ENVIRONMENTAL SANITATION

REVIEW LECTURE
COMPONENTS OF ENVIRONMENTAL SANITATION

- WATER SANITATION
- FOOD AND MILK SANITATION
- EXCRETA DISPOSAL
- SEWAGE DISPOSAL
- REFUSE DISPOSAL
- VECTOR AND VERMIN CONTROL
- HOUSING
- AIR SANITATION
WATER SANITATION

WATER ANALYSIS CONSISTS OF:

- PHYSICAL
- CHEMICAL
- RADIOLOGICAL
- BIOLOGICAL
- BACTERIOLOGICAL
WATER SANITATION

- PUBLIC WATER SUPPLY MUST BE-
  - SAFE
  - REASONABLY SOFT
  - PLENTIFUL
  - CHEAP
WATER SANITATION

- HOUSEHOLD TREATMENT OF WATER
  - BOILING, i.e., beyond 2 minutes
  - CHLORINATION - 1-5 ppm
  - IODINE TREATMENT - 10 drops per gallon
  - FILTRATION
  - AERATION
## Bacteriological Examination of Water Samples

<table>
<thead>
<tr>
<th>Pop’n served</th>
<th>Max. Interval between sampling</th>
<th>Min # of samples/per pop’n/month</th>
</tr>
</thead>
<tbody>
<tr>
<td>Up to 20,000</td>
<td>One month</td>
<td>One sample/5000</td>
</tr>
<tr>
<td>20,001-50,000</td>
<td>Two weeks</td>
<td>One sample/5,000</td>
</tr>
<tr>
<td>50,001-100,000</td>
<td>Four days</td>
<td>One sample/10,000</td>
</tr>
<tr>
<td>More than 100,000</td>
<td>One day</td>
<td>One sample/10,000</td>
</tr>
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## WATER SANITATION - CHEMICAL QUALITY

<table>
<thead>
<tr>
<th>CHEMICAL</th>
<th>CONCENTRATION [mg/L]</th>
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<tbody>
<tr>
<td>Arsenic</td>
<td>0.2</td>
</tr>
<tr>
<td>Barium</td>
<td>1.0</td>
</tr>
<tr>
<td>Cadmium</td>
<td>0.01</td>
</tr>
<tr>
<td>Chromium</td>
<td>0.05</td>
</tr>
<tr>
<td>Cyanide</td>
<td>0.01</td>
</tr>
<tr>
<td>Lead</td>
<td>0.1</td>
</tr>
<tr>
<td>Selenium</td>
<td>0.05</td>
</tr>
<tr>
<td>Silver</td>
<td>0.05</td>
</tr>
</tbody>
</table>
FOOD AND MILK SANITATION

- The GOLDEN RULE of food sanitation is:

  “Keep it cold or hot, and keep it covered”
FOOD SANITATION

- 3 ENEMIES OF FOOD STORAGE:
  - HIGH TEMPERATURE
  - HIGH HUMIDITY
  - CONTAMINATION BY STRONG ODORS
FOOD SANITATION: FOOD BORNE DISEASES

FOOD BORNE INFECTION

BACTERIAL
-Typhoid, Cholera, Bacillary dysentery, Salmonella

PARASITIC
-Ascariasis, Trichinosis, Amoebiasis
FOOD SANITATION: FOOD BORNE DISEASE

- BACTERIAL
  - Staphylococcus
  - Streptococcus
  - Cl. botulinum

- PLANT OR ANIMAL
  - Mushroom
  - Mussels
  - Fish
  - Herbs

- CHEMICAL
  - DDT, Lead,
  - Mercury, Cadmium
MILK SANITATION

- **STERILIZATION** - The application of high temperature for the purpose of destroying all types of microorganisms.

- **PASTEURIZATION** - The application of heat to milk for the purpose of destroying pathogenic microorganisms with minimum injury to the substance.
MILK SANITATION

- TYPES OF PASTEURIZATION:
  - HOLDING OR VAT PASTEURIZATION: 142—143 F FOR 30 MINS.
  - HIGH TEMPERATURE, SHORT TIME [HTST]-160-162 F FOR 15 MINS.
  - FLASH PASTEURIZATION- 190 F FOR FEW SECONDS.
EXCRETA DISPOSAL

- METHODS:
  1. WITH WATER CARRIAGE
  2. WITHOUT WATER CARRIAGE
EXCRETA DISPOSAL

1. WITHOUT WATER CARRIAGE
   - CAT-HOLE
   - STRADDLE TRENCH
   - SANITARY PIT PRIVY
   - BORED-HOLE
   - CHEMICAL TOILET
   - PAIL SYSTEM
   - OVERHUNG LATRINE – “POUR-FLUSH”
EXCRETA DISPOSAL

