

# Dealing with Restaurant High Strength Waste

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High strength waste is  
created within the facility

# Where do you find HSW?

- Normally—
  - Food establishments
  - Bakeries
  - Supermarkets
  - Taverns
  - Mini marts
  - Camps and golf courses
  - Hospitals, clinics, etc
  - Anywhere food is prepared or chemicals are used
  - Some Residential

# What causes HSW?

- Elevated
  - BOD<sub>5</sub>
  - FOG
  - TSS

# Typical Residential Waste Strength Values

	Parameter	Range	Typical
a.	BOD <sub>5</sub>	110 – 250 mg/L	140 mg/L
b.	TSS	44 – 155 mg/L	75 mg/L
c.	FOG	10 – 20 mg/L	15 mg/L
d.	DO	0 - 1.0 mg/L	0.5 mg/L
e.	pH	6.5 – 7.2	7.0
f.	Temp	48 - 70° F	59° F



**Table 7.2** Waste characteristics (average range of values) of restaurant wastewater



Parameter	Chinese Restaurant	Western Restaurant	American Fast Food	Student Canteen	Bistro
BOD <sub>5</sub> (mg/L)	58 - 1430	489 - 1410	405 - 2240	545 - 1630	451 - 704
TSS (mg/L)	13.2 - 246	152 - 545	68 - 345	124 - 1320	359 - 567
FOG (mg/L)	120 - 172	52.6 - 2100	158 - 799	415 - 1970	140 - 410



Chen et.al. 2000

O & M should include basic  
troubleshooting

# Basic troubleshooting includes the use of--

- Your eyes
- Your nose
- Tools
- A checklist



# Tools required for O & M

- Sludge measuring tool
- Sample rod
- Imhoff cone
- pH meter
- Voltage meter
- DO meter
- Thermometer
- Sample bottles & labels

