

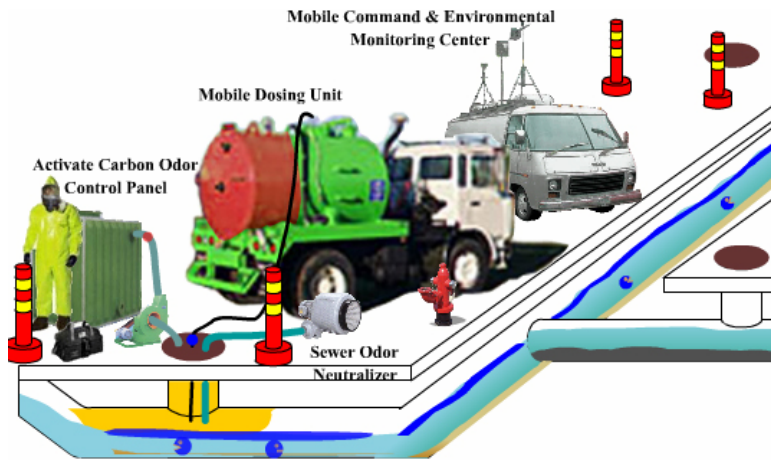


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ABS Municipal/Industrial Sewer Cleaning and Toxic Gas Removal Technologies

We Came a Long Way Since the Roman Built their First Sewer System

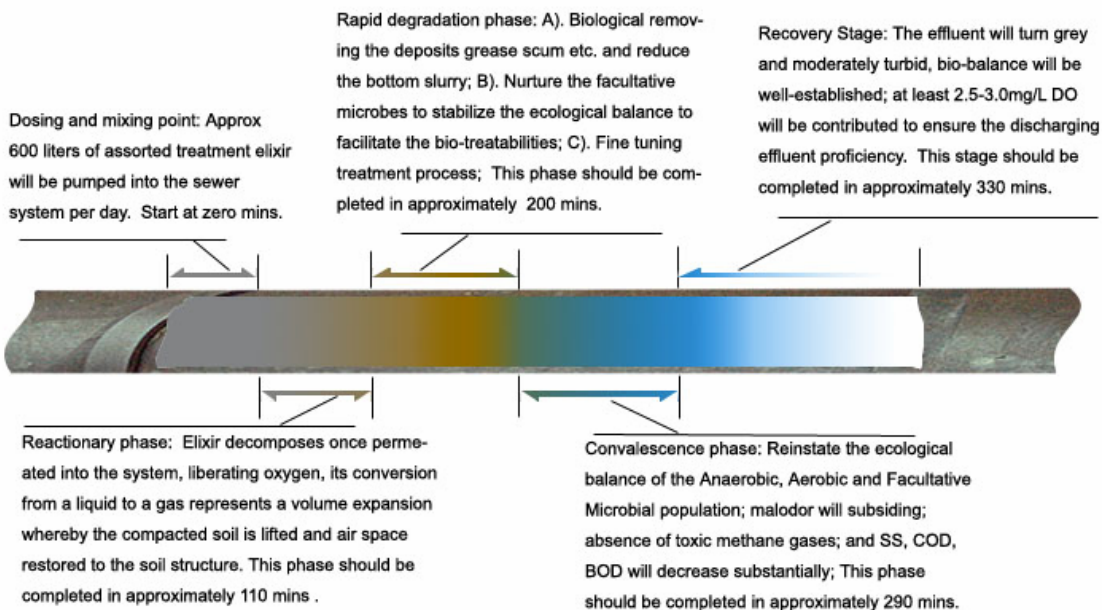


Sewer Cleaning in Early 1900



The Current ABS-Mobile Sewer Cleaning Units

ABS-Zero Toxic/Explosive Gas Discharge and Cost Effective Mobile Sewer Pre-treatment Technology



ABS Mobile Sewer Cleaning Reactive Pathway

This is a computer authenticated document, no signature require

Worldwide Patent Pending for all material usages, process implementations, applications and system designs



