

Experts Review of Aerobic Treatment Unit Operation and Maintenance

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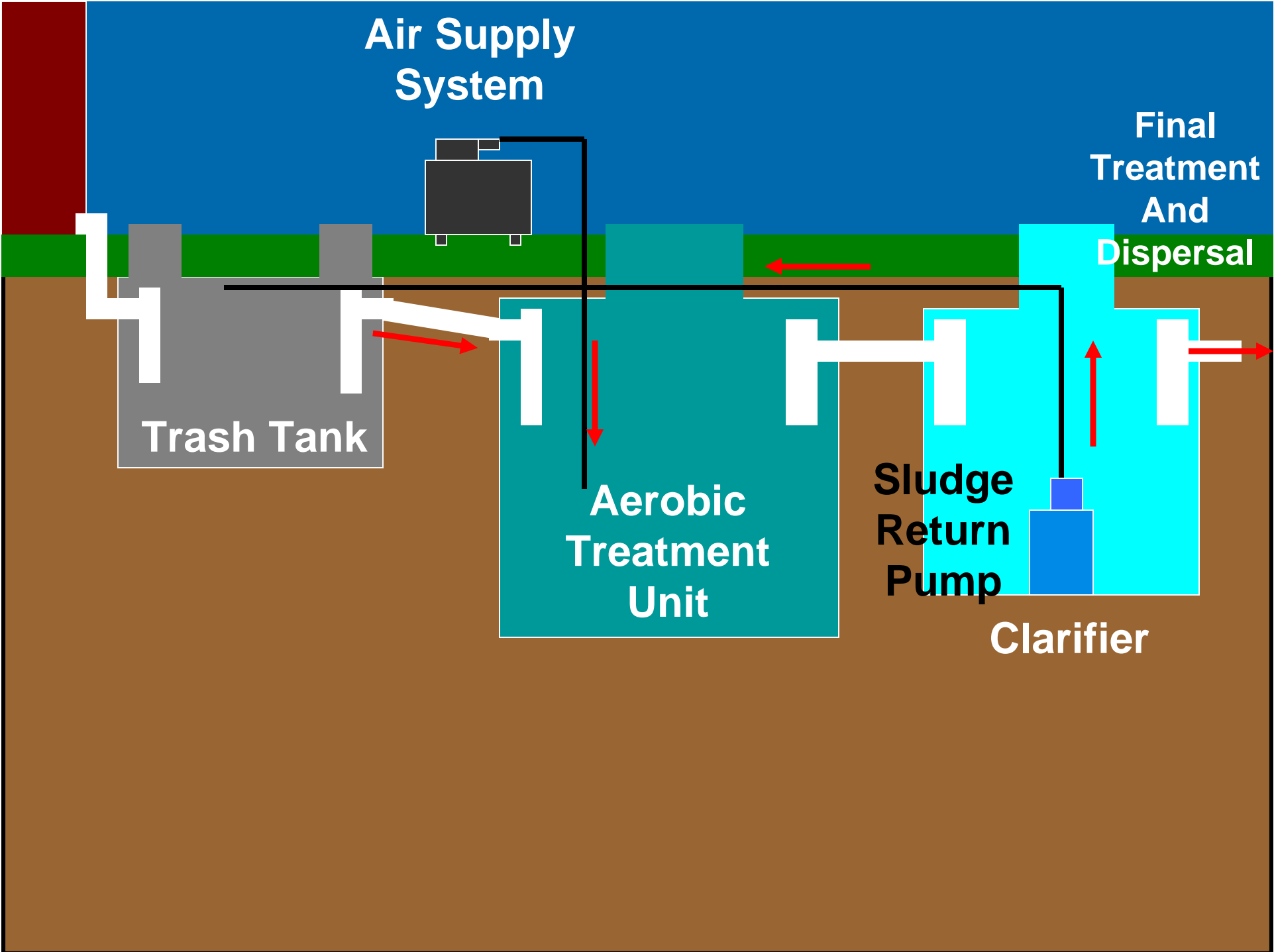


Overview

- Overview of Aerobic Treatment Units
- Installing for accessibility to system components for conducting maintenance
- System maintenance is critical for all onsite wastewater treatment systems
- Describe operation and maintenance activities.
- Sharing information regarding operation and maintenance

Components

- Trash Removal/Anaerobic Treatment
 - Aerobic Treatment
 - Mixing of the Food & Bacteria
 - F/M ratio
 - Air Supply
 - Clarification
 - Sludge Return
- 



Air Supply System

Final Treatment And Dispersal

Trash Tank

Aerobic Treatment Unit

Sludge Return Pump

Clarifier

Trash Removal and Anaerobic Treatment.