•Thermometer



•Tool used to  
measure  
sludge levels

•Sample collection tool

•Imhoff cone

- Sample bottles

- Distilled water



- pH measuring device

- DO and Temp meter

•DO test  
kit—

1 to 12



•DO test  
kit—

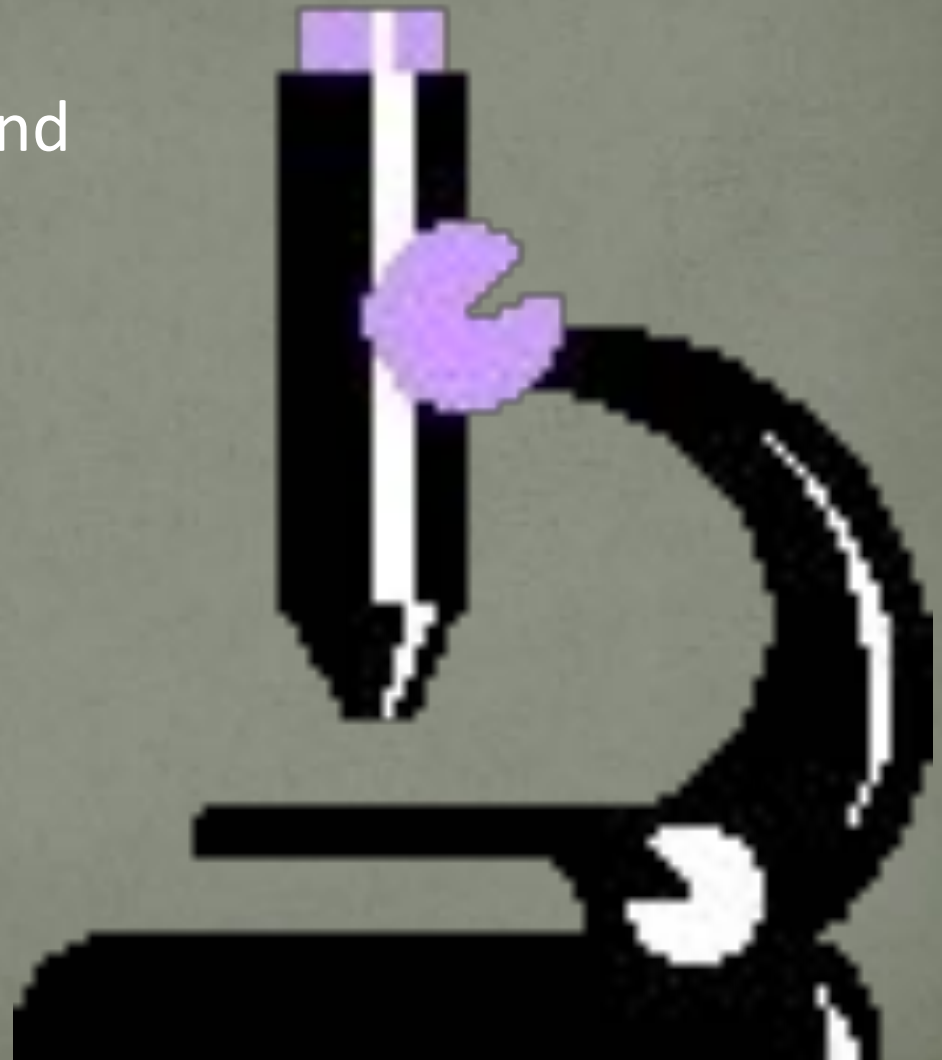
0 to 1

•Pocket pH meters & buffer  
for calibration in the field

Volt meter

- Using a microscope is the easiest method of determining FM Ratio and the presence of living organisms

- Helps determine if lab testing is necessary



# Residential unit receiving restaurant waste



## •Foaming:

An oily sheen indicates high sudsing detergent (normally smells like detergent)

Particles in the foam indicate the system lacks food (normally has an unusual odor)