2. WITH WATER CARRIAGE
   - WATER SEALED
     SEPTIC TOILET/AQUA PRIVY
   - IMHOFF TANK SYSTEM
EXCRETA DISPOSAL

- CHARACTERISTICS OF ADEQUATE EXCRETA DISPOSAL FACILITIES FOR RURAL AREAS.
  - SIMPLE, CHEAP AND EASY TO CONSTRUCT
  - EASY TO MAINTAIN
  - AFFORDS EASY PROTECTION AGAINST THE ELEMENTS AND PROVIDE DESIRED PRIVACY
  - ACCEPTABLE TO THE USERS
REFUSE/WASTE DISPOSAL

- **REFUSE** is a general term applied to solid and semi solid waste materials other than human excreta.
REFUSE DISPOSAL

- PUBLIC HEALTH REASONS FOR PROPER DISPOSAL OF WASTES
  - BREEDING PLACE FOR INSECTS AND RATS
  - GIVES OUT FOUL SMELL
  - “EYE SORE”
  - FIRE HAZARD
REFUSE DISPOSAL

- **TYPES OF REFUSE**
  - **GARBAGE**: LEFT-OVER VEGETABLES, ANIMAL AND FISH MATERIAL FROM KITCHENS AND FOOD ESTABLISHMENTS.
  - **RUBBISH**: WASTE MATERIAL SUCH AS BOTTLES, BROKEN GLASS, TIN CANS, WASTE PAPERS, DISCARDED PORCELAINWARE, PIECES OF METAL, WRAPPING PAPERS ETC.
REFUSE DISPOSAL

- **TYPE OF REFUSE:**
  - ASHES: LEFT-OVER FROM BURNING OF WOOD AND COAL.
  - DEAD ANIMALS/ CARCASSES
  - STABLE MANURE
  - STREET SWEEPING: DUST, MANURE, LEAVES, CIGARETTE BUTTS, WASTE PAPER AND OTHER MATERIALS THAT ARE SWEPT FROM THE STREETS
REFUSE DISPOSAL

- TYPES OF REFUSE ..con’t..
  - NIGHT SOIL: HUMAN WASTE WRAPPED AND THROWN INTO SIDEWALKS AND STREETS
  - YARD CUTTINGS: LEAVES, BRANCHES, GRASS
REFUSE DISPOSAL

- CHARACTERISTICS OF CONTAINERS
  - SMALL ENOUGH TO BE EASILY CARRIED
  - SUFFICIENT IN NUMBER
  - PROVIDED WITH TIGHT-FITTING COVERS
  - MADE OF STURDY MATERIAL
  - STEADY
  - PLACED IN AN ACCESSIBLE LOCATION
REFUSE DISPOSAL

COMMUNITY REFUSE DISPOSAL METHODS:
- DUMPING ON LAND
- SANITARY LANDFILL
- COMPOSTING
- INCINERATION
- REDUCTION AND SALVAGE
REFUSE DISPOSAL

- REFUSE DISPOSAL METHODS FOR HOUSEHOLDS
  - BURIAL
  - BURNING
  - FEEDING TO ANIMALS
  - COMPOSTING
  - GRINDING AND DISPOSAL TO SEWER
REFUSE DISPOSAL

- REFUSE COLLECTION
  1. FREQUENT COLLECTION OF REFUSE, SPECIALLY GARBAGE, IS NECESSARY FOR GOOD SANITATION
  2. A LONGER INTERVAL BETWEEN COLLECTION CREATES PROBLEM OF STORAGE AND FOUL ODOR FOR THE HOMEOWNER
REFUSE DISPOSAL

REFUSE COLLECTION:

3. It is necessary to cover the refuse in the vehicles during transportation to final disposal sites to prevent flies, minimize odors or remove traveling "eye sores".

4. It is important to have adequate and properly maintained collection carts, trucks and other vehicles to eliminate collection delays and complaints from residents.
5. THE ROUTE TO THE FINAL DISPOSAL SHOULD BE AS DIRECT AS POSSIBLE FROM THE POINT OF ORIGIN. It should preferably not pass busy streets.

6. IT IS PREFERABLE TO HAVE COLLECTION DONE AT NIGHT
VERMIN CONTROL
[RODENT AND INSECTS]

• TYPES
  – PHYSICAL OR MECHANICAL
  – CHEMICAL
  – BIOLOGICAL
  – ENVIRONMENTAL
  – EDUCATIONAL
HOUSING SANITATION

- CHARACTERISTICS OF AN ACCEPTABLE HOUSE
  - ADEQUATE SPACE: AT LEAST 50 SQ.FT./PERSON FOR BEDROOM
  - ADEQUATE LIGHTING: AT LEAST 100 FT.CANDLES FOR READING
  - ADEQUATE WATER SUPPLY: 15-20 GALLONS PER CAPITA PER DAY

.....CONT.....
CHARACTERISTICS OF AN ACCEPTABLE HOUSE…[cont]…
- NOISE: SHOULD NOT BE MORE THAN 30 DECIBELS
- ADEQUATE HEAT AND VENTILATION
- EQUIPPED WITH SANITARY TOILET, FOOD STORAGE AND PROPER REFUSE DISPOSAL
SANITATION REQUIREMENTS IN EMERGENCY SITUATIONS

