VAPOR-PHASE ODOR CONTROL FOR COLLECTION SYSTEMS

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Agenda

- Why Is Odor Escaping From My System
- Where Is The Odor Escaping
- Odor Control Technologies
Why Is There Odor Escaping from My System?

- Sewer drag
- Pressurization of sewers
- Change in barometric pressure
- Relative density of sewer and outside air
Where Are Odors Escaping

- Lift station wet wells
- Force main discharge manholes
- Siphons
- Vents
- Manholes
- Areas of high turbulence
  - Junction structures
  - Drop structures
Vapor-phase Technologies

- Wet scrubbers
- Activated carbon systems
- Other dry media systems
- Biofilters
- Biotrickling filters
- Technologies in need of further study
  - Air ionization (Bentax™)
  - Hydroxyl ion fogger (Vapex™)
Wet Scrubbers for Collection Systems

- Small footprint
- Height restrictions
- Operation and maintenance
- Chemical delivery issues
  - Truck traffic in neighborhoods
  - Truck accessibility at sites
Package Wet Scrubber Systems

L-Series Odor Control Systems

RJ Environmental Lo-pro System
Package Wet Scrubber Systems
Activated Carbon for Collection Systems

- Small footprint
- Contaminant loading limitations
- Grease and moisture elimination
- Operation and maintenance
- Media monitoring
- Accessibility for media replacement
- Media selection
Activated Carbon Media Types

- Virgin – Good VOC removal, low H₂S capacity
- Caustic impregnated – High H₂S, low VOC removal
- Water washable – Good H₂S, moderate VOC removal
  - Centaur™ by Calgon
- High capacity carbon – Good H₂S and VOC removal
  - Midas™ by US Filter
  - Sulphasorb XL™ by Pure Air Filtration
  - Minotaur™ by Calgon
Activated Carbon System Types

Carbon Systems come in a wide range of shapes and sizes including:

- Manhole inserts
- Drum systems
- Skid mounted systems
- Vertical bed systems
- Phoenix™ by Calgon
# Manhole Inserts - Comparison

<table>
<thead>
<tr>
<th>Name/mfg</th>
<th>Price</th>
<th>1 year warranty</th>
<th>Carbon LBS.</th>
<th>Replacement</th>
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<tbody>
<tr>
<td>Wolverine Manhole insert</td>
<td>$425 all sizes</td>
<td>Yes</td>
<td>20 LBS</td>
<td>$100</td>
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<tr>
<td>Manhole OC unit/ Bay Products</td>
<td>$650</td>
<td>?</td>
<td>20 LBS</td>
<td>?</td>
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<tr>
<td>Calgon Street Sweet</td>
<td>740</td>
<td>Yes</td>
<td>20 LBS</td>
<td>$400</td>
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<td>Nodpor advanced carbon systems</td>
<td>$400</td>
<td>Yes</td>
<td>27 LBS</td>
<td>$150</td>
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<tr>
<td>Manhole bio filters/RJM inc.</td>
<td>$1000</td>
<td>?</td>
<td>?</td>
<td>?</td>
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<tr>
<td>Manhole odor insert/PEC</td>
<td>Starts @ $375</td>
<td>Yes</td>
<td>Dioxide Pellets</td>
<td>$250</td>
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<tr>
<td>Peacemaker Syneco Systems</td>
<td>Starts at $300</td>
<td>?</td>
<td>Oxidizing pellets at $150 per bucket</td>
<td>?</td>
</tr>
</tbody>
</table>
Drum and Skid Mounted Systems

Bay Products, Inc

HDPE Drum System

Fiberglass Skid Mounted System
Vertical Bed Carbon System

The PureAir VTS system is a complete self contained, vertical airflow unit.

For air streams ranging in volume from 6,000 to 40,000 CFM in a compact design.

The systems come in either blow-through or draw-through configurations.
Other Dry Media Systems

- Dry Chemical Media
  - Purafil™
  - Peacemaker™
- Iron Sponge
  - Marcab™
  - Varec™
- Granular Iron Media
  - SulfaTreat™
  - Sulfa-bind™
Purafil™ Dry Scrubbing Media

Purafil Odoroxidant SP™ Media is activated alumina pellets impregnated with sodium permanganate.

Purafil Odorcarb II™ is activated alumina pellets impregnated with caustic chemicals.
Purafil™ Dry Scrubbing Systems

**MOLE Manhole Scrubber**
Controls street-level sewer odors. Odors flow through 2 passes of Purafil ESD Odormix SP media. Scrubber collar fits any manhole.

**Drum Scrubber**
Quiet control of odors at pump stations in residential communities. Odors are drawn upwards through multiple layers of Purafil media. System is weatherproof and requires little maintenance. Sized for airflow from 0 to 1,000 cfm.
Purafil™ Dry Scrubbing Systems

**Tub Scrubber**
For small headworks, large pump stations, in screening rooms, and at the discharge of biofilters. Features a 3 ft (0.9 m) media bed for increased residence time. Sized for airflows from 500 to 6,000 cfm.