- Generally referred to as the “trash tank” or septic tank
 - Removes non degradable materials from the waste stream.
 - Provides anaerobic treatment.
 - Can be used as a component of a denitrification process

Microbes for Wastewater Treatment

➤ Microbes

- Provide treatment
- Must keep them healthy
 - Food
 - pH
 - DO
 - Temperature



➤ Healthy Environment

- Aerobic microbes
- Facultative microbes
- Anaerobic microbes



Loading

- Water – Hydraulic
 - Flow volume, GPD
 - Velocity
 - GPM
 - GPH



- Food – Organic
 - BOD
 - Concentration, mg/L
 - Mass, Pounds per day

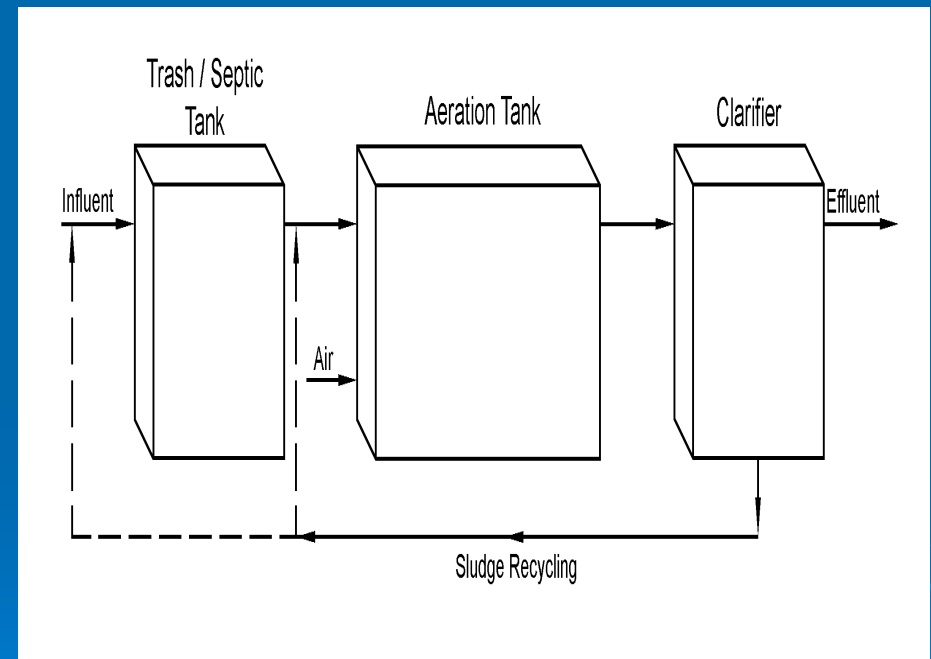


Types of Aerobic Treatment Units

- Submerged Aerobic Treatment Systems
 - Suspended Growth
 - Submerged Attached Growth/Fixed Film
 - Sequencing Batch Reactor
 - Rotating Biological Contactor

