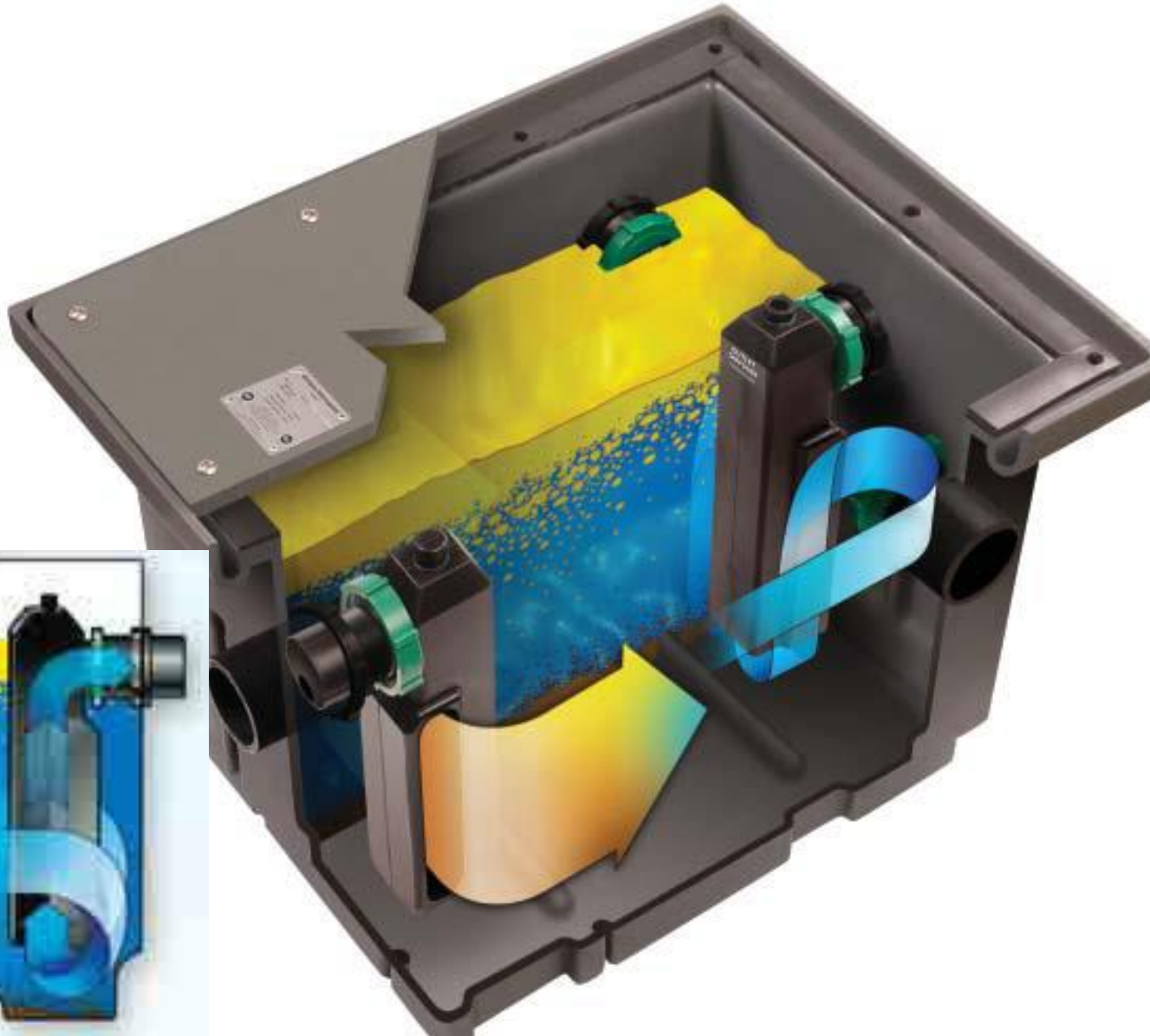
Grease Interceptor Problems

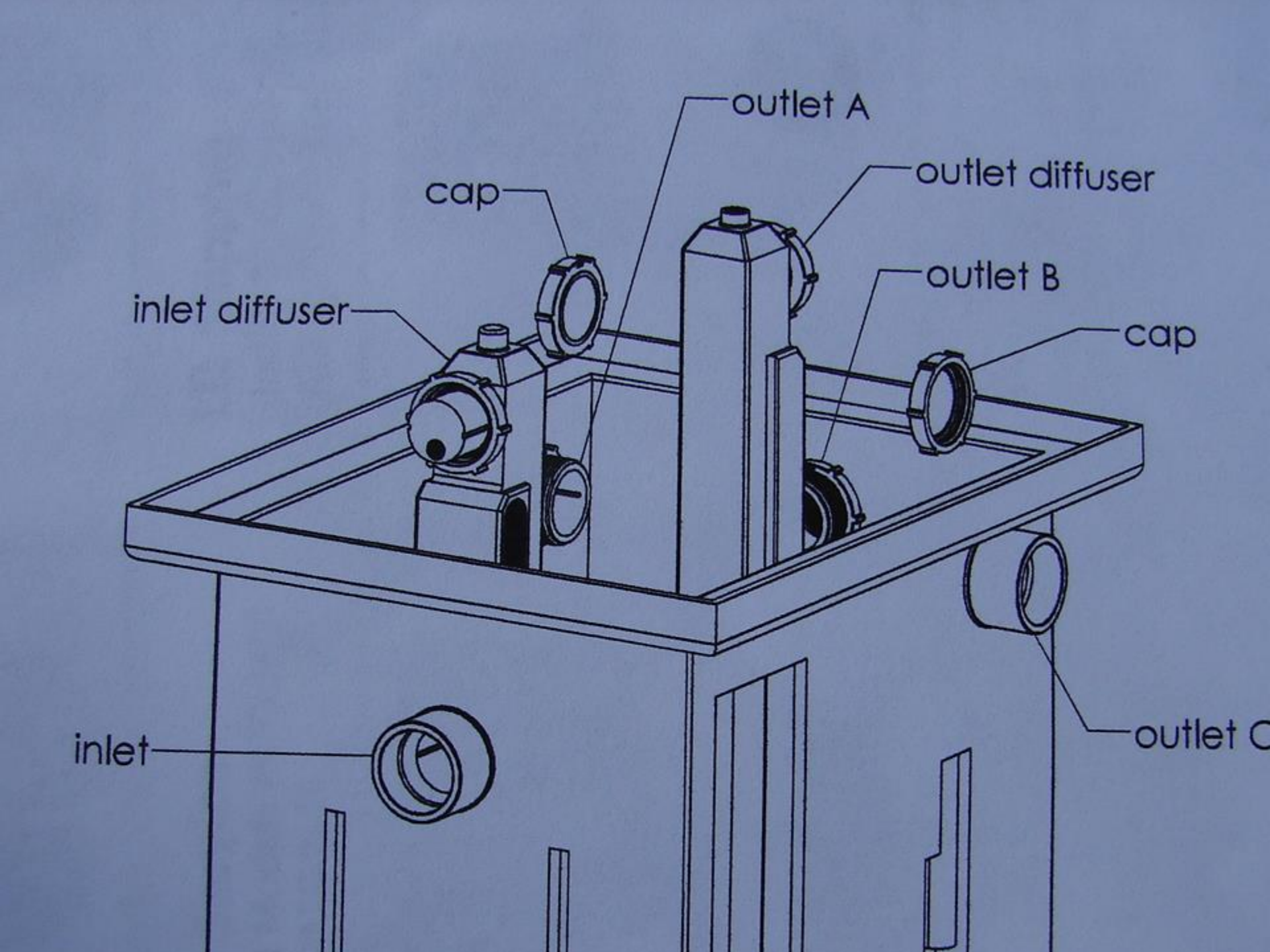
- Generation of hydrogen sulfides
  - Dissolved readings as high as 50 mg/L
  - H2S in GI as high as 1000 ppm in the air
  - Severe corrosion
  - Odor complaints downstream, related to release and venting of the H2S through apartment and home roof vents
- Low pH discharges