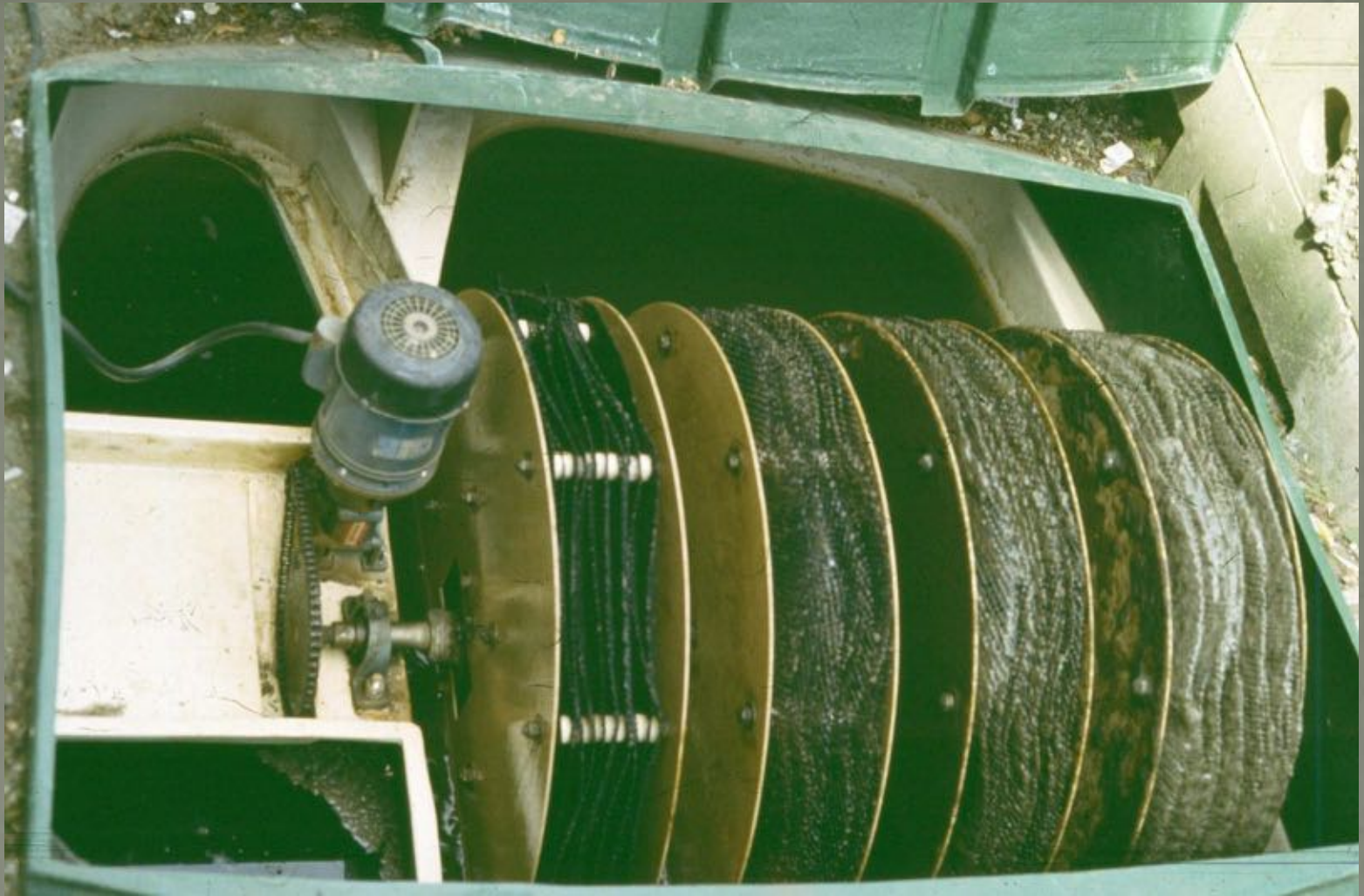
# FOG

You know you  
are in trouble  
when you find  
something like  
this





Vegetable oils are floating around the edge—Animal fat is yellow in center



ATU working properly



ATU organically overloaded



Surface of trickling filter organically overloaded



Organically overloaded trickling filter beneath the surface



Tank needs  
pumping but  
drainfield is  
not damaged

## Sludge Profile

Bottom to top  
Left to right

Ft 1  
Ft 2  
Ft 3  
Ft 4



# Sludge profile of second compartment

- Wrong color sludge