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Performance Arcade

Exhibit (A) ABS Oxygen Alleviating Medium Performance

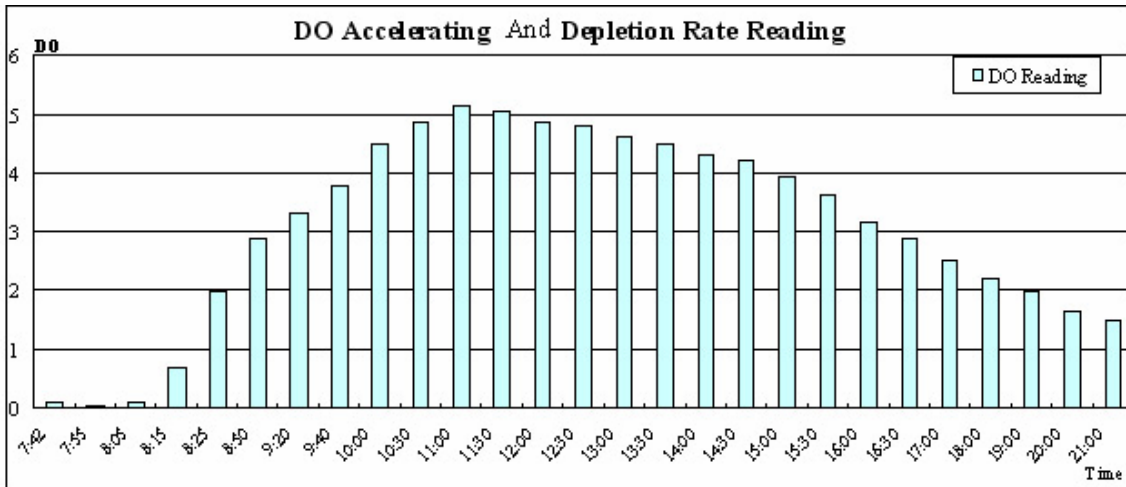
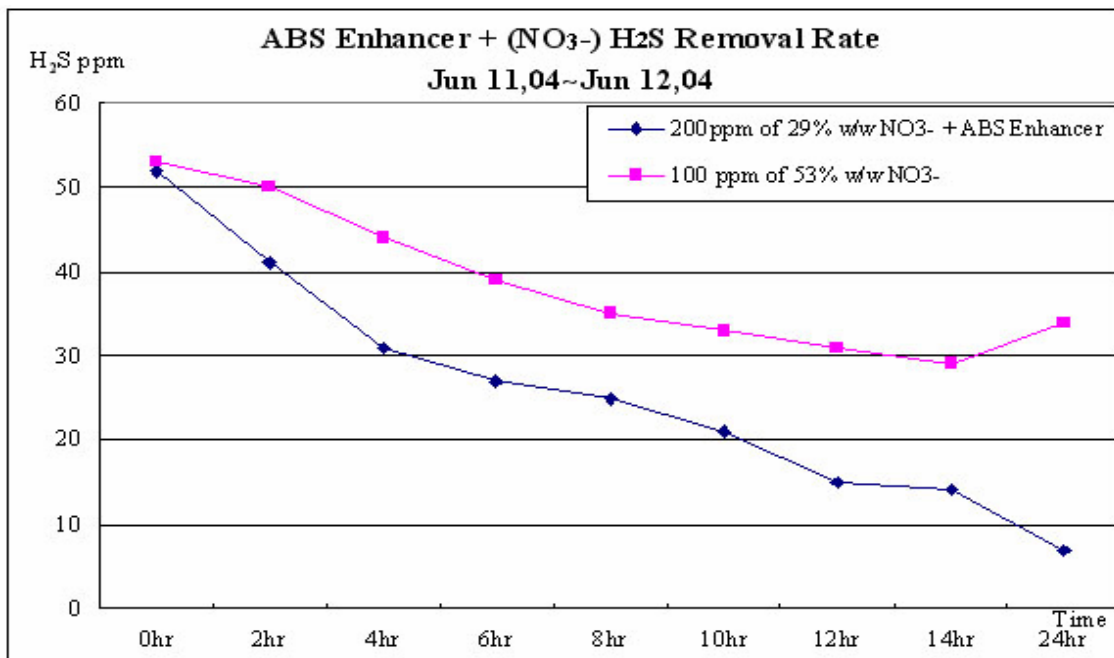


Exhibit (B) ABS Calcium Nitrate Enhancer Performance





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Typical Deployment for a 35,000m³ per day Sewer Treatment Headwork



Table of Contents:

The Cover Page: 1 – 1

Product Performance Arcade Page 2 - 2

Chapter (1): Page 4- 8
ABS Urban Sewer Odor, Septicity
Management Statement of Works

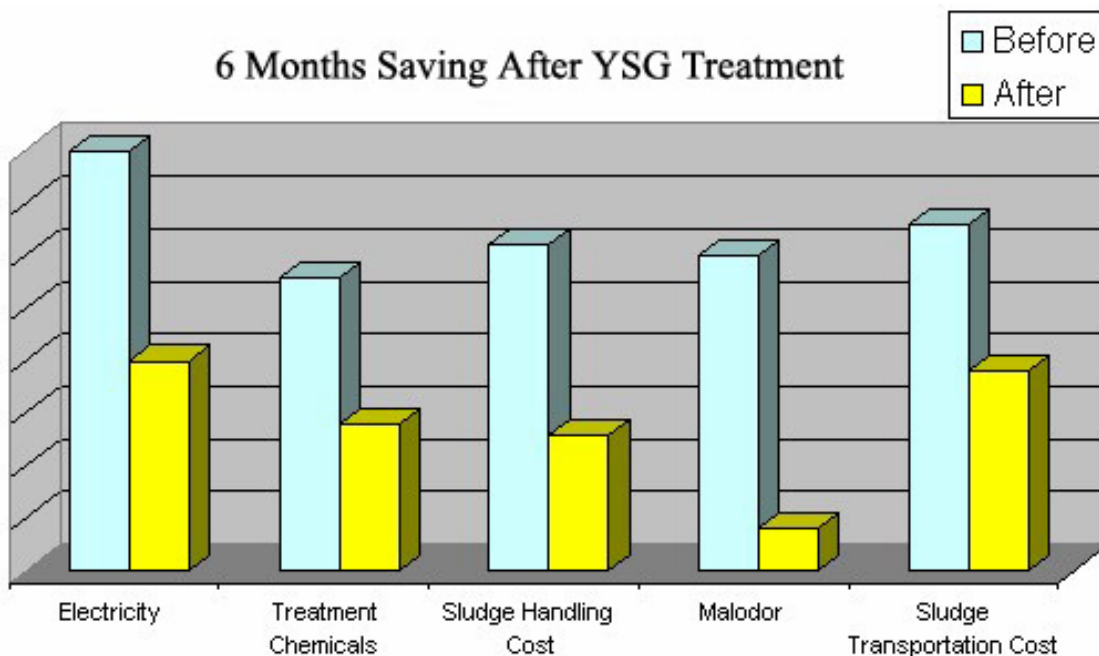
Chapter (2): Page 9 – 11
Traditional Sewer Cleaning Technologies

Chapter (3): Page 12 – 33
Statement of Work (**Page 22**); ABS-
Sewer Line Odor/Septicity Control and
Cleaning Method

References fr. ABS Library: Page 34 - 39

From a blissful Client

6 Months Saving After YSG Treatment





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Insight of ABS Urban Sewer Odor/Septicity Toxic Gas Removal Technology

Chapter (1): Introduction

The production and release of H₂S gas in municipal wastewater collection system is responsible for numerous odor complaints and the destruction of sewer pipes and other wastewater facilities. The process begins with the biological reduction of sulfate to sulfide by the anaerobic slime layers residing below the water surface in wastewater conveyance lines and collection systems.