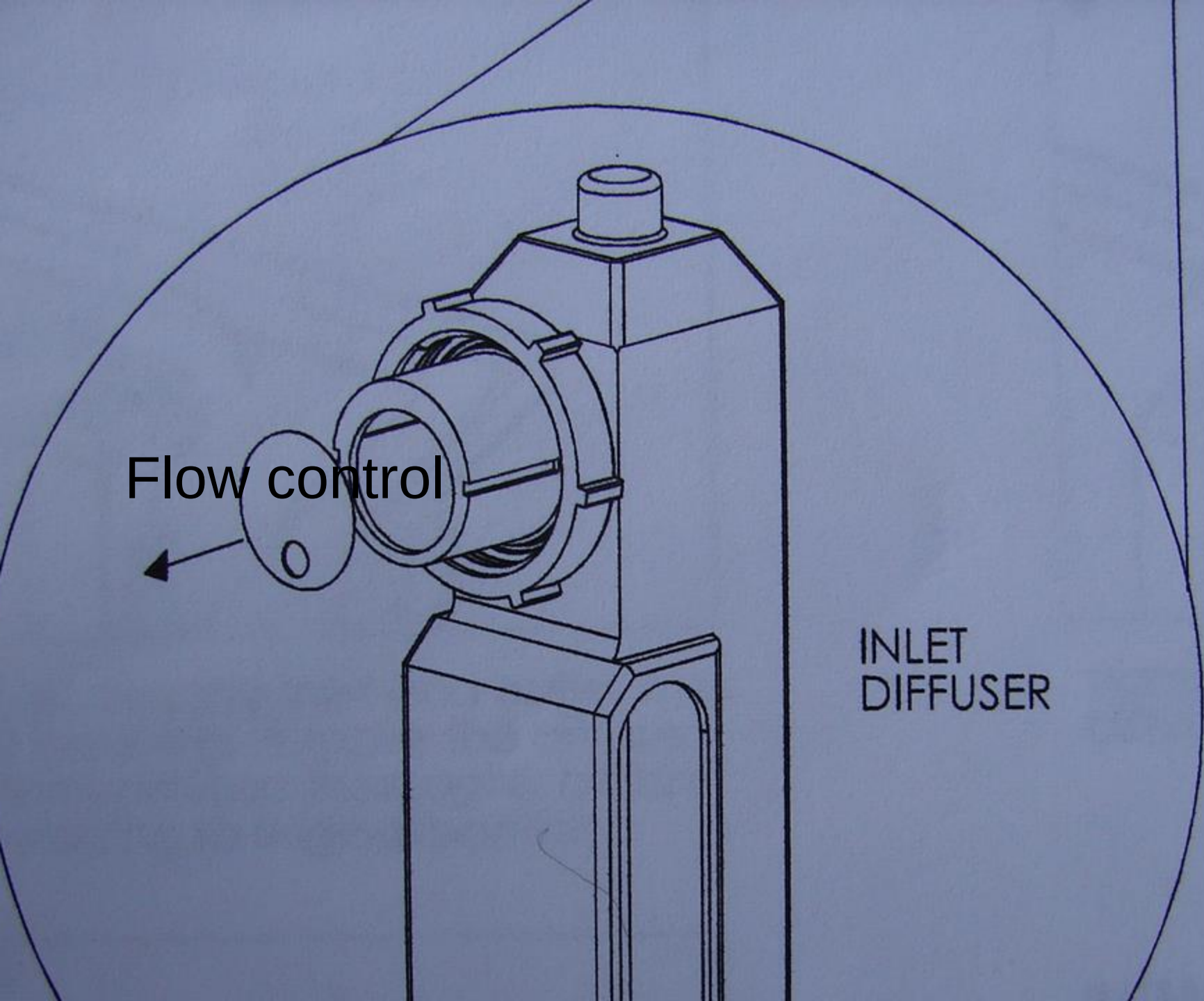
Cleaning cycle	Meals/ day	Sq. feet	Daily Flow	GI size Gallons	~Flow/ day	Flow/size Ratio	Inches grease/ month	pH	H2S
6 month	650	5172	4697	787	2349	2.98	1.5	4.70 / 5.60 / 4.70	20 / 2 / 15 / 8 / 12 /4
4 months		3298	573	1100	459	0.42	1.75	5.4 / 5.1 / 5.7	8 / 12 / 6
6 month	500	2600	4000	825	1000	1.21	2	5.2 / 5.1 / 4.9 / 5.7	10 / 8 / 25 / 25
9 month	new	3952	418	440.5	209	0.47	0.75	5.0 / 4.8 / 4.6	19 / 25 / 15
3 month	500	6350	1630	907.5	815	0.9	2.25	4.3 / 4.6 / 4.5	12 / 15 / 10
3 month		8158	3689	2744	1845	0.67	2.5	4.1 / 4.5	2 / 8
Monthly	600	5460	4967	1611	2484	1.54	nrd	5.2 / 4.5 / 4.6	12 / 4 / 1
3 month		2754	673	925	539	0.58	nrd	4.7 / 4.8 / 4.8	5 / 5 / 12
2 month	n/a	5000	3067	1000	1533	1.53	nrd	6.0 / 6.0	18 / 10
Monthly	n/a	5000	5386	1000	2693	2.69	nrd	4.4 / 4.2 / 4.6	4 / 5 / 1
2 month	700	10330	4475	932	2238	2.4	3	4.7 / 5.2 / 4.2	ND / ND / 6
3 month	250	4928	2260	938	1130	1.2	2.25	4.8 / 5.4 / 5.3 / 5.4	2 / 12 / 2 / ND / 8
4 months	575	7315	3615	1473	1808	1.23	3.5	5.0 / 4.8 / 5.2	5 / 8 / 19
3 month	1119	3742	1107	928	886	0.95	2.75	3.5 / 4.2 / 4.2	4 / 12 / 10
3 month	1855	6077	1746	960	904	0.94	3	5.0 / 4.5 / 5.1 / 4.5	13 / 11 / 18 / 8/12
2 month	790	9588	7451	1509	5961	3.95	1.75	6.4 / 5.8 / 5.2	12 / 12 / 6
4 months	350	2600	811	911	649	0.71	0.5	2.3 / 4.6 / 4.8	12 / 15 / 12
6 month	575	8434	6910	1161	3455	2.98	nrd	6.2 / 3.3 / 6.2 / 4.6	3 / 10 / ND / 12
3 month	450	4947	3713	1513	1857	1.23	2.5	4.6 / 5.4 / 4.9	6 / 2 / 12
3 month		9000	2287	1500	1144	0.76	1	4.7 / 5.1 / 6.0	12 / 19 / 25
12 month	n/a			1000			utd	6.6 / 6.2 / 6.2	20 / 18 / 12
3 month		7882	1475	939	738	0.79	nrd	8.8 / 6.4 / 6.4	12 / 50 / 8
3 month	1600	8000	12000	1506	1200	0.8	2	4.5 / 4.6 / nm	5 / 6 / nm
12 month		2926	811	1000	649	0.65	1	4.5 / 5.0 / 4.9	15 / 12 / 31
4 months	380	2844	1057	924	846	0.92	nrd	4.2 / 4.6 / 3.5	16 / 12 / 6
3 month	600	7128	5361	1818	2681	1.47	nrd	3.9 / 4.9 / 4.6	15 / 8 / 6


canplas
AIR INTAKE
CLEANOUT
FLOW INLET
INLET BAFFLE SLOWS WATER FLOW
GREASE RETENTION AREA
CLEAN EFFLUENT EXIT
AIR ASSISTS UPWARD FLOW OF GREASE
DIFFUSER BAFFLE
FLOW CONTROL PLATE
FLOW HITS RAMP DIRECTING GREASE & AIR UPWARDS
Bottom solids are flushed out

The Trapper II by Schier




outlet A
outlet diffuser
cap
outlet B
inlet diffuser
cap
inlet
outlet C


Flow control
INLET
DIFFUSER


Zurn Grease Trap
OCT 1 2009

Zurn Flow Control


Zurn
Flow
control
OCT 1 2009

chamber. For example, without a properly vented flow control device, little or no air would be drawn into the interceptor during use, causing the operating level to rise, pushing the grease cake toward the cover (Diagram D). If the grease layer reaches the air relief by-pass, grease could be pushed on into the outlet.