Suspended Growth

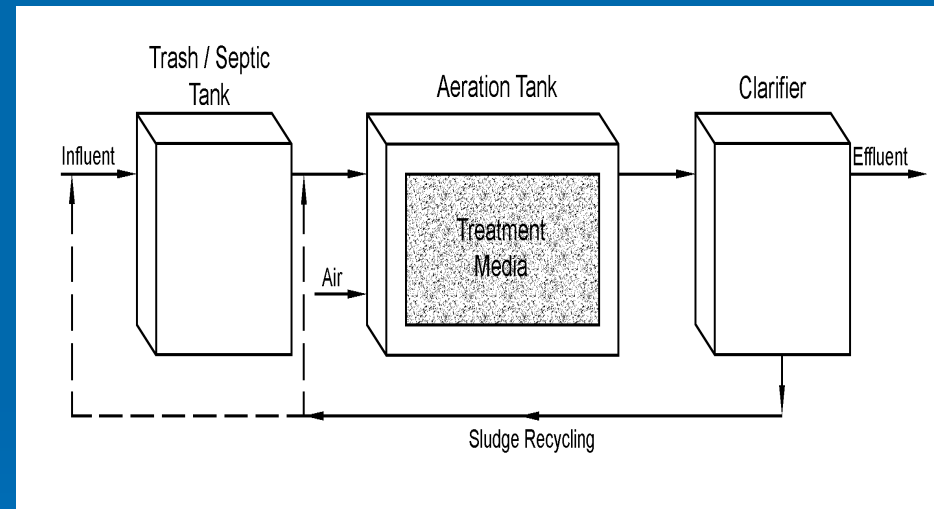
- Aerobic microbes free swimming in the aeration chamber
- Mixing in the chamber mixes the microbes and the wastewater contaminants
- Microbial growth in equilibrium with the organic loading, Extended aeration



Mixing: Microbes to Food

Submerged Attached Growth / Fixed Film Media

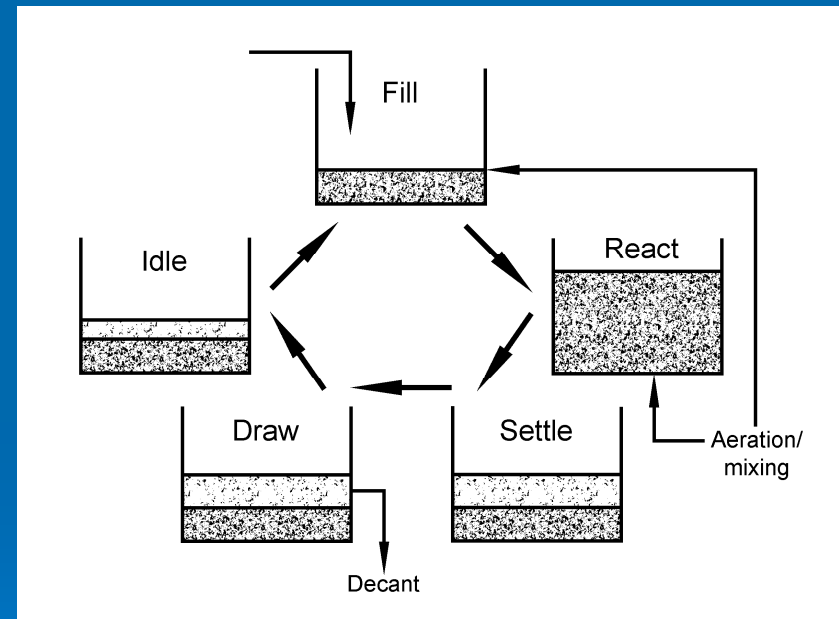
- Media is submerged in the aeration chamber
- Microbes are attached to the media
- Effluent is circulated through the media thus passing contaminants by the microbes
- Microbial growth in equilibrium with the organic loading, Extended aeration



Mixing: Food to Microbes

Sequencing Batch Reactor

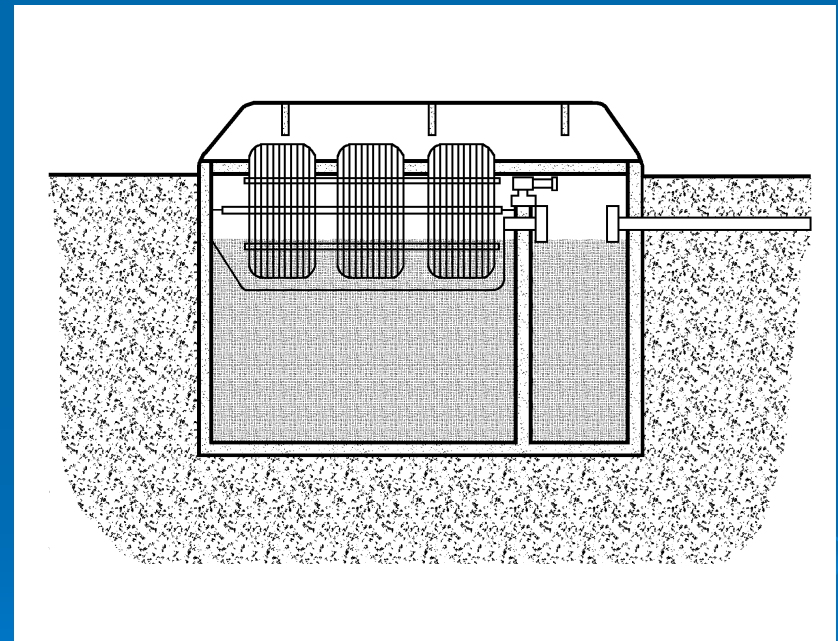
- Suspended growth treatment process
- Utilize a single chamber for achieving aeration, clarification and anoxic conditions
- Flow equalization chamber for dosing effluent into the treatment chamber



