Dealing with Restaurant High Strength Waste

2010 Pumper & Cleaner Environmental Expo
Education Day
Louisville KY – February 24, 2010

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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$_5$
- FOG
- TSS
### Typical Residential Waste Strength Values

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Range</th>
<th>Typical</th>
</tr>
</thead>
<tbody>
<tr>
<td>a. BOD₅</td>
<td>110 – 250 mg/L</td>
<td>140 mg/L</td>
</tr>
<tr>
<td>b. TSS</td>
<td>44 – 155 mg/L</td>
<td>75 mg/L</td>
</tr>
<tr>
<td>c. FOG</td>
<td>10 – 20 mg/L</td>
<td>15 mg/L</td>
</tr>
<tr>
<td>d. DO</td>
<td>0 - 1.0 mg/L</td>
<td>0.5 mg/L</td>
</tr>
<tr>
<td>e. pH</td>
<td>6.5 – 7.2</td>
<td>7.0</td>
</tr>
<tr>
<td>f. Temp</td>
<td>48 - 70 °F</td>
<td>59 °F</td>
</tr>
</tbody>
</table>
Table 7.2 Waste characteristics (average range of values) of restaurant wastewater

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Chinese Restaurant</th>
<th>Western Restaurant</th>
<th>American Fast Food</th>
<th>Student Canteen</th>
<th>Bistro</th>
</tr>
</thead>
<tbody>
<tr>
<td>BOD5 (mg/L)</td>
<td>58 – 1430</td>
<td>489 – 1410</td>
<td>405 – 2240</td>
<td>545 – 1630</td>
<td>451 – 704</td>
</tr>
<tr>
<td>TSS (mg/L)</td>
<td>13.2 – 246</td>
<td>152 – 545</td>
<td>68 – 345</td>
<td>124 – 1320</td>
<td>359 – 567</td>
</tr>
<tr>
<td>FOG (mg/L)</td>
<td>120 – 172</td>
<td>52.6 – 2100</td>
<td>158 – 799</td>
<td>415 – 1970</td>
<td>140 – 410</td>
</tr>
</tbody>
</table>

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

• DO and Temp meter

• pH measuring device
• DO test kit—
  1 to 12

• Pocket pH meters & buffer for calibration in the field

• Volt meter

• DO test kit—
  0 to 1
• 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$_5$ 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°
Now you go inside--
Utensils

Disposable or Washable
Cooking Oils – have they changed what they use?
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
Does the facility have one?

- Increases undigested food
Drains

- Drain cleaners will elevate BOD5
- Scraping plates will reduce BOD5
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