at max
integra
intake
and flo

Standa
gravity
pressu
If an in
maxim
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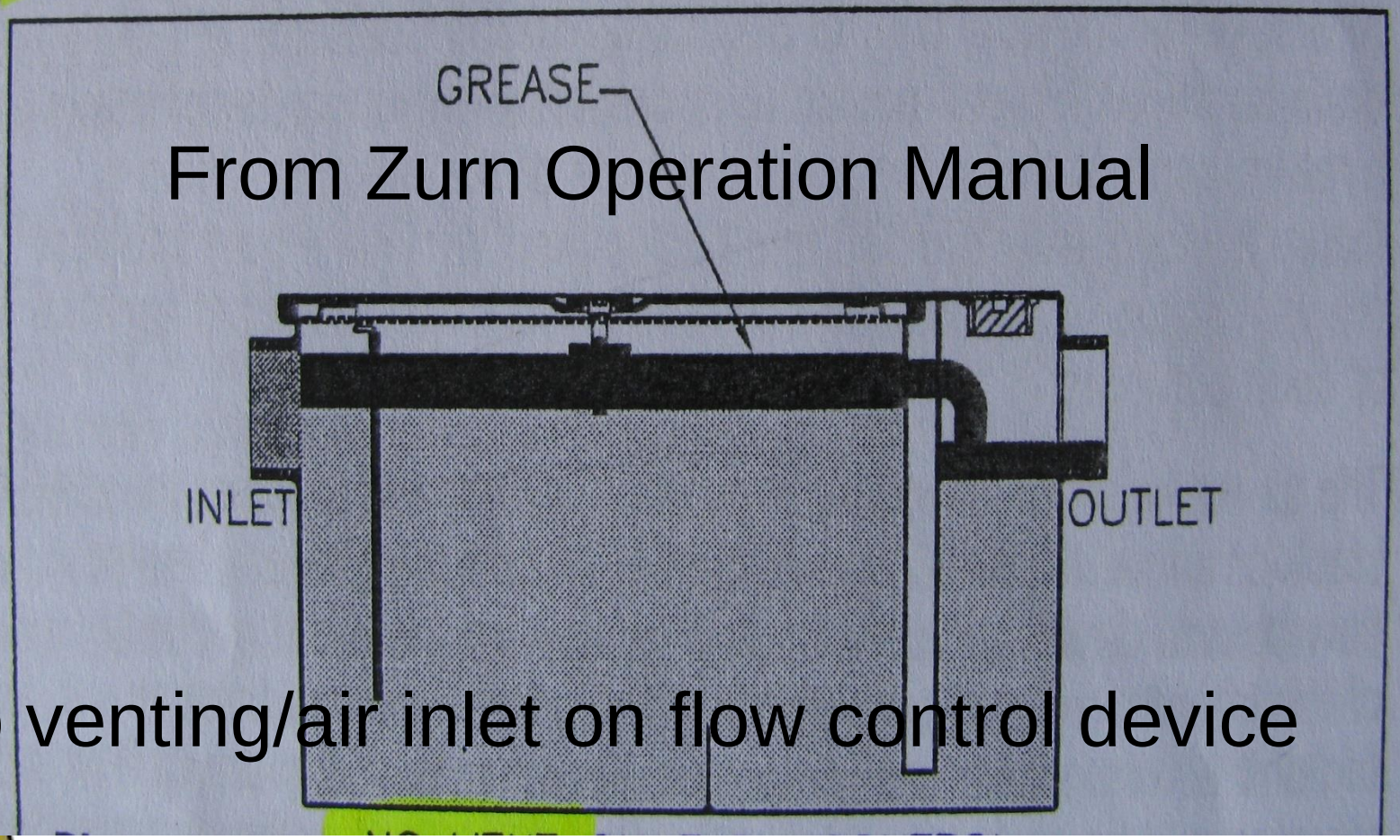
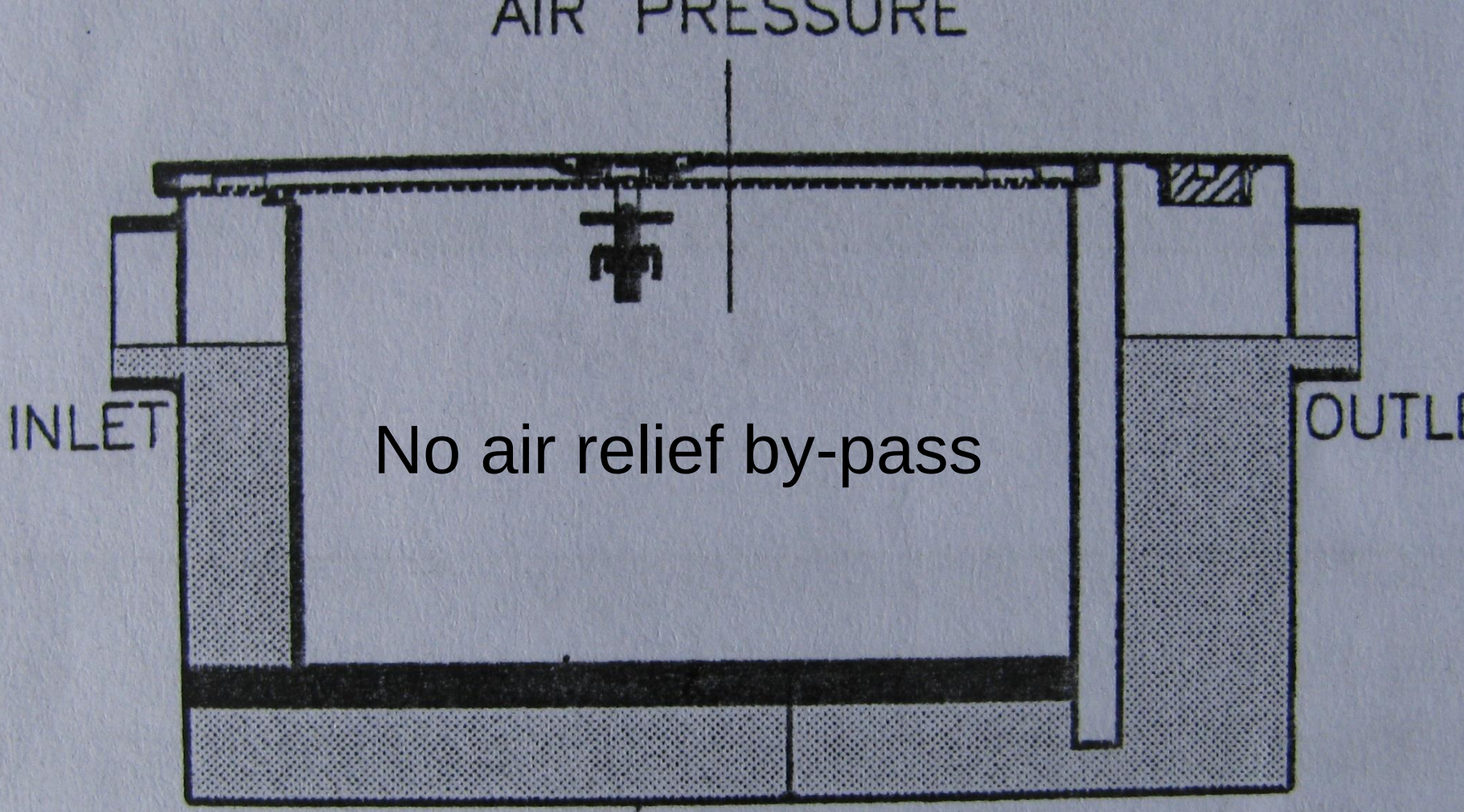
conditi