Rotating Biological Contactor

- Fixed film media
- Media is a disk
- Motor slowly rotates disks through the effluent
- Aeration is achieved by passing the media through the air space in the chamber

System venting for air



Installation for O&M

- Appropriate assembly
- Water tightness
- Accessibility for O&M



Appropriate Assembly

- Components
- Elevation
- Level
- Stable backfill



Water Tightness

- Critical for treatment
 - Water entering
 - Water exiting
- Hydraulic overloading flushes system
 - Partially treated wastewater exits
 - Solids carryover
 - Dilutes microbial population



Accessibility for Maintenance

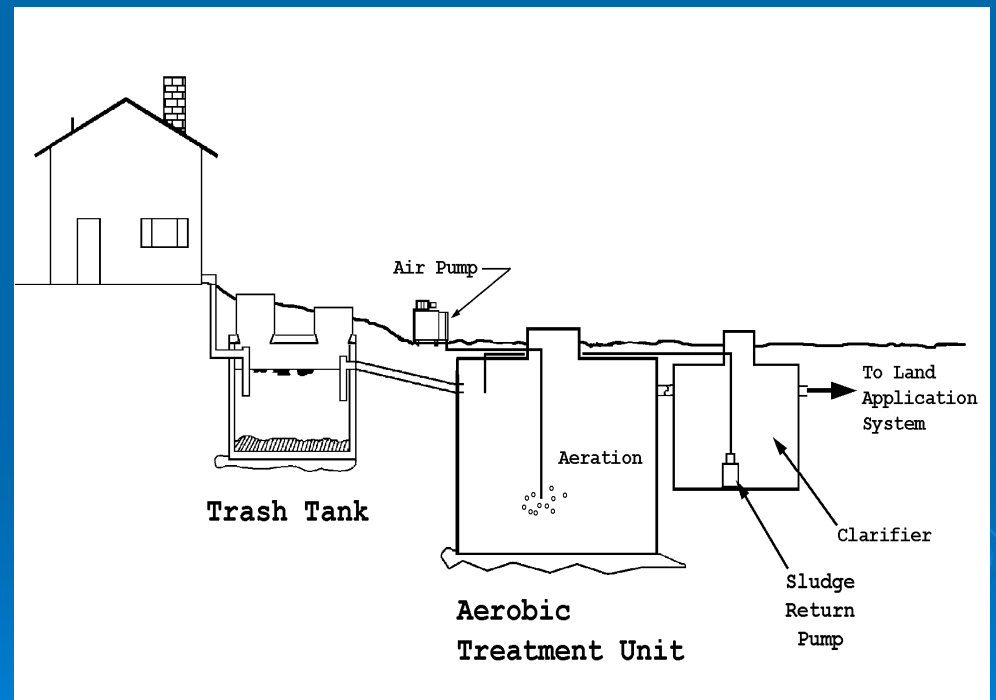
- Manufacturers guidance
- Risers to surface
- Appropriate size openings
- Appropriate depth
- Connections to components



Too Deep

Operation

- General operational status
- Operational status of the five components



General Operation

- Odors present
 - Aerobic
 - Anaerobic
 - Location
- Risers & Drainage
- Power to panel