- No clear zone

- Using a DO meter and a microscope in the field

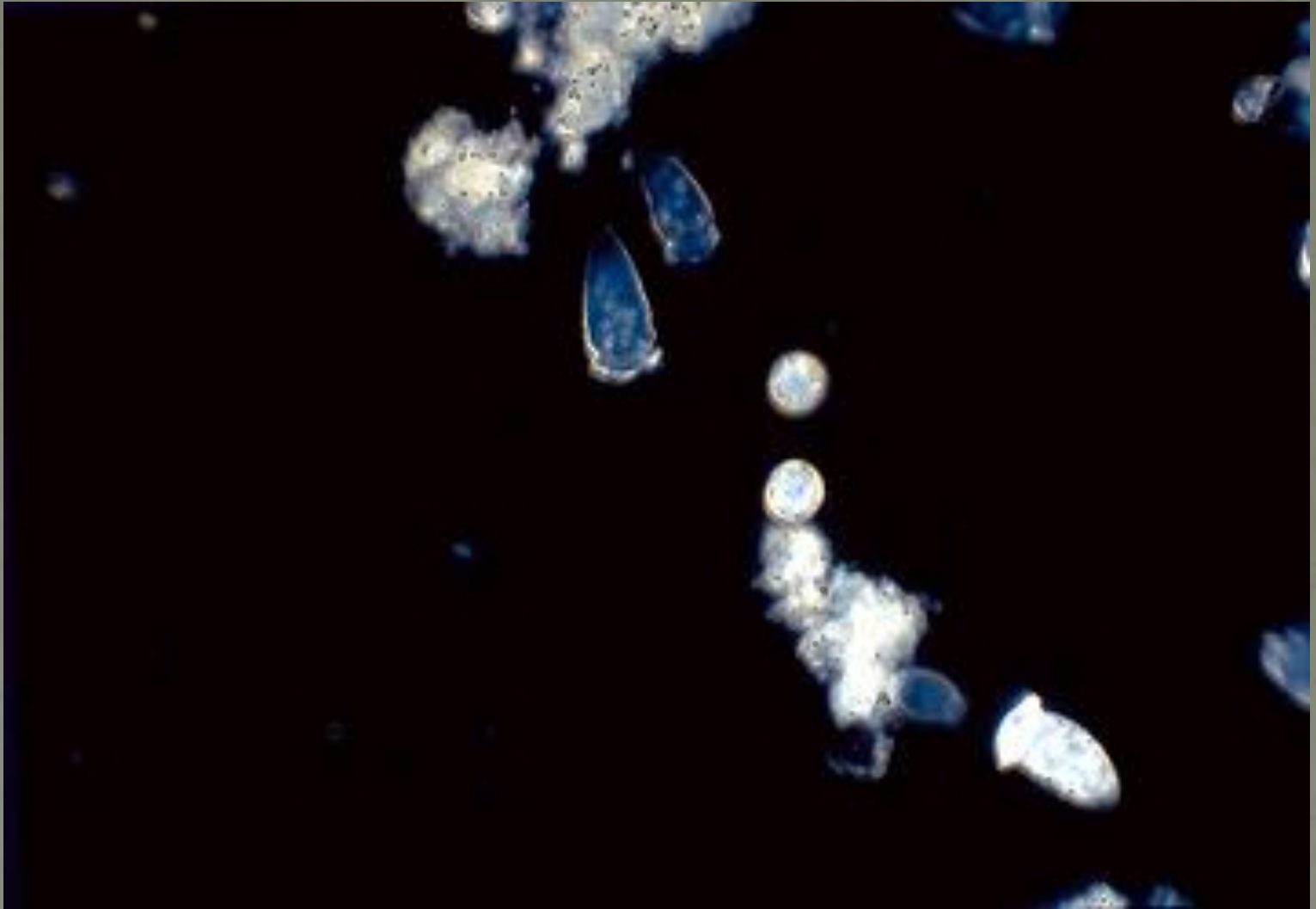




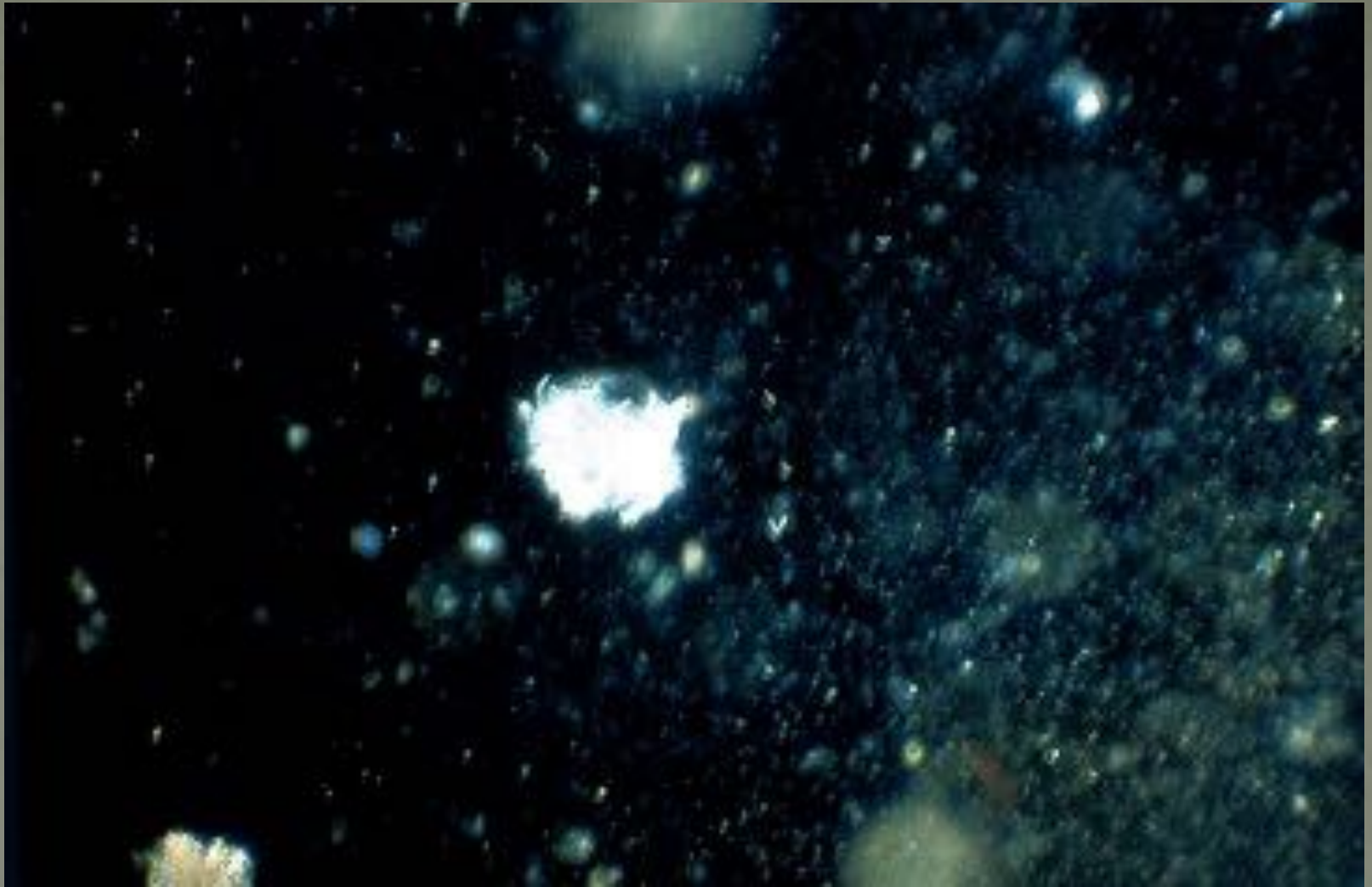
# F M Ratio

- *Food to microorganism*

While not normally considered, FM Ratio is important in the functioning of onsite systems



F M Ratio: Low food supply  
DO .5



F M Ratio: High food supply  
DO 2.0

Septic tank effluent going to an ATU.  
(meets state guidelines)



ATU effluent meets discharge standards of both the manufacturer and the state guidelines.