From Zurn Operation Manual

No venting/air inlet on flow control device



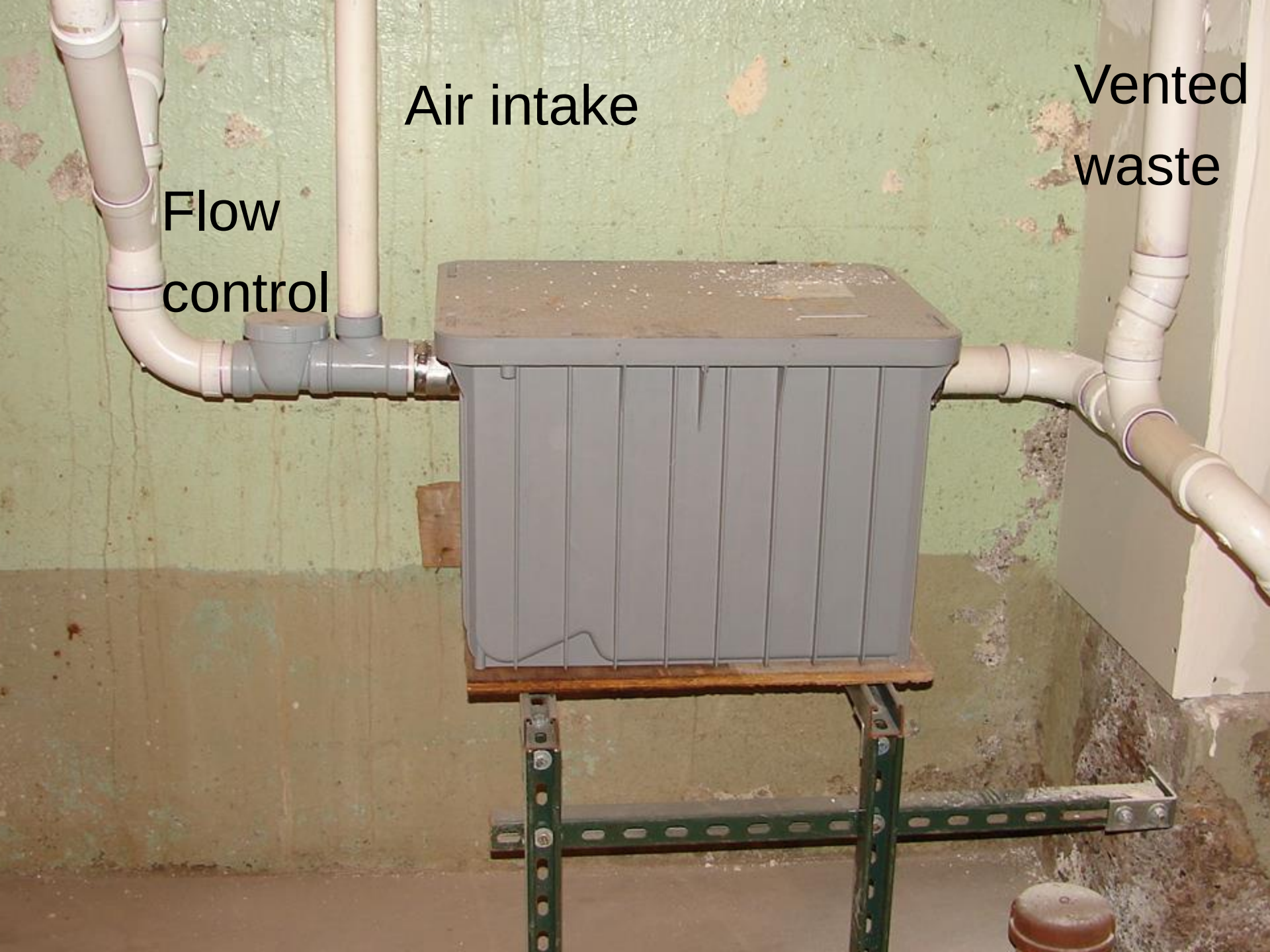
m E

NO AIR RELIEF BY-PASS

Air admittance valve


Wade Grease Trap

Trap with internal flow control device

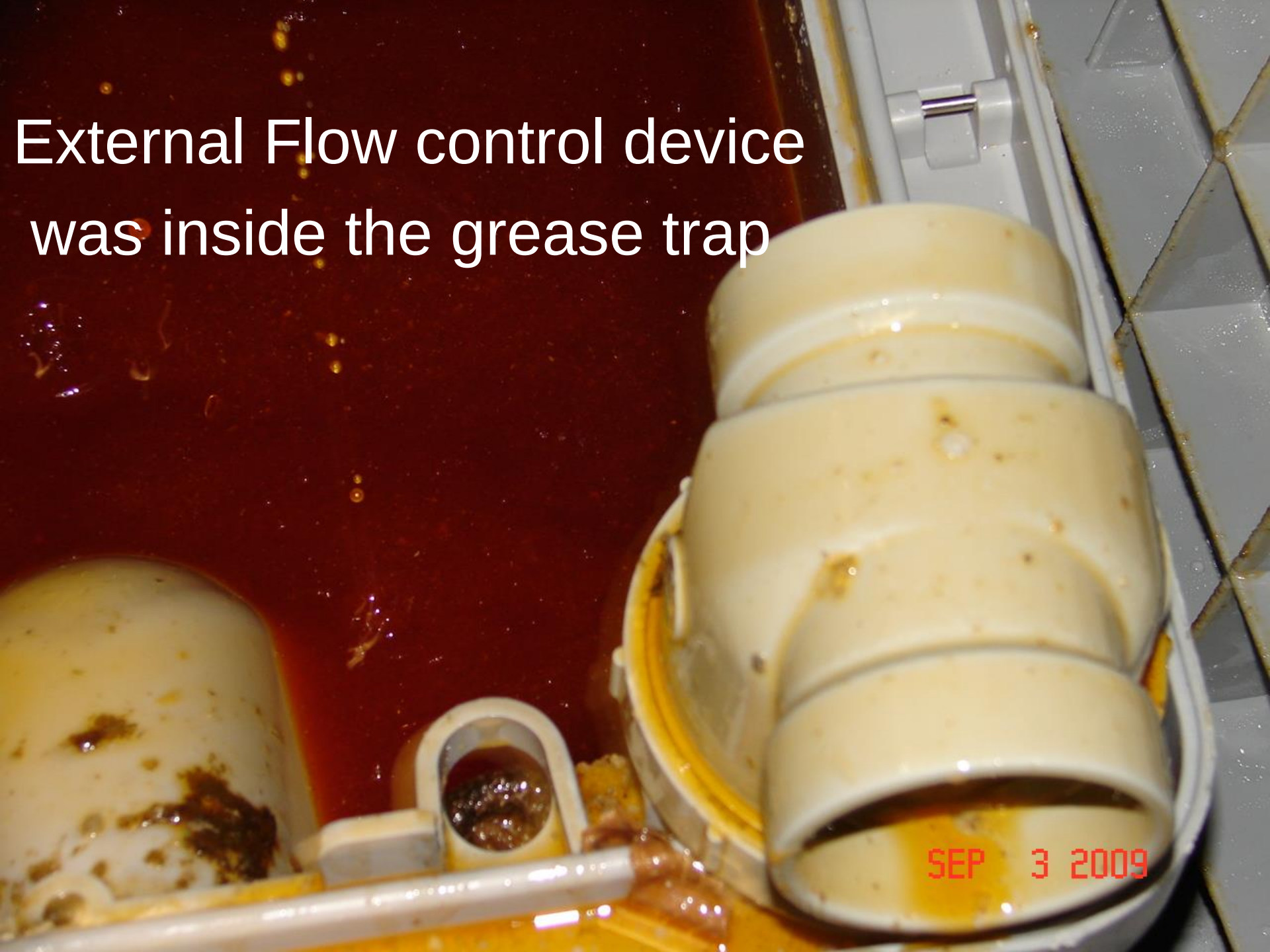

Air intake
Vented
waste
Flow
control


JUL 8 2008


No flow control
No air intake and
Connected to dishwasher


Air intake is capped
Quiznos Sub
BRITE
1021

Operation manual in grease trap


External Flow control device
was inside the grease trap
SEP 3 2009


Must be easy to in
JAN 5 20

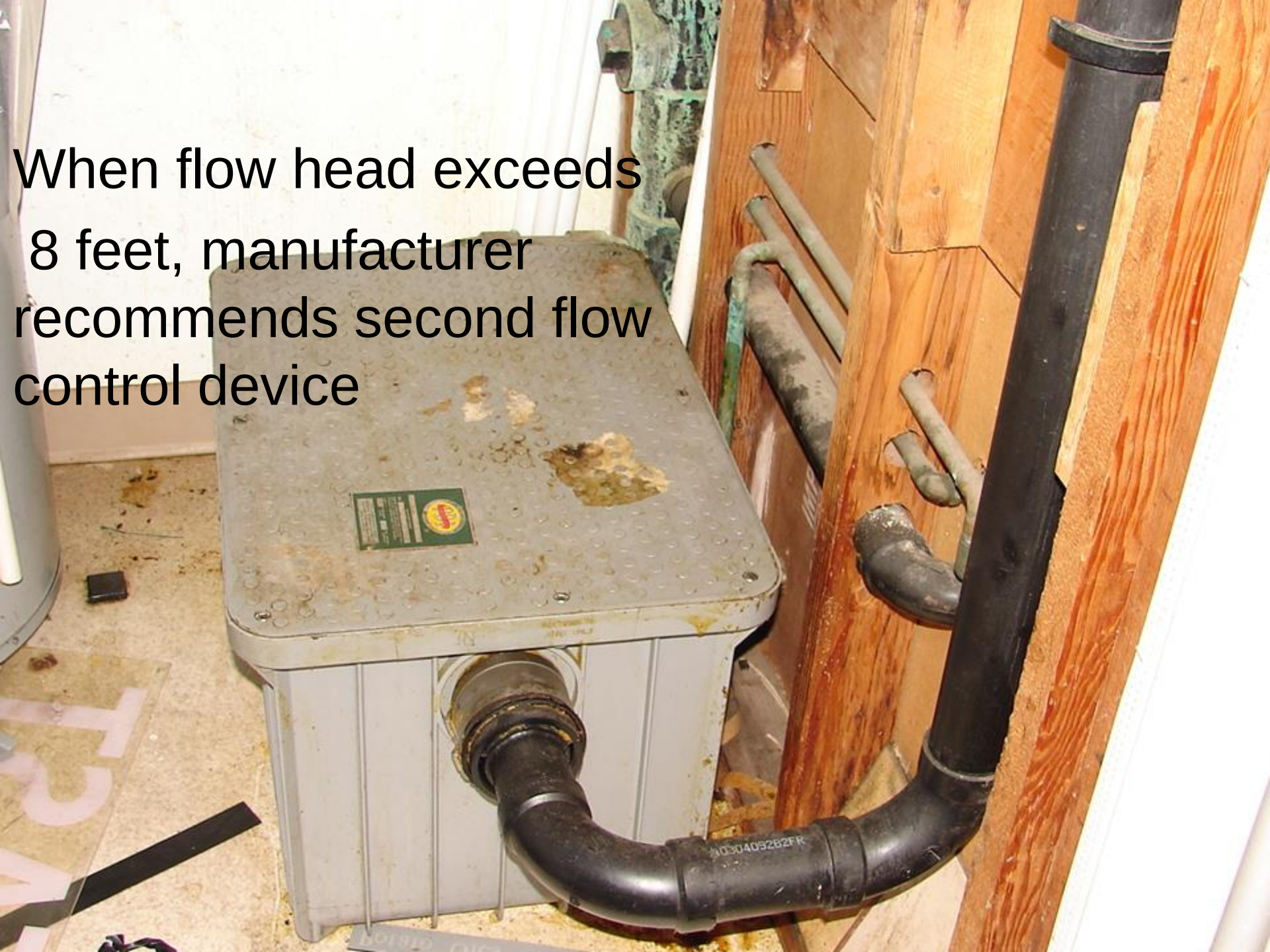

Air intake on