The anaerobic bacteria utilize the oxygen in the sulfate ion as an electron acceptor in their metabolic processes. The resulting sulfide ion is transformed into H₂S gas after picking up two hydrogen ions from the wastewater. Once released to the sewer atmosphere, an aerobic bacteria (Thiobacillus) which resides on sewer walls and surface above the waterline consume the H₂S gas and secrete sulfuric acid. In sever instances; the ph of the conveyance line can reach as low as 0.5.in this cause sever damage to unprotected collection system surface and can eventually result in total failure of the sewer piping and the uncontrolled release of toxic gases, odor and raw wastewater to the environment.



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Background

For domestic wastewater the main source of sulfide and sulfate. Sulfide generation is bacterially mediated process occurring in the submerged portion of the sewer conveyance line and force mains. Fresh domestic wastewater entering a collection is usually free of Sulfide. However, a dissolved form of Sulfide soon appears as a result of low dissolved oxygen content; high-strength wastewater, low flow velocity and long detention time in the collection; elevated wastewater temperature and extensive pumping.

Once release from wastewater as H_2S , odor and corrosion begin. Another type of bacteria utilizes H_2S gas to produce H_2SO_4 that causes the destruction of wastewater piping and facilities. Operation and maintenance expenditures are required to correct the resulting damages caused by the H_2SO_4 . In severe instances, pipe and conveyance line failure, disruption of services and uncontrollable release of the toxic gas, odor etc...can occur.

The first step in this bacterially mediated process is the establishment of a slime layer below the water level in the sewer. This slime layer is composed of bacteria and inert solids help together by a biologically secreted protein glue or film called Zooglea. When this biofilm becomes thick enough to prevent dissolved oxygen from penetrating it, an anoxic zone develops within it.



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Approximately two weeks is required to establish a fully productive slime layer or Zooglea film in the sewer conveyance line. Within this slime layer, sulfate reducing bacteria use the sulfate ion, a common component of wastewater, as an oxygen source for the assimilation of organic matter in a way equivalent to dissolved oxygen is using by aerobic bacteria. Sulfate concentrations are almost never limiting in normal urban wastewaters. When So_4^- is utilized by these bacteria, S^- is the by-product. The rate at which S^- is produced by the slime layer depends on a variety of environmental conditions including the concentration of organic of food source or biochemical oxygen demand, dissolved oxygen concentration, temperature, wastewater velocity and the area of the normally wetted surface of the sewer conveyance line.

As So_4^- is consumed, the S^- by product is released back into the wastewater stream where it immediately establishes a dynamic chemical equilibrium between four forms of sulfide, the sulfide ion (S^-), the bi-sulfide or hydrosulfide in (HS^-), dissolved H_2S and H_2S gas. The rate at which H_2S leaves the aqueous phase is governed by Henry's Law and other factors.



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Factors Affecting Sulfide Concentration

Settleable Solids

Periods of low flow in the sewer conveyance line correlate to the average wastewater velocities. Low flow velocities allow material to settle in the sewer conveyance line. The increase the mass and surface area of material in the sewer conveyance line upon which So_4^- reducing bacteria (slime layer) can grow and can lead to an increased conversion of So_4^- to S^- . The inaction between a large quantity of bacteria and an almost unlimited food will create dissolved S^- spikes that are subsequently released in the area of high turbulence. This trend is common and well documented in many cities with similar grit deposition problem.

Temperature

Higher wastewater temperature increase the metabolic activity of So_4^- reducing organisms, causing faster conversion of So_4^- to S^- and increase dissolved S^- concentrations. It has been estimated that each incremental 7°C increase in wastewater temperature doubles the production of S^- .



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Flow Turbulence

Turbulence is a critical parameter in controlling H₂S gas release from water. The effects of H₂S gas odor and corrosion are by order of magnitude at points of turbulence. Henry's Law governs the concentration of gas over a liquid containing the dissolved form of gas. Any action that serves to increase the surface area of the liquid also increases the driving force from the liquid to the gas phase.

Structural Corrosion

Thiobacillus aerobic bacteria, which commonly colonize pipe crowns, walls and surface about the waterline in conveyance line and structures, have the ability to consume H₂S gas and oxidize it to H₂SO₄. This process can only take place where there is an adequate supply of H₂S gas (>2.0ppm), high humidity and atmospheric oxygen.

These conditions exist in the most of the wastewater collection system and the inner chamber of the sewer conveyance line. A ph of 0.5 (approximately equivalent to 70ml of H₂SO₄ concentration) has been increased on the surface exposed to severe H₂S gas environments (>50ppm in air).



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Chapter (2): Conventional Sewer Cleaning Technologies

Introduction:

Generally, if sediments are left to accumulate in pipes, hydraulic restriction can result in blockages in the flow-line discontinuities. Otherwise, the bed level reaches equilibrium level. A number of conventional and unique biological cleaning techniques are described below, following by a discussion of various manual/automated cleaning techniques.

Conventional Sewer Cleaning Techniques

Conventional sewer cleaning techniques include rodding, balling, flushing, bucket machine. These methods are used to clear blockages once they have formed, but also serve as preventative maintenance tool to reduce future problems. With the exception of flushing, these methods are generally used in a reactive mode to prevent or clear the hydraulic restrictions. As a control concept, flushing of sewer is viewed as a means to reduce restriction problem as well a pollution prevention approach.



