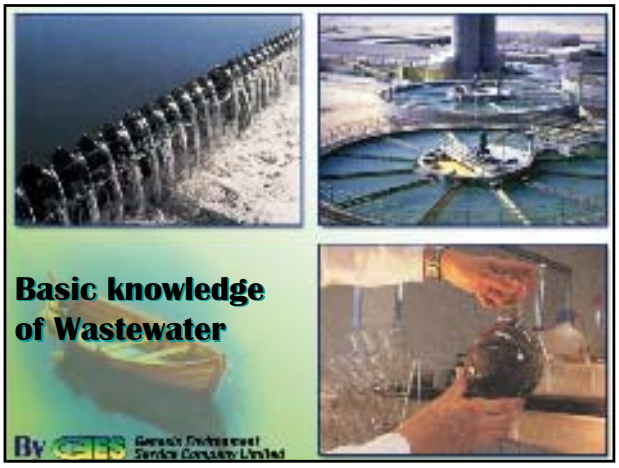

Wastewater

What is wastewater ... !

The used water and solids from our activities such as washing, bathing and from industrial uses such as cleaning raw material.

The characteristics of used water is changed due to polluted organic and inorganic. Which cannot be used anymore.

The term "sewage" usually refers to household wastes, but this word is being replaced by the "wastewater"

Water + Solids waste → Wastewater

Wastewater Sources

Sources of wastewater ... !

There are two major reasons for understanding the sources of Department stores's Wastewater.

First, by understanding the sources and quantities of wastewater, an operator can identify, define, and solve wastewater treatment system problems caused by department store discharge.

The Second reason for understanding the sources the sources of departments store wastes is to determine theirs effect on the environment

Wastewater Sources

Sources of wastewater ... !

1 Toilet

2 Kitchen
- Food court
- Restaurant
- Fresh Area
- Bakery
- Frozen food

Wastewater Sources

Sources of wastewater ... !

3 Cleaning and washing
Wastewater produced from floor cleaning, cloth or utensil washing

4 Other sources
such as cooling, Air condition

Wastewater Characteristic

Pollutants contained in wastewater

Particles contaminated in wastewater called pollutants. Wastewater generated from different sources or same sources but different time, pollutants and their concentration may be varied.

An understanding of the nature of wastewater is essential in the design and operation. In addition, the performance of wastewater treatment plant can be evaluated. Wastewater is characterized in terms of its physical, chemical and biological composition.

Wastewater Characteristic

Wastewater

Organic | **Inorganic** | **Heat** | **Micro-organism**

Odor

- Heavy metals
- Oil & Grease
- Solids
- Color
- Turbidity
- Acidity & Alkalinity
- Surfactant
- Nutrient

Wastewater Characteristic

Temperature…

The temperature of wastewater is commonly higher than that of the water supply, because of the addition of warm water from our activities. When significantly large quantities of heated water are discharged to natural receiving water, it effects to the aquatic life.

1. *Oxygen is less soluble in warm water than cold water.*
2. *The increase in the rate of biochemical reaction of microorganism that accompanies an increase in temperature.*
3. *High temperature can foster the growth of undesirable water plants.*

Wastewater Characteristic

pH

pH is an expression of the intensity of the basic or acidic condition of liquid. The pH may range from 0-14, where 0 is most acidic, 14 most basic, and 7 is neutral.

Optimum pH for aquatic life and bacterial activity are in the range from about 6-8.

pH : pH paper or pH Meter

Wastewater Characteristic

Dissolved Oxygen : DO

DO is molecular oxygen dissolved in water or wastewater.
DO is important parameters for the respiration of aerobic microorganisms as well as all other aerobic life forms.

The quantity of oxygen that can be present in solution is governed by

- *the solubility of the gas*
- *the partial pressure of the gas in the atmosphere*
- *the temperature*
- *the purity of water*

Wastewater Characteristic

Organic Mater

Waste material which come from animal or plant sources such as vegetables, rice, meat, etc. Organic wastes generally can be consumed by bacteria and other small organisms.

Wastewater Characteristic

Biochemical Oxygen Demand : BOD

The rate at which organisms use the oxygen in wastewater while stabilizing decomposable organic matter under aerobic condition. In decomposition, organic matter serves as food for the bacteria and energy result from its oxidation.