Wrong side


Old style grease trap with internal flow control device without air intake


No flow control
No air intake
Uphill slope


No baffle plate


Installed backward


When flow head exceeds
8 feet, manufacturer
recommends second flow
control device


Grease trap never had to be serviced, possibly not connected to anything
JUL 2 2008


JUL 1 2008


1 1:07PM


JUL 14 2008


SANITIZE
HIGIENIZAR
AUG 5 2008

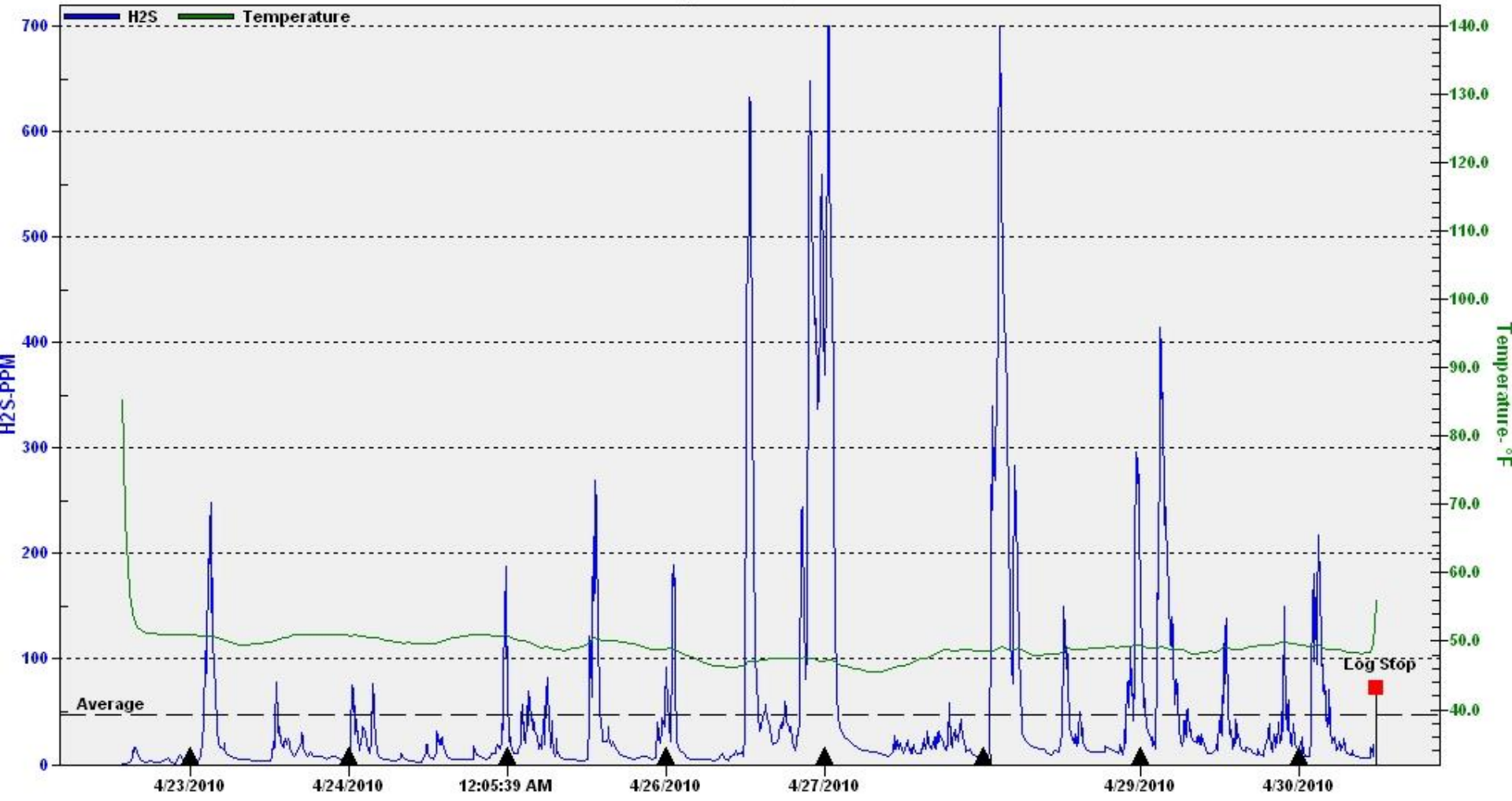
H2S Effect on Concrete

H2S (ppm)	Life expectancy (Years) for 3″ diameter pipe, 1″ cover
0.5	>50
1	25 - 50
1.5	25
2	10-25
3	10
4	5-10
7	5
>7	<5