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Power Rodding:

Power rodding includes an engine driven unit, steel rods and variety of cleaning and driving units. The power equipment applies torque as it is pushing through the line, rotating the cleaning device attached to the lead end. Power rodding can be use for routine preventative maintenance, cutting the sediments or grease deposits.

Power rodding are efficient in lines up to 0.3m or 12 inches in diameter.

Balling:

Balling is a hydraulic cleaning method in which the pressure of the water head creates high velocity water flow around an inflated rubber cleaning ball. The ball has an outside spiral thread and swivel connection that causes it to spin, resulting in a scrubbing action of the water along the pipe.

Balls remove settled grit and the grease buildup inside the line. This technique is useful up to 0.6m or 24 inches in diameter.



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Sewer Flushing Systems:

Flushing of sewer either by manual or by automated means is generally meant to reduce hydraulic restriction problems and infrequently as a pollution prevention approach. Flushing of sewers has been a concern dating back to the Roman, the concept of sewer flushing is to induce the unsteady waveform by either rapidly adding external water or creating a “dam break” effective by quick opening of the restraining gate. Cleaning efficiency of periodic flush waves depends on flush volume, flush discharge rate, sewer slope, sewer length, sewer flow rate; sewer diameter and population density. Maximum flushing volumes at upstream points are limited by available regulator/interceptor capacities or prior to overflow.

Manual flushing methods usually involve discharge from the fire hydrant or quick opening valve from tank truck to introduce a heavy flow of water into the line at a manhole. Flushing removes floatable, some sand and grit, but is not effective for removing heavy organic solids.



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Chapter (3):

Alternative Sewer Line Odor/Septicity Control and Cleaning Method

Introduction:

Odor/Septicity control within sanitary sewers has been practiced for over 50 years, yet only recently have substantive advances been made since the introduction of ABS- Sewer Line Odor/Septicity Control and Cleaning Method in 2002.

In recent years, a new pollution problem is forcing a strain large or smaller wastewater treatment plants. Many of the treatment facilities today are not capable of keeping up with the increased waste loads that are being produced by rapidly growing industry, specifically restaurants, mega airport aircraft/car washes, or any establishment where food waste, animal waste, or detergents, fossil oil residues are produced and released into sewer systems. Additionally, the ever-changing regulations and directives may make yesterday's process unacceptable today.

Sewer contaminated with hydrocarbons (petroleum residues, solvents, pesticides, wood preservatives, etc.) present one of the more difficult challenges for waste treatment specialists. When the matrix of these unfriendly chemicals reach the **Auto-ignition Temperature** (refer to the Standard MSDS) it will silently transform into powerful damaging explosive and lethal carnage mists of Methane, Ammonia, Carbon Monoxide; Hydrogen Sulfide etc...all at the same occurrence. .



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This is particularly true when the contamination has spread deep into the city, airport, hospital etc....sewer and storm-water systems and leaks to the below ground surface, making excavation costly or impractical. The technologies currently in use are all have serious shortcomings whereas:

Technology Options

Major Shorting

Air

- May air bind pumps and piping
- Volatilizes odors into the atmosphere
- Dissolution is inefficient, and oxygen solubility limited
- Limited applicability (typically not cost-effective for H₂S levels > 10 mg/L)

Alkalis

- May change or worsen odors
- Removal of H₂S to low levels may be cost-prohibitive
- Does not destroy sulfide - volatilization will occur once the pH is neutralized
- NaOH is a hazardous chemical
- Inefficient for gravity and pressurized sewer lines
- Resultant N₂ gas (or residual NO₃) may present problems downstream

Calcium Nitrate

- Costs for prevention mode may be excessive in long retention time lines Biomediated oxidation mode may require several hours Costs for prevention mode impacted by high BOD levels

Fe Salts

- Removes dissolved oxygen from the water
- Precipitate settles out in low-velocity sewers (< 2 fps)
- Iron films form on pipe walls and instrument sensors
- Ineffective for (non-sulfide) organic odors
- Hard to achieve low sulfide limits (pH dependent)
- Does not destroy sulfide (H₂S may volatilize if the pH is lowered)
- Product purity may impact biosolids re-use (heavy metal contamination)
- Messy to handle
- CERCLA rating may restrict dosing sites (persistent environmental hazard)
- High dosages may cause solids carry-over from clarifiers
- Solids production (> 3 lbs/lb - Sulfide) increases processing and disposal costs



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Technology Options

Major Shortcoming

Sodium Chlorite\ Hypochlorite

- Limited industry experience
- Moderate to high cost
- Best applied as a curative (to destroy odors already present)
- Oxidizer rating may restrict dose sites

Oxygen

- Efficient dissolution of oxygen into the water requires pressurization
- Significant storage and handling issues

Potassium Permanganate

- Relatively high cost
- Labor intensive feed systems
- Messy to handle
- Provides no residual H₂S control
- Solids production is > 3 lbs/lb-Sulfide
- Oxidizer classification may restrict feed sites

ABS- Sewer Line Odor/Septicity Control and Cleaning Doctrine

The ABS Odor Control and Corrosion Preventive Program is designed not only for conveyance of water and pollutants, but also for obtaining a wastewater quality that is suitable for the treatment processes at the receiving wastewater treatment plant. The integration of sewer networks and wastewater treatment plant of ABS Sewer Pretreatment indeed over the others in terms of:

- Allows the optimization of both systems include the sewer networks and the WWTP;
- Minimize the impacts on the receiving environment.
- Reduces chemical addition consumption;
- Reduces treatment and maintenance cost;

