

SECONDARY SEWAGE TREATMENT

**Prepared for presentation to Jamaica Mortgage Bank
Housing Development seminar on Thursday December 2,
2004 — Presented By Julia Brown- SRC**

ENVIRONMENTALLY SOUND WASTEWATER TREATMENT TECHNOLOGIES AND SYSTEMS

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INTRODUCTION

- Economical situation and the need for pollution control necessitates that technologies and system are environmentally sound.
- Because of competing demands on limited resources waste management is not a priority.
- The disposal of wastewater has negative impact on both freshwater and coastal marine environment

PRESENT SCENARIO

- Decentralized/Onsite approach - Septic Tanks and soak-away, Pit latrines
- Centralized approach - Waste Stabilization Ponds, Activated Sludge, Oxidation Ditches etc.

DEFINITIONS

- Environmentally Sound
 - It is no way damaging to the environment
 - Should be cost effective and sustainable
- Cost Effective
 - Low capital cost
 - Low operating cost
 - Low maintenance cost
 - a short payback period
 - useful byproduct/s
- Sustainable
 - A sustainable waste management system is one which meets the present and future environmental demand

Why Environmentally Sound Wastewater Treatment

- The impact of wastewater discharge on economically important natural resources and ecosystem
- The risk to health posed by inadequate handling and disposal of wastewater
- Wastewater is causing serious pollution of surface and ground waters
- The need to protect economically important water resources
- Why Environmentally Sound Wastewater Treatment The present 'on-site' systems of wastewater disposal do not provide much in way of treatment
- Many of the high tech systems (activated sludge, oxidation ditches etc.) are in operation for over 30 years and are poorly maintained
- The plants are simply being run, not operated. Staff does not have the know-how to operate the treatment plants
- Technologies
 - Anaerobic Technology
 - Natural Systems

ANAEROBIC TECHNOLOGY

The break down of organic material under airless conditions utilizing five groups of bacteria is called "Anaerobic Digestion"

Benefits/Advantages of anaerobic treatment

The method is simple in construction and operation, consequently inexpensive

- The biological process does not require electricity
- The method can be applied at very small and at very large scale
- Application in an on-site mode results in significant savings in the investment of sewerage systems
- Benefits/Advantages of Anaerobic Technology
- Sludge production is very low
- The sludge produced is stabilized/mineralized

NATURAL SYSTEMS

Advantages of Natural Systems

- Very simple to construct
- Low capital cost investment especially when land is available at reasonable price
- Easily operated and maintained
- Low operation and maintenance cost
- Easily scaled down to small scale application make them attractive for remote towns and villages
- The ability to markedly reduce BOD, nutrients and pathogen concentration
- Environmentally Sound Wastewater Treatment Systems
- Anaerobic Wastewater Treatment Systems
 - Upflow Anaerobic Sludge Blanket Reactor
 - Biodigester Septic Tank
 - Biodigester
 - Bio-latrine
 - Imhoff Tank
- Environmentally Sound Wastewater Treatment Systems

- Natural Systems
 - Reed Bed
 - Evapo-Transpiration Bed
 - Waste Stabilization Ponds
 - WHAT IS THE UASB Reactor
- Upflow Anaerobic Sludge Blanket Reactor
- A high rate anaerobic treatment system (can facilitate high loading and short retention time)
- Utilized on small and large scale

THE UASB REACTOR WHAT IS THE BST?

The BST is an on-site sanitation unit, which provides for the disposal of toilet (black) wastewater as well as of kitchen and bathroom(grey) water.

Schematic outline of the Biodigester Septic Tank BIODIGESTER SYSTEM

The biodigester system or Biogas - Bio-fertilizer Plant is a concrete tank used for the degradation of solid organic waste such as dung, sewage, green plants and plant waste as well as agro-industrial waste and wastewater to biogas and bio-fertilizer

BIO-LATRINE SYSTEM

The Bio-latrine Units are installations where the Biodigester plants have been built to collect the waste from a VIP latrine.

From the cabin the faeces go directly into the inlet chamber and into the digester under gravity

IMHOFF TANK

The Imhoff Tank consist of a two-story tank in which sedimentation is accomplished in the upper compartment and digestion of the settled solids is accomplished in the lower compartment.

REED BEDS

This is a subsurface flow constructed wetland. The system have also been called "root zone" or "rock - reed filters" and consist of channels or trenches with relatively impermeable bottom filled with sand or rock media to support emergent vegetation

Outline of a Reed Bed Waste Stabilization Pond

A stabilization pond is a relatively shallow body of wastewater contained in an earthen basin.

Stabilization ponds are usually classified according to the nature of the biological activity taking place: aerobic, anaerobic, or aerobic-anaerobic

EVAPO-TRANSPIRATION BEDS

The Evapo-Transpiration Bed is a subsurface flow system excavated, lined and packed with a porous medium (usually gravel) to treat effluent removing the remaining organic matter, nutrient and faecal coliform.

CONCLUSION