Advanced Oxidation Technology, Buck Cox PhD, February 2004
http://www.advancedoxidation.com/uploads/YorkRiverPilotStudy.pdf

State St and Century, McDonalds, 4/30/2010

20100430_OL45035874_01: Session 1

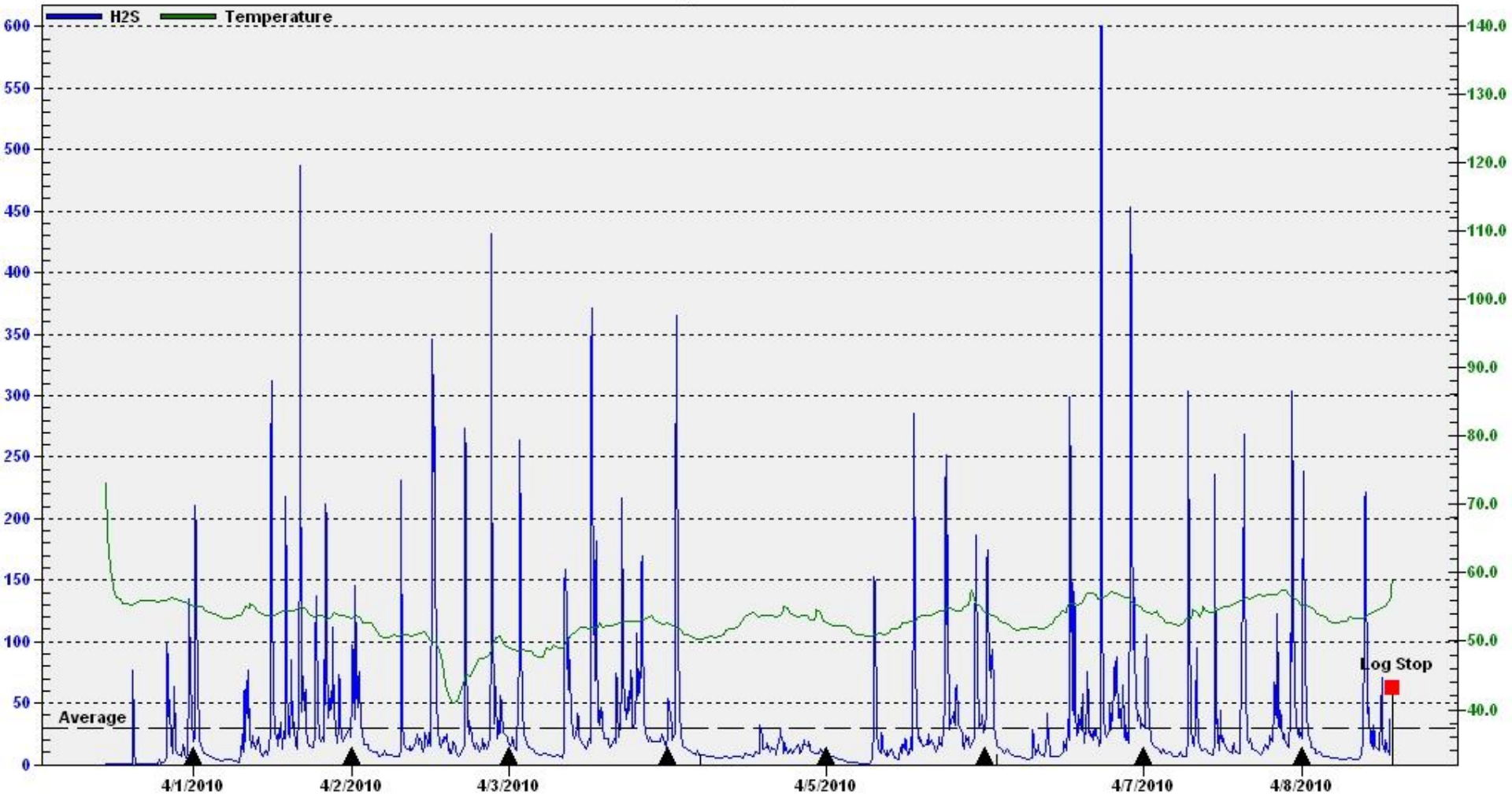


Period Displayed: 4/22/2010 - 4/30/2010 (Oda File: 20100430_OL45035874_01.oda -- Serial Number: OL45035874)

Average 45PPM | Day Transition Min 0PPM Max 725PPM

Manhole 3M, by Wendy's 4/8/2010

20100408_OL45065184_01: Session 1

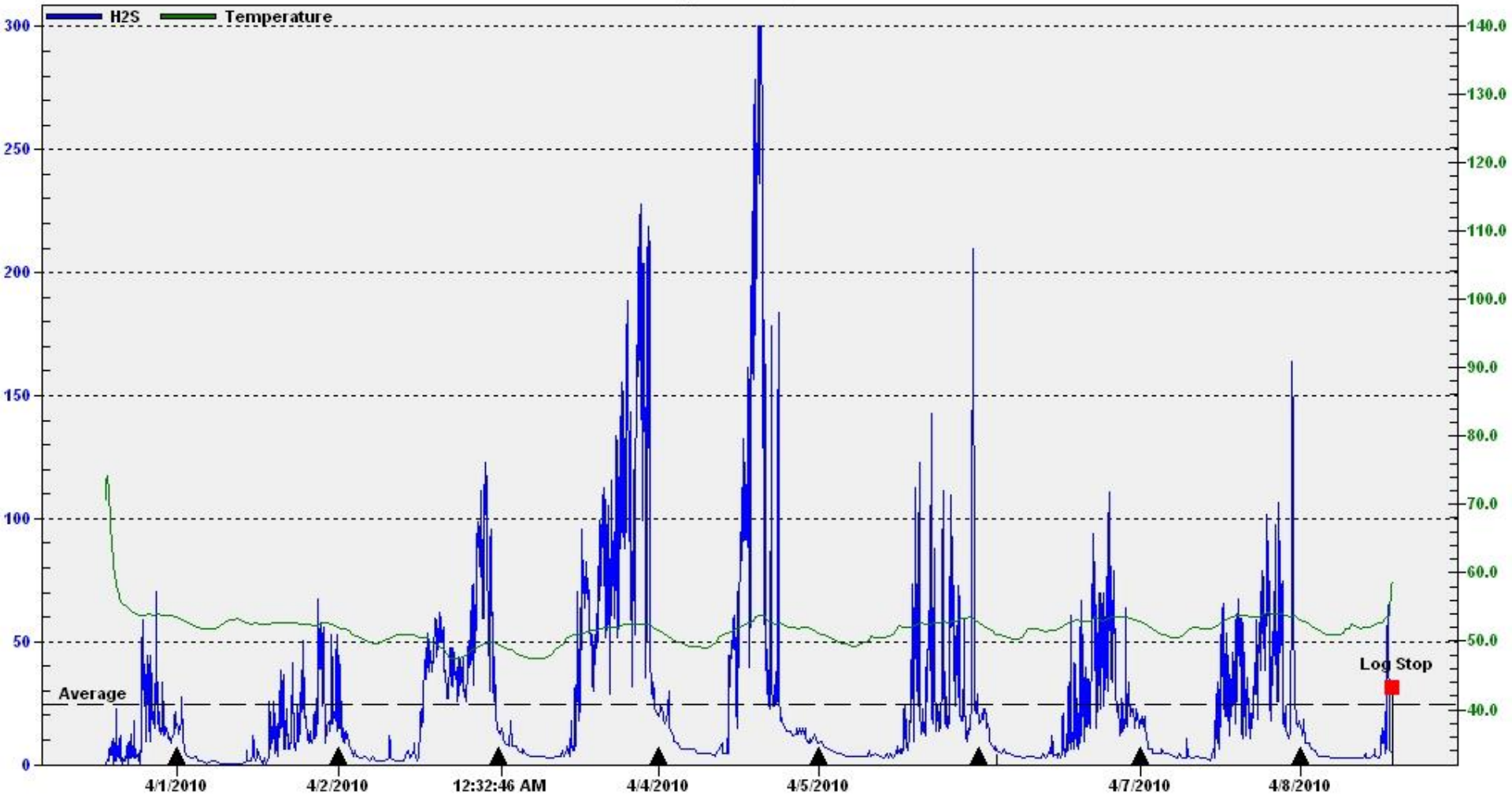


Period Displayed: 3/31/2010 - 4/8/2010 (Oda File: 20100408_OL45065184_01.oda -- Serial Number: OL45065184)