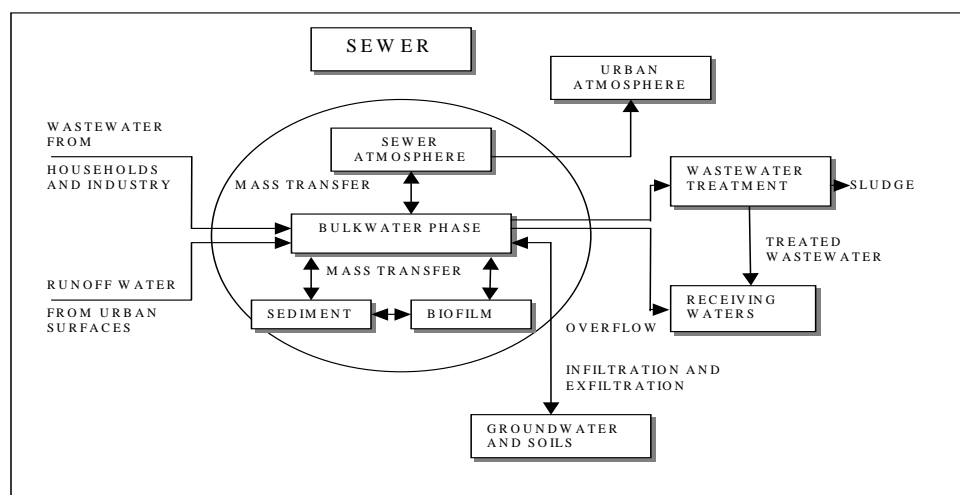


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In that case, the traditionally narrow distinction between collection and treatment of wastewater, under the principle of ABS Sewer Reconditioning Technology, must be reviewed and extended: "Wastewater treatment is starting at the kitchen sink or septic tank practically".

The systematic ABS Odor Control studies had been adopted in order to establish a sound understanding of the processes occurring in sewer conveyance line. To achieve this end, the sewer environment is simplified as comprising of four sub-systems, namely, the bulk-water phase, the bio-film phase, the sewer sediment and the sewer atmosphere. The sewer is dominated by heterotrophic microorganisms, which degrade and transform wastewater components. It is a very complex and highly dynamic system where mass transfer takes place between the sewer subsystems as shown:





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Transformations of organic matter in sewers occur either under aerobic, anoxic or anaerobic conditions. The dominating process will be determined by the availability of the type of electron acceptors (Nielsen *et al.*, 1992). The electron acceptors are utilized in a fixed sequence: oxygen for aerobic respiration, nitrate for de-nitrification, and organic compounds for fermentation, sulphate for sulphate reduction and carbon dioxide for methanogenesis (Bentzen *et al.*, 1995). Examples of processes utilizing different electron acceptors under various sewer network configuration is given in Table in page 15. Much progress has been made in understanding microbial processes during transport in sewer networks under aerobic, anaerobic and anoxic conditions.

Under the aerobic conditions, readily biodegradable organic matter is removed and particulate COD (biomass) is produced (Bjerre *et al.*, 1997). Such aerobic transformations can be managed to comply with primary and secondary treatment of the wastewater. On the contrary, under anaerobic conditions, readily biodegradable substrate is preserved and even produced, thereby made available for potential biological N- and P- removal in subsequent advanced wastewater treatment processes in the following manners:



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A) ABS Method utilize: the liquefied Oxygen Alleviating Agent to stop the buildup of Toxic Gases in Sewer Line to protect Life, prevent Sewer Line Constriction, anti-corrosion, expand its lifespan and reduce the organic loading to save government exponential cost in Sewer Line Cleanup and wastewater treatment costs, whilst providing the following benefits:

- More Effective than chlorine in inactivating virus, spore, cysts Rejuvenate
- Require less operating and storage space;
- No toxic chemical residence after degraded;
- Remove and prevent H₂S and TVOC formation faster than any known chemical method.
- Can Immediate measure the disinfecting results
- Contributes dissolved oxygen
- Prevent sewer and leach line constriction, it does this in two ways: 1) it oxidizes microbial slimes that block leach lines; and 2) it decomposes once permeated into the sewer line system, liberating oxygen, its conversion from a liquid to a gas represents a volume expansion whereby the compacted soil is "lifted" and air space restored to the soil structure.



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B): Most Versatile Application:

- **Municipal Sewer Conveyance Lines:** Odor Control, Sediment Removal, Prevent conveyance line constriction and Removal of Toxic Gases; prevent concrete and metal corrosion; increase Dissolved Oxygen level and substantial increase the sewer treatabilities.
- **Municipal and Industrial Wastewater Treatment Plant:** Odor Control, Sediment Removal and prevent sewer conveyance constriction; Prevent and Removal of Toxic Gases; prevent concrete and metal corrosion; reduce over all sludge volume and sludge management cost; increase Dissolved Oxygen level and substantial increase the sewer treatabilities; increase the treatment capacity without extra facilities; drastically reduction of chemical uses.
- **Dyke Lakes and Recreational Waters:** Odor Control; Sediment Removal and prevent sewer conveyance line constriction; increase Dissolved Oxygen level; increase Water Clarities; high yield of quality wildlife and aquatic plants.
- **Open Conduit and Strom Water Piping:** Odor Control, Sediment Removal, Prevent and Removal of Toxic Gases and sewer conveyance line constriction; prevent concrete and metal corrosion; increase Dissolved



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Oxygen level and substantial increase the sewer treatabilities.

- **Commercial Building Sewer System:** Odor Control, Sediment Removal, Prevent and Removal of Toxic Gases and disinfect virus, pathogens and insects; prevent concrete and metal corrosion; increase Dissolved Oxygen level and substantial reduction of spreading the contiguous diseases.
- **Residential Building and Single Dwelling Sewer System:** Odor Control, Sediment Removal, Oil/grease/fats degradation; Prevent and Removal of Toxic Gases and disinfect virus, pathogens and insects; prevent concrete and metal corrosion; Prevent system constriction increase Dissolved Oxygen level and substantial reduction of spreading the contiguous diseases.
- **Hospitals, Clinic, Senior Citizen Residences and Institutional Buildings Sewer System:** Odor Control, Sediment Removal, Prevent and Removal of Toxic Gases and disinfect virus, pathogens and insects; prevent concrete and metal corrosion; increase Dissolved Oxygen level and substantial reduction of spreading the contiguous diseases.
- **Portable Toilets and Parkland Oxidizing Lagoons:** Odor Control, Sediment Removal, Prevent and Removal of Toxic Gases and disinfect virus, pathogens and insects; prevent concrete and metal corrosion; Prevent



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sewer system constriction; increase Dissolved Oxygen level and substantial reduction of spreading the contiguous diseases.