The demand of oxygen is increased while BOD concentration is increasing. Higher BOD indicate high organic pollutants contaminated.

BOD is used as important parameters for wastewater treatment plant design and equipment specification.

Wastewater Characteristic

Chemical Oxygen Demand : COD

A measure of the oxidation consuming capacity of organic matter present in wastewater.

COD represents the amount of organic matter both in biodegradable and non-biodegradable forms contained in wastewater.

Wastewater Characteristic

Solids

Solids is the most important physical characteristic of wastewater which is composed of floating matter, settleable matter, colloidal matter, and matter in soluble.

Solids can cause clogging problem in equipment such as aerator, pump.

Wastewater Characteristic

Suspended Solids ; SS

Solids that either float on the surface or are suspended in wastewater. Suspended solids is important parameter to treatment efficiency.

Wastewater Characteristic

Sulfide

The sulfate ion occurs naturally in most water supplies and is present in wastewater as well. Sulfur is required in the synthesis of proteins and is released in their degradation. Sulfate is reduced biologically under anaerobic conditions to sulfide, which in turn can combine with hydrogen to form hydrogen sulfide (H2S).

The accumulated H2S can then be oxidized biologically to sulfuric acid, which is corrosive to sewer pipes.

Wastewater Characteristic

Nitrogen

The elements nitrogen is essential to the growth of protista and plants and as such are known as nutrients or biostimulants. Nitrogen is an essential building block in the the synthesis of protein.

Nitrogen data will be required to evaluate the treatability of wastewater by biological processes. Insufficient nitrogen can necessitate the addition of nitrogen in wastewaters prior to discharge may be desirable.

BOD : N : P = 100 : 5 : 1
COD : N : P = 150 : 5 : 1

Wastewater Characteristic

Phosphorus

Phosphorus is also essential to the growth of algae and other biological organisms. Because of noxious algal blooms that occur in surface waters, there is presently much interest in controlling the amount of phosphorus compounds that enter surface waters in domestic and industrial waste discharges and natural runoff.

Similar to nitrogen, phosphorus is necessary for biological treatment plant.

BOD : N: P = 100 : 5 : 1
COD : N: P = 150 : 5 : 1

Fat ,Oil and Grease

Fat, Oil & Grease are the third major component of foodstuffs. FOG are contributed to domestic wastewater in butter, lard, margarine, and vegetable fats and oils. Fats are also commonly found in meats, in the germinal area of cereals, in seeds, in nuts and in certain fruits.

Fats are among the more stable of organic compounds and are not easily decomposed by bacteria. The FOG content of wastewater can cause many problems in both sewers and wastewater treatment plants.

Biological Characteristic

Microscopic Organism or Microorganism

- *The group of microorganisms found in surface waster and wastewater*
- *The group of microorganisms responsible for biological treatment*
- *The organisms used as indicators of pollution*
- *Indicator organisms*

Wastewater Flow

Determining the rates of wastewater flow is a fundamental step in the design of wastewater treatment facilities and plant operation.

Wastewater flow rate estimates have to be developed from water consumption records and other information.

- *Determine the wastewater flow rate at the actual source*
- *Estimate from water supply record*
- *Wastewater quantity = 70 –90 % of water supply*
- *Estimate from other sources that have the similar wastewater flow and characteristics.*

Effluent

Effluent is wastewater, partially or completely treated, flowing from a treatment plant.

Water quality standard

- The enhancement and conservation of the national environmental quality act B.E. 1992
- Factory Act
- Building effluent standard

Effluent Standard

The most important act is the enhancement and conservation of the national environment quality act B.E. 1992

The effluent quality should to achieve this standard.

Building Type .....

8. Department Store
   Area 25,000 m^2 or more
   = building size A

   Area From 5,000 to not greater than 25,000 m^2
   = building type B

Building Effluents Standards

…Department stores size A.

1. pH	5-9		
2. BOD_5	lower than	20	mg/L
3. Suspended Solids	lower than	30	mg/L
4. Sulfide	lower than	1	mg/L
5. Total Dissolved Solids	lower than	500	mg/L
	These values are in addition to the TDS of the water used.		
6. Settleable Solids	lower than	0.5	mg/L
7. Fat Oil and Grease	lower than	20	mg/L
7. TKN	lower than	35	mg/L