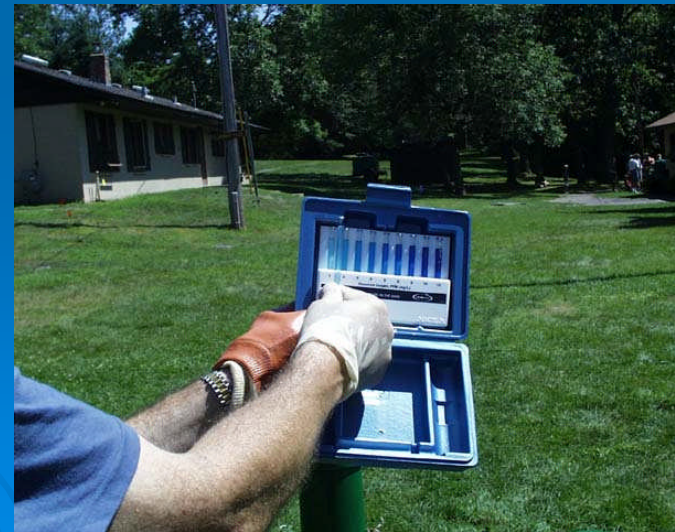
Trash Tank - Operation

- Not present on some units
- Determine depth of scum, solids, clear zone
- Baffles present



Aeration Chamber - Operation

- Mixing
- Color of biomass
- Microbial population
- Sludge depth
- Dissolved oxygen
- pH



Air Supply - Operation

- Operating status
 - Pressure
 - Vacuum
- Air flow



Clarification - Operation

- Water column
- Scum present
- Clear zone depth
 - Relation to outlet
- Settling solids in bottom
- Color of solids



Sludge Return - Operation

- Passive
 - Solids returning
- Active return
 - Pump operational
 - Depth of solids



Maintenance

- All technologies require maintenance
- Frequency and activities vary
- Types
 - Routine - scheduled
 - Unscheduled – response to alarms
- Five components of system



Trash Tank - Maintenance

➤ Pumping

- Remove all materials from the trash tank
- Check baffles when pumped
- Structural review
- Water tightness review



Aeration Chamber - Maintenance

➤ Pumping

- Suspended mixed liquor
- Sludge in bottom of tank



Aeration System - Maintenance

- Cleaning inlet
 - Filters
 - Screens
- Distribution
 - Piping
 - Aspirator
 - Diffusers
- Air pumps
 - Motors
 - Heads
 - Vanes



Clarification - Maintenance

- Scum removal
 - Spraying
 - Mixing
 - Removal
- Sides of clarifier
- Active filtration
 - Bio-filters
 - Socks



Sludge Return - Maintenance

- Passive
 - Solids returning
- Active
 - Solids removal
 - Changing pump run time



Response to Alarms

- Type of alarm
 - Water level
 - Air supply
 - Electrical
- Response time
 - 48 hours



Monitoring

- Performance criteria
 - Compliance
- Effluent quality
 - Biochemical Oxygen Demand, BOD₅
 - Total Suspended Solids, TSS
 - Fecal Coliforms



Service Contracts

- First two years
- On-going service
- Type of contract
 - Operation
 - Maintenance
 - Monitoring
 - Repairs
 - Responsible management entity



Documentation of Service

- Routine service reports
 - Homeowner
 - Permitting authority
 - Weather proof tag
- Alarm response reports
 - Homeowner
 - Permitting authority
 - Weather proof tag
- Door hanger, business card
- Talk to the occupant in the home

Fixed film _____ Manufacturer _____
 Other _____ Manufacturer _____

2. (a) Within 10 feet of perimeter of ATU unit, odor was present: Yes No
 (b) If 'Yes', rank strength of odor (0=none, 10 = strong) _____
 Color of the mixed liquor _____
 DO in Mixed liquor _____ ppm

3. Was foaming/residue observed outside the unit: Yes No
 4. Air Supply working satisfactorily: Yes No
 Pressure in the system _____

5. Air Filter cleaned: Yes No
 6. Unit effluent filter cleaned (if present): Yes No
 7. Alarm working satisfactorily: Yes No
 Settling chamber appearance _____
 DO in the settling chamber _____