- **Airport, Ocean Terminal, Mass Transit Terminal Sewer System:** Odor Control, Sediment Removal, Prevent and Removal of Toxic Gases and disinfect virus, pathogens and insects; prevent concrete and metal corrosion; Prevent sewer system constriction, increase Dissolved Oxygen level and substantial reduction of spreading the contiguous diseases.
- **Ocean-going Oil Tankers:** Odor Control, Sediment Removal, Prevent and Removal of Toxic Gases and disinfect virus, pathogens and insects; prevent concrete and metal corrosion; Prevent sewer system constriction, increase Dissolved Oxygen level and substantial reduction of spreading the contiguous diseases.
- **Military Land and Naval Vessel Sewer System:** Odor Control, Sediment Removal, Prevent and Removal of Toxic Gases and disinfect virus, pathogens and insects; prevent concrete and metal corrosion; Prevent sewer system constriction, increase Dissolved Oxygen level and substantial reduction of spreading the contiguous diseases.
- **Garbage Transfer Station sewer system:** Odor Control, Sediment Removal, Prevent and Removal of Toxic Gases and disinfect virus, pathogens and insects; prevent concrete and metal corrosion; Prevent



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-
- sewer system constriction, increase Dissolved Oxygen level and substantial reduction of spreading the contiguous diseases.
- **Petroleum industry and pipeline sewer system:** Odor Control, Sediment Removal, Prevent and Removal of Toxic Gases and disinfect virus, pathogens and insects; prevent concrete and metal corrosion; Prevent sewer system constriction, increase Dissolved Oxygen level and substantial reduction of spreading the contiguous diseases.
 - **Garbage landfill sites de-odor and leaching wastewater treatment plant:** Odor Control, Sediment Removal, Prevent and Removal of Toxic Gases and disinfect virus, pathogens and insects; prevent concrete and metal corrosion; Prevent sewer system constriction, increase Dissolved Oxygen level and substantial reduction of spreading the contiguous diseases.

ABS Odor and Septicity Control Treatment Method been revitalized over 1.8 billion metric tons per year of solid/aquatic wastes in primary treatment of municipal sewer, industrial, surface/ground water, aquatic farming, landfill Leachate and fossil oil sewer lines with zero failure in any part of the globe since 2003; simply for the reason that:



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Statement of Works: Simplest Operative Procedures:

1. Simple to use: Single Step Application
2. No Special Equipments: Utilizing the Most Dependable and Energy Saving Metering Pump System.
Just submit the appropriate diagram, our experiment
3. Custom Design Treatment PL treatment engineers formulate the most economical and innovative plan at you disposal.
4. Accurate Dosing Range:: Clear-Cut Dosages to Clear Hydrogen Sulfide and the ancillary Toxic Organic Gases ranging from 2 – 300 ppm.
Toxic chemical ions can be simply calculated to any compatible dosages accurately for chemically oxidize; or
5. Reproducible Result: neutralize the toxicities of the harmful chemicals and gases to stabilize the treatment process.
 - A) All Treatment Reagents are in ready to use format according to the pre-set treatment parameter and doing by micro-processor driven pumps
 - B) The only manual work is (1) walk-around
6. Hand-off Operation: inspection per-shift to ensure equipments are properly set, the treatment additives volume and refill. (2) Record Keeping. (3) Made sure to equip with Proper Confinement Area Gear with emergence communication devices.



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Practical Consideration:

With the elimination of other chemistry addition, the benefits realized in applying ABS Ozone Platform include no formation of chlorinated VOC's, no chlorine odors due to overdosing, substantially reduced corrosion of process equipment, increase steadily pH level, and reduced packing material. However, because of the different properties of ABS Ozone Platform versus NaOCl or $\text{Ca}(\text{NO}_3)_2$, the substitution is not straightforward.

For example:

- Since ABS Treatment is more concentrated and leaves no salt residues, there is less need for cleaning in any containers or reactors. Typically, cleaning rates may be reduced 5-10 fold over those using bleach.
- Since the reaction between ABS Ozone Platform and sulfide is slower than that between NaOCl and sulfide, a higher working concentration of oxidant is needed in the working solution.
- Heavy metals like Cr, Cu, Pb, Cd, Mo, and Ni etc are concentrated in wastewater, the concentrated levels are known for their toxic effects on aquatic plants and animals and, may cause serious problems during the drink water production. The traditional approach followed was to utilize microbial leaching procedure eventually stabilized sludge, and this method was considered too slowly and costly, even impractically. For reducing the time and cost of treatment,



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ABS Treatment process now is verified the more effective and rapid solution for oxidation of heavy metals present in sewer.

- Because of the requirement for a high residual concentration of oxidant, conventional control systems which rely on ORP sensing may not be suitable for controlling Agent feed.
- Optimal pH level ranges from 4-9, thereby allowing direct oxidation of H₂S to occur in the gas or adequate phase.
- Apply of ABS Treatment entails special considerations and the user is encouraged to contact Assure Bio-Sciences for further guidance.