Average 28PPM | Day Transition Min 0PPM Max 688PPM

Oregon & 19th St. 4/8/2010

20100408_OL45035874_01: Session 1

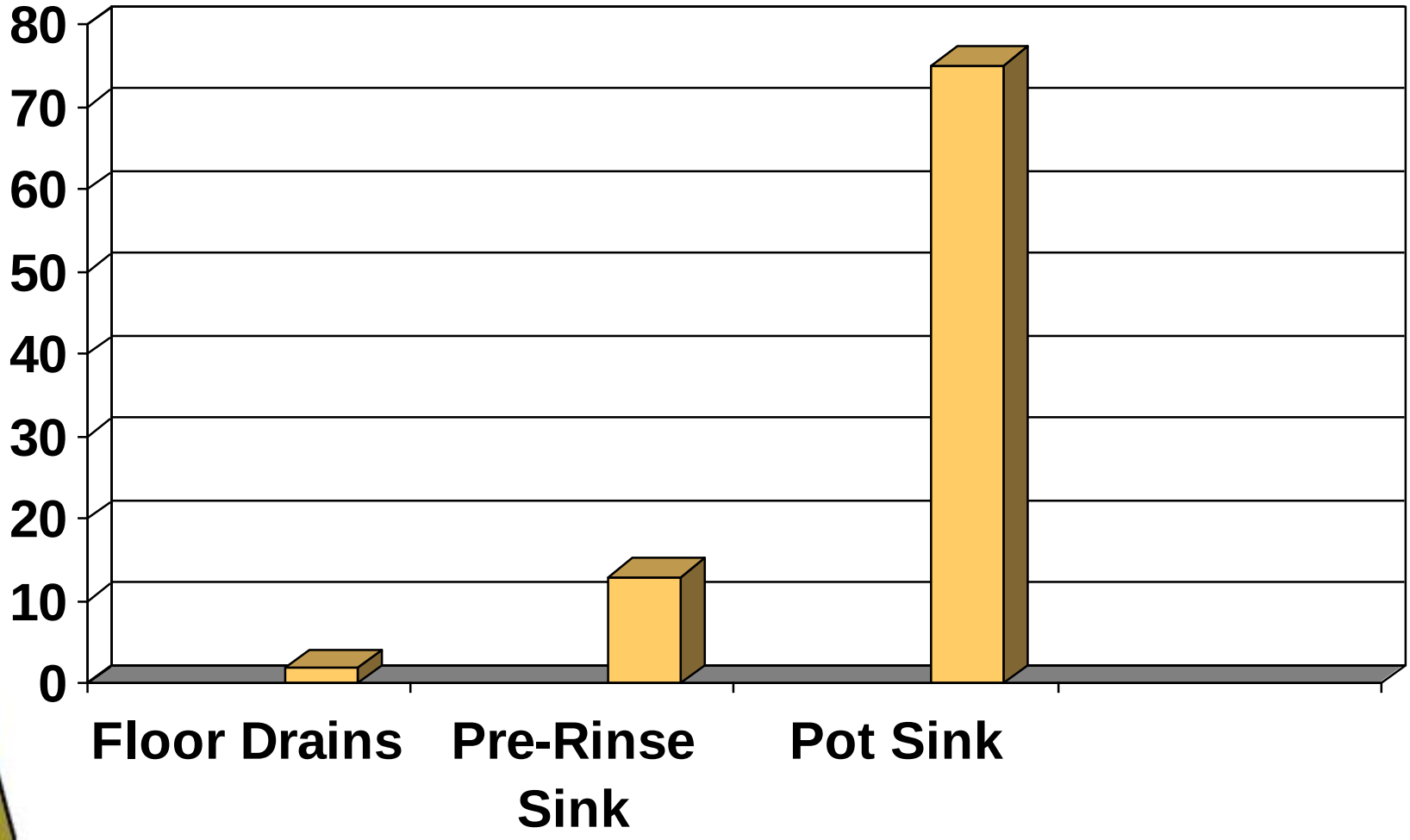


Period Displayed: 3/31/2010 - 4/8/2010 (Oda File: 20100408_OL45035874_01.oda -- Serial Number: OL45035874)

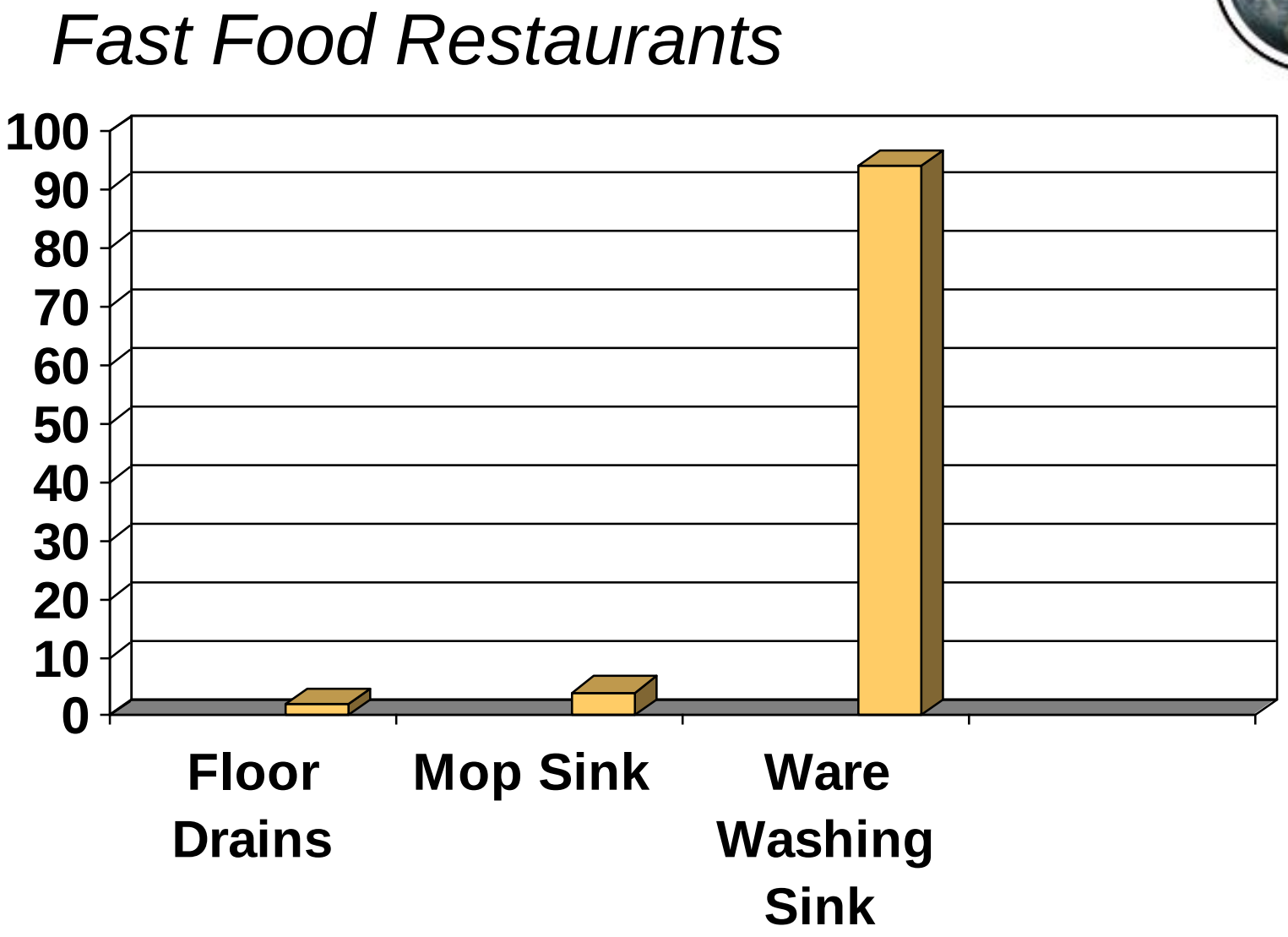
Average 24PPM | Day Transition Min 0PPM Max 335PPM