8. Pumping unit recommended: Yes No
 Settle ability rate 20 % in 30 minutes _____ ppm

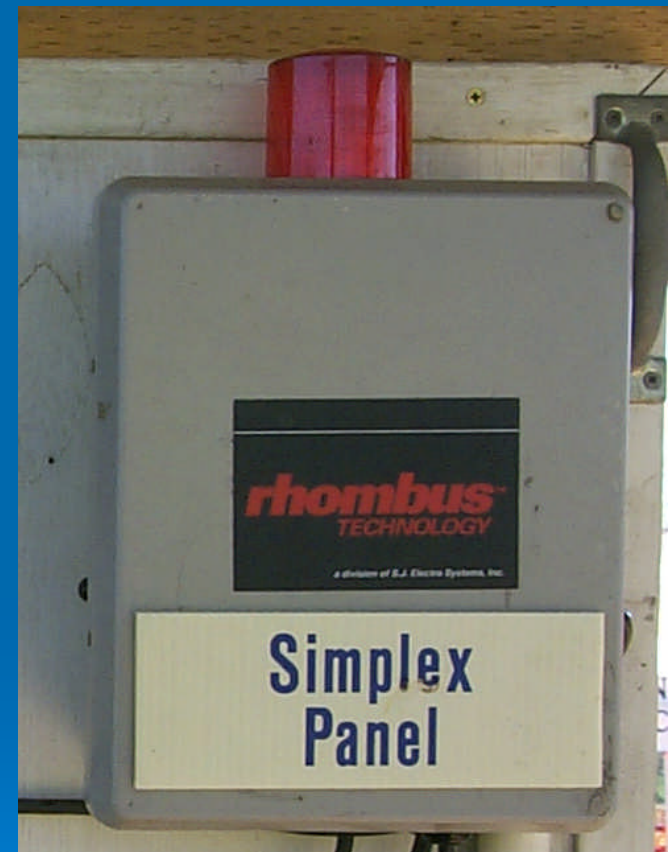
9. Additional Manufacturer's required maintenance was performed: Yes No
 (If 'Yes', attach Manufacturer inspection form to this report, if supplied)

10. Sampling effluent was performed (describe if 'Yes'): Yes No

Year	2007	Initials	2008	Initials	2009	Initials
1st Service Jan.-Apr.						
2nd Service May-Aug.	8-8	1069	K9			
3rd Service Sept.-Dec.	K3	K9				

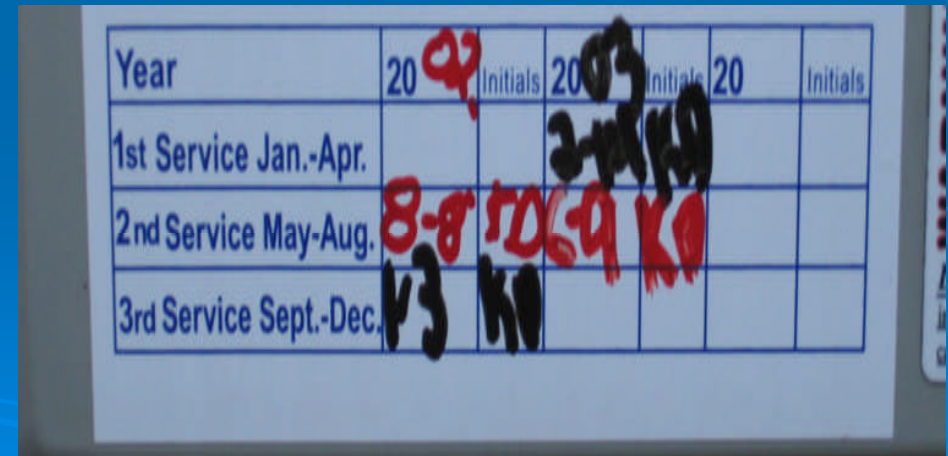
Notification of Alarms

- Audio / visual alarms
 - Homeowner contacts service provider
- Electronic Monitoring and Automatic Notification
 - Service provider
 - Answering service
 - Electronic recording and notification



Verification of Service

- Regulatory function
- Office activities
 - Review work
 - Record keeping
 - Tracking
- Field activities
 - Spot check reports
 - Verify signatures on tag
- Electronic verification
 - Service provider went to site



Year	20	Initials	20	Initials	20	Initials
1st Service Jan.-Apr.						
2nd Service May-Aug.	8-8	1069	KO			
3rd Service Sept.-Dec.	V3	W				

Summary

- Installing for accessibility to system components for conducting maintenance
- System maintenance is critical for all onsite wastewater treatment systems
- Describe operation and maintenance activities.
- Sharing information regarding operation and maintenance