- WATER
  1. MINIMUM DEMAND PER PERSON PER DAY
     A. 2 LTS FOR DRINKING
     B. 10 LTS FOR FOOD PREPARATION AND COOKING
     C. 15 LTS FOR BATHING
     D. 15 LTS FOR LAUNDRY
     E. 10 LTS FOR SANITATION AND HYGEINE

...CONT...
IN EMERGENCY SITUATIONS

- WATER

1. MINIMUM REQUIREMENTS [..CONT..]

HOSPITALS AND CLINICS

A. OUT-PATIENT: 5 LTS / PATIENT / DAY.
B. IN-PATIENT: 40-60 LTS / PATIENT / DAY

FEEDING CENTERS: 20-30 LTS / PERSON / DAY
2. QUALITY CONTROL

- To preserve public health, a large amount of reasonably safe water is preferred over a small amount of purified water.

- Bacteriological, biological, chemical, physical and radiological quality of water must be deemed safe. …[CONT…]
WATER

2. QUALITY CONTROL…[CONT..]
   - THERE MUST BE NO FECAL COLIFORMS PER 100 ML. AT THE POINT OF DELIVERY
   - PEOPLE DRINK WATER FROM A PROTECTED OR TREATED SOURCE IN PREFERENCE TO OTHER READILY AVAILABLE WATER SOURCES.
IN EMERGENCY SITUATIONS

- WATER

2. QUALITY CONTROL… [CONT…]
   
   - STEPS ARE TAKEN TO MINIMIZE POST DELIVERY CONTAMINATION
   
   - NO NEGATIVE HEALTH EFFECT IS DETECTED.
...IN EMERGENCY SITUATIONS

- WATER

3. DECONTAMINATION AND DISINFECTION:
   - WATER PURIFIER: 2 TABS/PERSON/DAY
   - HTH [HIGH TEST HYPOCHLORIDE]: STOCK SOLN: 1 LT/20 FAMILIES/5 DAYS
   - SHOCK DISINFECTION: 50-100 PPM OF 70% AVAILABLE CHLORINE
IN EMERGENCY SITUATIONS.

- WATER

4. OTHERS REQUIREMENTS

- DRINKING WATER CONTAINER: ONE CONTAINER OF 10 LTS PER FAMILY
- COMMUNAL WATER STORAGE TANK: 10 LTS PER PERSON /DAY. VOLUME OF TANK MUST BE GOOD FOR TWO DAYS
- SHALLOW WELL: FOR TOILET FLUSHING AND CLEANING ONLY
...IN EMERGENCY SITUATIONS

- OTHER SANITARY REQUIREMENTS:
  - LATRINE
    - ONE /FAMILY
    - MIN. 1 SEAT/20 PERSONS
    - 50 METERS AWAY FROM HOUSES
  - WASTE DISPOSAL
    - ONE COMMUNAL PIT/500 PERSONS [2X5X2 M]
  - SOAP
    - 250G/PERSON/MO

...CONT...
...IN EMERGENCY SITUATIONS...

- OTHER REQUIREMENTS… cont…
  - SHELTER
    - INDIVIDUAL: 4 SQ.M./PERSON
    - COLLECTIVE: 30 SQ.M./PERSON [INCLUDING SHELTER, SANITATION SERVICES, COMMUNITY ACTIVITIES, WAREHOUSING, ACCESS ETC]
THE MOST COMMON AND MOST PRACTICAL DISINFECTING AGENT FOR DRINKING WATER:

A. OZONE
B. SILVER
C. UV RAYS
D. CHLORINE
THE MOST PREFERRED GARBAGE DISPOSAL SYSTEM IN THE PHILIPPINES:

A. BURRYING
B. SANITARY LAND FILL
C. BURNING
D. INCINERATION
THE MOST IMPORTANT AIR POLLUTION PROBLEM IN URBAN AREAS are those that come from:
A. Acid rain
B. Automobiles
C. Factories
D. Burning of trash

A gas produced by the biodegradation of organic waste
A. Oxygen
B. Methane
C. Carbon monoxide
D. Carbon dioxide
The most practical and sanitary way of excreta disposal is
A. Overhung latrine
B. Chemical toilet
C. Water sealed toilet
D. Bored hole latrine

The minimum distance of a satisfactory excreta disposal facility from an underground water source
A. Not within 10 meters
B. Not within 20 meters
C. Not within 30 meters
D. Not within 40 meters
The most widely practiced sanitary control measure for milk quality

A. Bacterial count  
B. Coliform count  
C. Pasteurization  
D. Chlorination

Chlorination of water removes

A. Odor  
B. Bacteria  
C. Bad taste  
D. Turbidity
Turbidity of water can be removed by
A. Boiling         C. Chlorination
B. Coagulation     D. Filtration
The control of the environment to prevent communicable disease is
A. Disinfection
B. Sterilization
C. Sanitation
D. Surveillance