Generation Patterns by Fixture, from Cary NC

Full Service Restaurants



Generation Patterns by Fixture, from Cary NC



GREASE PRODUCTION VALUES BY MEAL TYPE

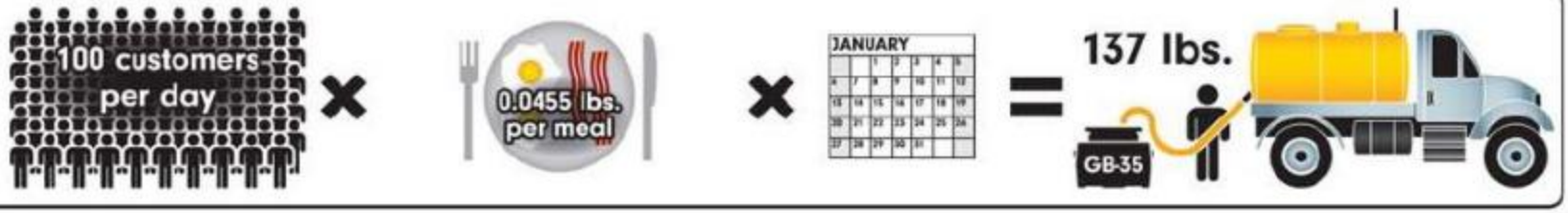
G2

LOW GREASE PRODUCTION		MEDIUM GREASE PRODUCTION		HIGH GREASE PRODUCTION	
Sandwich Shop, Convenience Store, Fresh, Bar, Sushi Bar, Delicatessen, Snack Bar, Ice Cream Parlor, Frozen Yogurt, Hotel Breakfast Bar, Residential		Coffee House, Pizza, Grocery Store (no fryer), Cafeteria (no food prep), Japanese, Fast Food, Drive-In, Greek, Indian, Low Grease Output FSE (w/fryer)		Cafeteria, Family Restaurant, Italian, Steak House, Bakery/Donut Shop, Chinese, Buffet, Mexican, Seafood, Fried Chicken, Grocery Store (w/fryer), Barbecue	
A No Flatware **0.005 lbs./meal**	B With Flatware **0.0065 lbs./meal**	C No Flatware **0.025 lbs./meal**	D With Flatware **0.0325 lbs./meal**	E No Flatware **0.035 lbs./meal**	F With Flatware **0.0455 lbs./meal**

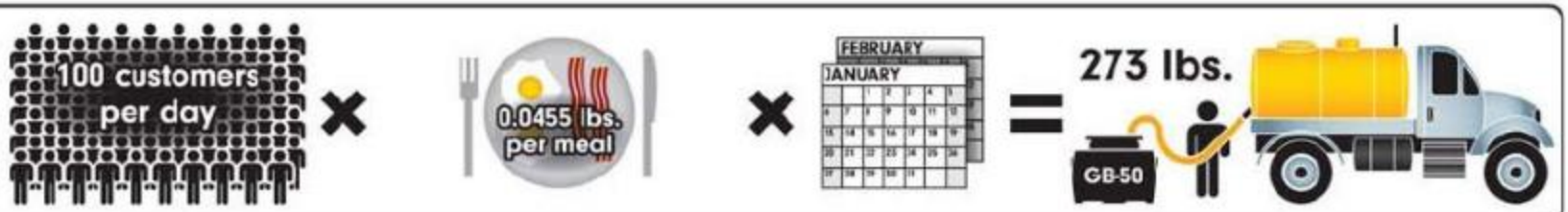
Note 1: Grease production values are estimates based on data obtained from Municipal Pre-Treatment Officials, Pumper Contractors and several independent research reports. Actual grease production is independent to each restaurant and will vary by entrée and kitchen practices along with other factors.

Customers or Meals Per Day × Grease (lbs.) Per Meal (see A, B, C, D, E, or F above) × Days = **Grease Production**

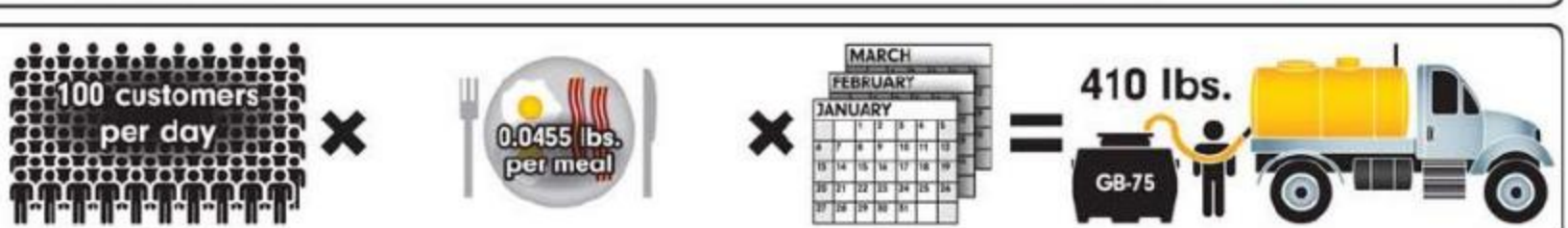
30 Days



60 Days



90 Days



SIZING TIP: For sit-down restaurants when number of seats is known but average meals/day is unknown, use the following:

$1-15/meal: = 1.9 seat turns/day	>$15-$24/meal = 1.5 turns/day	>$24/meal = 0.8 turns/day

FSE Grease, gallons/month

94 FSEs in study	GI	GT
Number of	40	54
Min, gallons/month	11	0
Max, gallons/month	83	36
Avg., gallons/month	34	8

Can a grease trap be as effective as a GI?

Facility	GRD	Frequency	Gallons grease/month	Pounds grease/month	Comment
McDonald's	Canplas 35/70	weekly	29	232	#2 FSE, trap works as well as a GI,
McDonalds - Country West	Zurn 10/20	weekly	1	8	#5 FSE, undersized and out dated trap
McDonald's-East	GI	3 month	30	240	#3/4 FSE
McDonald's-North	GI	3 month	40	320	#1 FSE
McRock N Roll Café on Main	Zurn 20/40	two weeks	3	24	#3/4 FSE, On 3/13/13 upgraded to a 35/70 grease trap

Can a grease trap be as effective as a GI?

Facility	GRD	Frequency	Gallons grease/month	Pounds grease/month
Wendy's North	GI	3 month	38	304
Wendy's South	Canplas 35/70	2 weeks	36	288
Wendy's West	GI	3 month	38	304

FOG Control Recommendations

- Require all Class 1 FSEs to install a grease removal device on the ware wash sink(s)and pre-rinse sink at a minimum
- Discourage new FSEs from installing a garbage disposal(s)

FOG Control Recommendations

- Require all Class 1 FSEs that have been grandfathered in to install an adequately sized grease removal device, which most likely will be a grease trap
- Require grease traps that have been installed to adhere to manufacture instructions to include; baffle plates, flow control device, air inlet and venting downstream of the grease trap

Final Thoughts

- Understanding of the grease removal devices (having an operation manual) is important to know if they are operating properly.
- Public education is an essential ingredient to our FOG program.
- Improvements in grease trap design have made them more effective and efficient.
- Following BMPs can drastically reduce FOG
- One size shoe did not fit all for grease control

Final Thoughts

- The sewer system is not a garbage can.
- If you do not put it into the sink, it can not go down the drain.
- Understanding of the grease removal devices (having an operation manual) is important to know if they are operating properly.
- Education is an essential ingredient to our FOG program.

Summary of Program Implementation

- Survey the collection system problems
- Survey the FSEs
- Work with the FSEs and internal resources
- Educate the FSEs and the public
- Develop short-term and long-term goals
- Take action
- Need to perform inspections to verify compliance

Questions?

Contact Information

Bismarck Industrial Pretreatment Program Staff

- Bill Gefroh, 701-355-1763
- Dean Woehl, 701-355-1768

- On line at www.bismarck.org, Go to Departments, Public Works, Utility Operations then Industrial Pretreatment