**Deep Bed Scrubber**
For multiple contaminant challenges. Horizontal bulk-fill system has up to four media stages. Use at small headworks, large pump stations, in screening rooms, and at the discharge of biofilters. Sized for airflows from 500 to 8,000 cfm.
Syneco™ Dry Scrubbing Systems

**PERSNICKETY®**
**OXIDIZING & POLISHING MEDIA**

- Oxidation is accomplished with chlorine dioxide media
- Polishing is done with Countervailant™ media which has polymeric adsorption and electrostatic bonding

**PEACEMAKER®**
**MANHOLE INSERTS**
Syneco™ Dry Scrubbing Systems

PEACEMAKER®
Dry Air Scrubbers
Iron Sponge Systems

Marcab™ iron sponge systems in residential settings
Iron Sponge Systems

Iron sponge system on JEA collection system near mall
Iron Sponge Systems

**OdorKnocker™ Media**

*Non-Hazardous!*

A hydrated iron compound mixed with wood chips and shavings is supplied for use with our insert and above ground units for H2S removal. The chips and shavings are carefully selected to give a range of particle sizes which give as much contact with the gas as possible to maximize removal. OdorKnocker™ Media weighs between 48-52 lbs per cubic foot. IT IS NON-HAZARDOUS in both the new and spent state. (MSDS furnished on request.) The media converts the H2S into iron pyrite, or fools gold. One cubic foot of media will convert 15 lbs of H2S. It will also remove mercaptans, but the amount and type vary, and testing is recommended for predicting results.
SulfaTreat® Media Systems

Granular iron impregnated media treats high $\text{H}_2\text{S}$, and mercaptans, but not other odorous VOCs

Force main air release manhole application in Johnson County, Kansas
SulfaTreat® Media Systems

Sierra Environmental has used a combination of SulfaTreat® and carbon to provide more complete removal of VOCs and odor.
Biofilters For Collection Systems

- Small footprint
- Contaminant loading limitations
- Moisture considerations
- Enclosed system with stack
- Accessibility for media replacement
- Organic or inorganic media
Biofilter System Types

Biofilters come in a wide range of shapes and sizes including:

- Manhole inserts
- Force main air release valve units
- Modular biofilters
Biofilter For Force Main Air Release Valve

DEBF-Series: Force Main Biofilter
Modular Biofilters

Treats airflow rates in a range of 300 cfm to 7,000 cfm.

Double walled filter containers with painted steel outer wall and inner surfaces coated with 3 mm heavy-duty polyethylene.

MCBF-Series: Modular Container Biofilter
Modular Biofilters

Envirogen

McMillan Street Pump Station in Jacksonville, FL (JEA)
Modular Biofilters

SIEMENS (USFILTER) ZABOCS BIOFILTER

- Airflow rates from 350 cfm to 1500 cfm
- Vinylester FRP
Modular Biofilters

Abess Road Pump Station in Jacksonville, FL (JEAT)
Modular Biofilters

BIOREM BASYS™ is an integrated modular biofilter using engineered media and suitable for treating air flows of 1,000 cfm to 5,000 cfm.

BASYS™ unit at Zanesville, Ohio

City of La Malbaie in Quebec, Canada, BASYS™ 12 unit treating 1,770 cfm
Biotrickling Filters For Collection Systems

- Small footprint
- High H₂S loads
- Residual outlet odor may require polishing
- Nutrient requirements with potable water
- Accessibility for media replacement
- Various systems now available
Biotrickling Filters

Bioway Zerochem® units in HDPE and fiberglass

Bioway Eliminodor® unit with integral carbon media core
Biotrickling Filters

Biotrickling Filters at Lift Stations on JEA collection system

Fiberglass Bioway Zerochem® units at Lennox Avenue Lift Station

HDPE Bioway Zerochem® unit at Renne Drive Lift Station
Biotrickling Filters

Biotrickling Filters at Lift Stations on JEA collection system

AroBIOS® by MetPro/Duall

Mixed Flow Exhauster™ (MFE)
Biotrickling Filters

Biotrickling Filters at Lift Stations on JEA collection system

Siemens (US Filter) Zabocs®

Envirogen RenovAIR®
Biotrickling Filters

BIOREM Mytilus™ biotrickling filter

BIOREM System showing “Popcorn” media

BIOREM installation in Lakeland, FL
Biotrickling Filter + Biofilter (SAM-M1)

- A combination of biotrickling filter and biofilter technologies.
- Applications where total odor removal is required.
- The first stage consists of a biotrickling filter customizable to 2 – 30 seconds EBRT and used as a roughing scrubber to remove elevated hydrogen sulfide concentrations, allowing the second stage biofilter to concentrate on the more recalcitrant organic sulfides and VOCs.
Technologies In Need Of Further Study

**Vapex - Hydroxyl Ion Fog**

**Supplier Information:**

- For collection systems controls odor, grease, and corrosion.
- For scrubber pretreatment removes 98%-100% \( \text{H}_2\text{S} \).
- The fog is applied in a scrubber duct, wet well, holding tank or any vessel containing foul air as the reaction chamber, needing no removal of foul air.
- The footprint is only 30”x31”x38”. Installation is simple; connect power, water and insert the fogging nozzle.
- No chemicals are purchased, stored or handled.
- Provides significant savings over other odor control methods. Annual O&M is less than $1,850/yr.
Technologies In Need Of Further Study

Vapex - Hydroxyl Ion Fog

Measurements Fury Drive lift station at JEA showed incomplete treatment with high residual H$_2$S in wet well application

Pilot study at Yakima, WA showed zero reduction of 4 to 5 ppm H$_2$S in ductwork ahead of wet scrubber
Technologies In Need Of Further Study

Air Ionization

Wet well applications are reported by system supplier to be highly effective at reducing \( \text{H}_2\text{S} \) and odor. However…………….. enclosed belt press testing at Lemay WWTP in St. Louis showed no reduction of \( \text{H}_2\text{S} \) at concentrations from 2 to 20 ppm.
Questions?

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