$BOD_5$  of 120 mg/L and 10 mg/L

Heavy flocculent –  
Sample collected  
from clear zone



BOD<sub>5</sub> over  
600 mg/L





Sample collected  
from tank shows  
the TSS is under  
40 mg/L



# Elementary School—notice the difference in TSS



Boys  
bathroom

Girls  
bathroom



Outlet of a grease  
trap--

Sample collected on a  
Thursday,  
temperature is appx  
85°



Outlet of a grease trap--

Sample collected on a  
Saturday afternoon,  
temperature appx 102°



Outlet of a grease trap—

Temperature has  
dropped to appx  $95^{\circ}$

Now you go inside--



# Utensils



Disposable or Washable

# Cooking Oils – have they changed what they use?



# Are Dishes Hand Washed?



- Draining and refilling frequency can produce large wastewater surges
- Lower temperatures require chemicals





# Dishwasher?



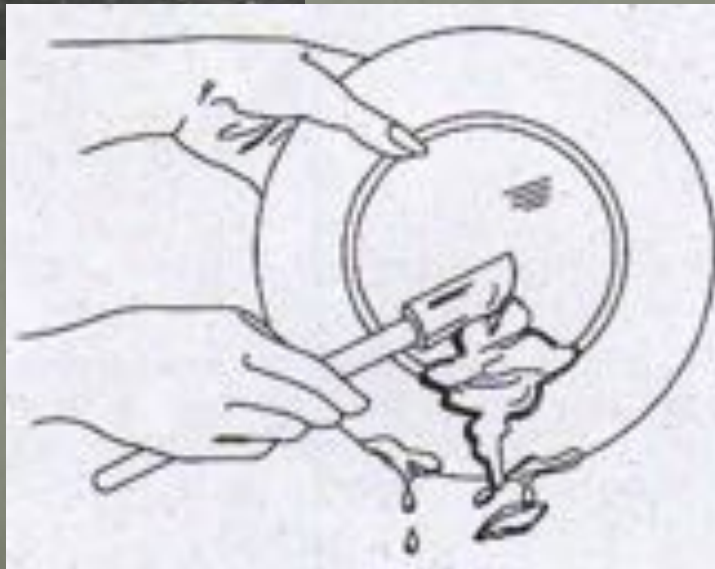
- Temperature can effect the state of the FOG
- Chemicals can also emulsify FOG
- Dishes should be scraped of extra food before washing

# Garbage Disposal



- Does the facility have one?
- Increases undigested food

# Drains



- Drain cleaners will elevate BOD<sub>5</sub>
- Scraping plates will reduce BOD<sub>5</sub>

# Dish Washer Prep Area

Area is so small it does not allow adequate space for storing dirty dishes





Not scraping  
dishes  
creates  
HSW



# Dish Washer Prep Area

Area is small but  
they do scrape  
the dishes

Hot water rinse—  
180 °





Low temperature (140°) chemical  
rinse

# After Hours Cleanup – have they changed their routine?



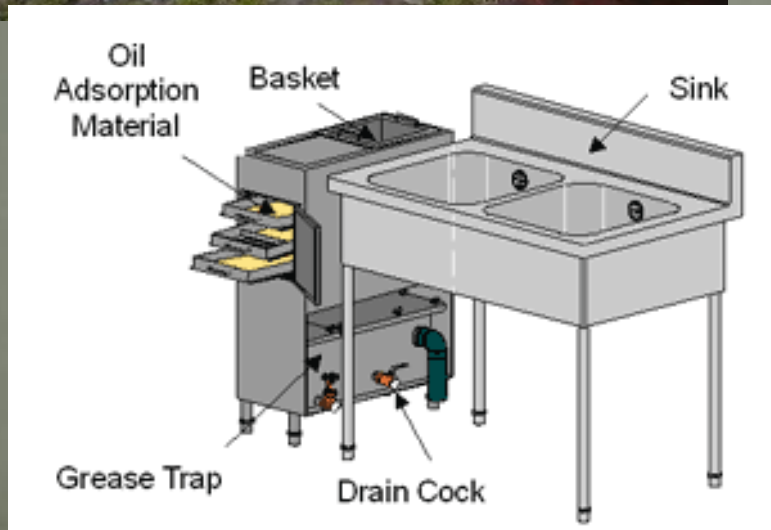
- Chemicals Used
- Does wash-water go down the floor drain?



# Grease Traps



- Is there a grease trap in the kitchen?
- Must be cleaned out on a regular basis.



Thank You