ABS Sewer Sediment and Gas Control:

Sulfide-rich effluents, a warm, humid environment and long retention times create the perfect conditions for microbiologically induced corrosion (MIC). MIC, a result of acid-producing bacteria known as *Thiobacillus*, is the principal cause of corrosion in a municipal sewer system. These microorganisms metabolize elemental sulfur oxidized from H₂S sewer gas and produce sulfuric acid as a

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waste product which then attacks the substrate. This sulfuric acid can quickly destroy ordinary concrete-based materials in a municipal sewer system.

The major components of sewer gas can include: nitrogen (N₂), hydrogen sulfide (H₂S), carbon dioxide (CO₂), methane (CH₄), ammonia (NH₃), biological organisms, water vapor, and other chemicals discharged to the effluent stream.

The presence and concentration of any of these components can vary with time, composition of the sewage, temperature, and pH.

Explosions in sewers are not uncommon and workers have been killed by breathing toxic gases produced by biological activity or industrial discharges. In some occasions, explosive gases from industrial chemicals such as calcium carbide, which may react with water and biologically produced hydrogen sulfide and methane.

Biological activities in the sewer may reduce the oxygen content of the atmosphere and this, by itself, or coupled with the presence of hydrogen sulfide and can be fatal to anyone nearby, and particularly the unprotected sewer works. Traditionally, the sewer toxic gases were flush by forced ventilation with portable blowers this locally passive method could not be adequate to dislodge the sewer gases built up downstream.

The ABS Ozone Platform is the most promising means of meeting regulated limits is to pre-treat wastewater on-site before it is discharged into the



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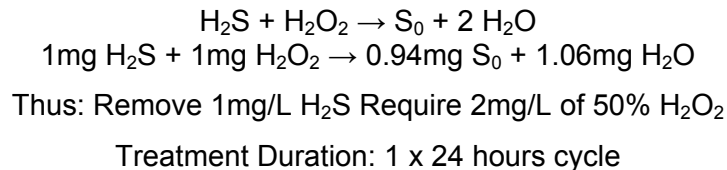
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Sewer By reducing (N₂), (H₂S), (CO₂), (CH₄), (NH₃), Oil, Grease, BOD, TSS, NH₃, NO₃⁻ and overall sludge volume the life of the treatment plant extended, safer workplace for sewer workers and provide cleaner environment for the public. Pretreatment utilizing ABS-Liquefied Ozone bioremediation techniques could also reduce sewer line constriction and clogging, saving governmental cleanup costs; wastewater treatment cost, provide safer environment for the public and reduce Sewer Worker Mortality.

Application Overviews:

50% H₂O₂ Theological Dosage vs 50% H₂O₂ with ABS-Oxygen Alleviating Medium

H₂O₂ Theological Dosage



Hydrogen Peroxide with ABS-Oxygen Alleviating Medium Optimal the dosage

Average require 0.5 – 0.8mg/L of 50% H₂O₂

Treatment Duration: 12 – 24 hours cycle

Thus; the Hydrogen Peroxide with ABS-Alleviating Combination can save up to 60% - 75% over the conventional method.



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ABS-Mobile Sewer Cleaning and Toxic Gas Control Units Configuration:

<p>ABS-MTCC System Configuration</p>	<ul style="list-style-type: none"> • 1 x 1 (Three) Compartments, 20m³ payload Tanker Truck for Variety of ABS Authorized Treatment Elixirs Dispensers and Toxic Gases Filtration Devices.. • 1 x 1 Treatment Command Unit equipped with state of the art Environmental Monitoring Equipments and a field laboratory to guarantee job quality and proficiency.
<p>ABS-MTCC Design Functions:</p>	<ul style="list-style-type: none"> • Emergency Response for Sewer Gas Leaks and cleanup • Municipal/Industrial Sewer Conveyance Line routine maintenance and scheduled treatments. • Pumping Stations; Sewer/Storm-water conveyance Lines, Septic Leachate, Manholes, Airport and Hospital Trichurators maintenance and scheduled treatments. • Cleaning Range: Maximum 10Km per single application.



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Discussion:

Pumping of sewage through long pressurized sewer has become far more common in modern cities, particularly those serving existing communities in congested areas where environmental regulations, space constraints or cost effectiveness make it impossible to build sewer system at the gravitational low-point.

Whether a particular H_2S concentration in sewage will cause odor nuisance depends on factors such as the amount of turbulence in the sewage, the pH value of the sewage and the nature of the environment around the emission. Generally, a dissolved H_2S concentration of 0.25mg/L is unlikely to cause significant odor nuisance, whereas a concentration of 2 mg/L will almost certainly do so.

The rate of production of H_2S (g/m^3) of sewer per hour) in septic, full sewers varies with sewer diameter and sewage strength. To determine H_2S concentration in the sewage, the production rate is multiplied by the average retention time (hours) of the sewage in the sewer. For a 400mm sewer and a sewage BOD of 300mg/L, the predicted total production rate of H_2S is $3.5g/m^3$ of sewer per hour. Assuming an average flow velocity of 1m/s, this rate is



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equivalent to a H₂S concentration increase of 1.0mg/L per 1000m of sewer. Thus even comparatively short pressurized sewer can give rise to odor nuisance.

In addition, the rate of H₂S production in the slime is generally greater than the production rate in the bulk sewage for sewers with diameters less than 500-600mm, and less for larger sewers. The consumption rate of dissolved gaseous oxygen in any particular full sewer, under aerobic conditions, is about a factor of ten higher than the production of H₂S in the same sewer under septic conditions. Hydrogen Peroxide with ABS-Oxygen Alleviating Medium is an environmentally friendly chemical used for oxidation reactions, bleaching processes in pulp, paper and textile industries, waste water treatment, exhaust air treatment and various disinfection applications. Decomposing to yield only oxygen and water, hydrogen peroxide is the cleanest, most versatile chemicals available.

ABS-Oxygen Alleviating Medium is an evolutionary hydrogen peroxide additive in which is 100% amicable to the environment because it does not consume electricity, land use and yet can manipulating any desirable dissolved oxygen levels instantaneously at a fraction of cost compared with the traditional mechanical aeration method.

Once the wastewater treatment plant is adequately aerated, there will be mountains of accountable benefits such as no more malodor; much lesser sludge



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handling cost, increase productivities and most of all no more non-regulatory compliance will be in place naturally.

ABS Oxygen Alleviating Medium with Hydrogen Peroxide is added to wastewater treatment plants, dyke lake, sewer/storm-water conveyance line to increase the Dissolved Oxygen (DO) level, and improve biological degradation of pollutants or to directly oxidize inorganic and organic reducing species.

ABS Oxygen Alleviating Medium with Hydrogen Peroxide works in two different approaches; whereas:

H_2O_2 can directly oxidize sulfides, sulfites, nitrites and a number of other inorganic and organic compounds. The Biological Oxygen Demand (BOD), Chemical Oxygen

Demand (COD), Total Organic Carbon (TOC), Sulfide and toxicity of the water will be reduced directly in this way. Often organic substances can be oxidized partly with hydrogen peroxide, resulting in reaction products, which are easily biodegradable.

ABS Oxygen Alleviating Medium with Hydrogen Peroxide delivers available oxygen to microorganisms to aid in biodegradation of many pollutants. As long as the concentration of hydrogen peroxide does not exceed the toxicity level for microorganisms (around 300 ppm), all organisms will have the capability of decomposing H_2O_2 through their enzyme systems (catalase and peroxidase) into oxygen and water. In practice, both actions take place leading to a significant reduction of BOC, COD and TOC in the wastewater. Because peroxide does not add any other substance to the water like permanganate or hypochlorite, nor

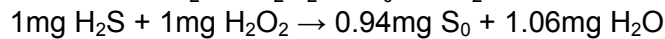
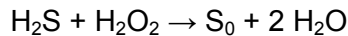


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does it form other toxic substances like chlorinated organic compounds, indeed it is the oxidizer of choice.

Application Overviews:

H₂O₂ Theological Dosage



Thus: Remove 1mg/L H₂S Require 2mg/L of 50% H₂O₂

Treatment Duration: 1 x 24 hours cycle

Hydrogen Peroxide with ABS-Oxygen Alleviating Medium Optimal the dosage

Average require 0.5 – 0.8mg/L of 50% H₂O₂

Treatment Duration: 12 – 24 hours cycle

Thus; the Hydrogen Peroxide with ABS-Alleviating Combination can save up to 60% - 75% over the conventional method.

Municipal WWTP Application:

Recheck and confirm the user manual for proper dosages or consult ABS-Technical Service before starting the treatment.

Shock Treatment Phase:

1. Working Reagent Preparation: To each Metric Ton of 50% Hydrogen Peroxide; add one (1) pail = 16.7 liters of ABS-Oxygen Alleviating Medium. Let stand in room temperature for 30 minutes before use



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2. Start pump in the Working Reagent in accordance with the prescribed dosages and reduce the aeration to minimum.
3. Measure and adjust the D.O. reading to your desirable level; once the desirable D.O. achieved; keep on dosing for 12-24 hours.

Remediation Phase:

1. Recheck and confirm the user manual for proper dosages or consult ABS-Technical Service before starting the treatment.
2. Working Reagent Preparation: To each Metric Ton of tap water, add 2 Liters of ABS-HHB Co-enzymatic\micro-nutrient. Let stand in room temperature for 30 before use
3. Start pumping the Working Reagent in accordance with the prescribed dosages; reduce the aeration to minimum for 6 days

Typical Dosage: ABS-OAM with H₂O₂ vs Neat H₂O₂

S (ppm)	S (kg/ton)	x35000 tons S (kg)	ABS OAM with 50% H ₂ O ₂		Neat H ₂ O ₂
			x0.5 kg	x0.8 kg	50% H ₂ O ₂ kg
10	0.01	350	175	280	700
20	0.02	700	350	560	1400
30	0.03	1050	525	840	2100
40	0.04	1400	700	1120	2800
50	0.05	1750	875	1400	3500
60	0.06	2100	1050	1680	4200
70	0.07	2450	1225	1960	4900
80	0.08	2800	1400	2240	5600



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Regulatory Compliances:

- Regulatory Compliance: USEPA 40 CFR 152.25 (a) EPA #63838-1 Equivalent; FDA approved as sanitizer on food contact Surfaces 21 CFR 178.1010 Equivalent; FAO/WHO Expert Committee C.O.E No. 10; FEMA No. 2799; JECFA No. 99 Equivalent.
- ABS Product Groups are made from edible ingredients; it does not contain abrasive chemicals, antibiotics, hormones, hybrid bacteria, steroid or enzymes

Appendix

ABS-Oxygen Alleviating Medium is a direct oxidization method which designed for rapid solution to reinstate the benign ecologies of the sewer conveyance lines; that includes the Septicity and Odor control. 53%w/w Calcium Nitrate is designed for bioremediation of pond, inland water way, and lake. Calcium Nitrate is ineffective to treat any gravity and pressurized sewer conveyance line because it requires naturally occurring bacteria to bio-chemically oxidize dissolved sulfide in the presence of nitrate and the high flow rate of the sewer conveyance line can not provide the necessary retention time and the cost of Nitrate Oxygen.

ABS-Oxygen Alleviating Medium is far more effective and more economical than the Dual Dosing of Calcium Nitrate and Gaseous Oxygen or all alternative technologies.

Hypothetically; ABS-Oxygen Alleviating Medium is proven technologies which require no Gases Oxygen and Nitrate Oxygen; and the cost of the ABS-HHB platform can immediate offer lower cost then the project cost since 2003.



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