

### Biotrickling Filter Odor and VOC Control Systems for:

- ¥ Wastewater treatment and sludge-composting operations
- ¥ Retrofit conversion of chemical wet scrubbers
- ¥ Lift stations
- ¥ Industrial odors and VOC emissions

### Innovative Biotrickling Filter Technology Featuring:

- ¥ Long-life synthetic media 10 year warranty
- ¥ Minimal equipment size 1 ultra-compact space saving footprint
- ¥ Energy efficient operation 1 low pressure drop & low power consumption
- ¥ Fully automatic control

# Advanced Odor Control Technology

For the control of odors and volatile organic compounds (VOC's), PRD Tech biofiltration systems provide an economical and environmentally friendly method of treatment for a wide range of organic and inorganic air emissions. PRD Tech biotrickling filters are fully automated and custom engineered to meet or exceed the performance requirements for virtually any odor or VOC control application.

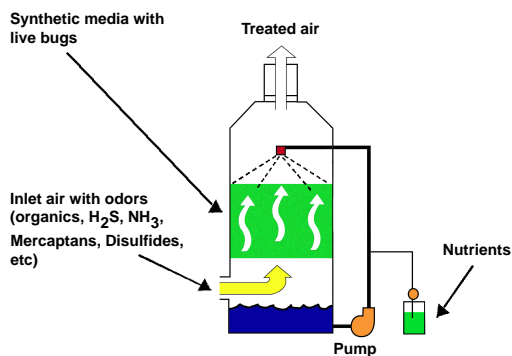
## What is biofiltration?

Biofiltration is a biological process that uses micro-organisms to convert odor causing compounds into harmless by-products, i.e., carbon dioxide, water and biomass.

Since the introduction of the technology in the 1960's, most biofilters have used naturally bioactive media such as peat, compost, soil or wood chips to biologically degrade odors and VOC's.

Recognizing the limitations associated with these organic media systems and other conventional odor control technologies, PRD Tech developed an innovative biotrickling process that achieves an entirely new level of performance for biological air treatment systems.

## What are PRD Tech biotrickling filters?



Biotrickling filters utilize synthetic media on which contaminant degrading bacteria are immobilized as biofilms on the surface of the media.

As air flows through the biofilter media bed, the contaminants come in contact with the active biofilms that degrade the odorous compounds. At the same time, a continuous stream of water trickles down through the media to keep the biofilms moist and biologically active.

PRD Tech achieves maximum treatment efficiency by also adding a nutrient biocatalyst to the water that circulates through the biotrickling filter so that the airborne contaminants are absorbed into the water where they are biodegraded by the suspended culture. Thus, with the PRD Tech system, contaminant compounds in the air are biodegraded by the active cultures in the liquid phase as well as by the active biofilms on the surface of the synthetic media.

## What is PRD Tech synthetic media?

PRD Tech biotrickling filters offer important state-of-the-art improvements in biofilter design that translate into tangible performance and economic benefits. Foremost among these improvements are the unique synthetic medias developed by PRD Tech specifically for use in biotrickling filters.

Depending on the application, the media may be either randomly packed hollow polymeric spheres (1", 2", 3" or 3" in size) or structured packings made of PVC or polypropylene. One or both types of media may be used in a single PRD Tech biotrickling filter depending on the flow rate, gas BOD, types of contaminants and operating conditions.

Regardless of which PRD Tech media is best suited for any given application, its design will have the following attributes for maximum performance.

## PRD Tech synthetic media features

**High void fraction (percentage of open space)** – PRD Tech's open structure medias allow ample room for biofilms to grow without causing the media to clog due to excessive biomass growth.

**High surface area** – The media provides a high degree of biologically active surface area per unit volume (30 – 110 ft<sup>2</sup>/ft) so as to achieve high mass transfer rates of odors and organic compounds into the biofilms.

**Low pressure drop** – The high void fraction of PRD Tech's synthetic media results in a very low pressure drop across the biofilter bed (<0.3" to 1" water column).

**Hydrophilic surface** – Since biofilms must be kept moist for the micro-organisms to remain biologically active, the surface of the media must be readily wettable (i.e. hydrophilic) and capable of retaining moisture. PRD Tech synthetic medias are surface modified to achieve the hydrophilic properties needed to retain water and support the attachment and growth of biofilms on the media surface.

**Low bulk density** - The total weight of the biofilter and the cost of the structure to support the media bed(s) are minimized due to the light weight of the low density synthetic media (2.5 – 7.0 lb./ft).



# How do PRD Tech biotrickling filters differ from other biofilters?

**P**RD Tech biotrickling filters offer many practical advantages over other biofiltration technologies due to the unique attributes of their synthetic media.

**Superior performance** – The high surface area and high void fraction of PRD Tech's synthetic media results in:

- *Higher gas velocity*
- *Minimal gas residence time*
- *Uniform distribution of gases and water within the media bed*
- *Rapid response to sharp fluctuations in contaminant loadings*
- *Ability to treat higher concentrations of H<sub>2</sub>S and other odorous compounds*

**Compact in size** – Due to the high velocity at which gas flows through the synthetic media, the cross sectional area of the media bed(s) is minimized and the overall size and footprint of the equipment is ultra compact.

**Energy efficient** – As a result of the low pressure drop of the synthetic media, energy costs to operate a PRD Tech biotrickling filter are minimal since the fan size and power consumption are directly proportional to the pressure drop.

**No clogging of the media** – The pressure drop between the gas inlet and outlet of the media bed is continuously monitored by differential pressure sensors.

If excessive biomass growth causes the pressure drop to exceed 0.5 inches of water column, a supplemental wash is automatically activated which causes excess biomass to slough off the media and exit the bed, thereby preventing the occurrence of clogging, gas channeling or dead zones within the media bed.

**Long media life** – With the built-in ability to purge the media of excess biomass and prevent clogging, there is no need for periodic replacement or reconditioning of the synthetic media. In addition, PRD Tech medias do not degrade or deteriorate and are **guaranteed for 10 years**.



**Fully automated design with flexible system control** – PRD Tech biotrickling filters require minimal operator intervention and can function as stand-alone units or integrated into a plant-wide control system.

## Biotrickling Filters control odors in wastewater treatment, sludge processing and

PRD Tech biotrickling filters are highly effective in treating hydrogen sulfide and other primary sources of wastewater odors, including ammonia, mercaptans, amines and reduced sulfur compounds. Shown in the photo below is an installation at a municipal wastewater plant in northern Kentucky where dual stage biotrickling filters are treating 15,000 cfm of odorous gases generated from the thermal conditioning of waste activated sludge. This system eliminates 99.9% of the odors from the sludge conditioning process without the use of costly chemicals or adsorptive media.



Biotrickling filters are also effective in treating odors from sludge composting operations that generate a variety of emissions including sulfur compounds, volatile fatty acids, ketones, ammonia and other nitrogen containing compounds.

While ammonia can be controlled with acid scrubbing, the other primary contaminants are typically treated with chemicals such as hypochlorite and/or hydrogen peroxide. PRD Tech's biotrickling process is an economical alternative that requires no chemical oxidizing agents and is more energy efficient, more effective in treating organics, and produces no potentially harmful by-products.

## Retrofit conversion of chemical scrubbers to biotrickling filters offers substantial benefits.

The adjacent photo shows a chlorine scrubber that was converted in-situ to a 30,000 cfm biotrickling filter and placed back into operation within a matter of a few weeks! A gradual "phase-in" retrofit approach meant virtually no downtime for the wastewater treatment plant. Immediate benefits to the district included:

- *Elimination of chemical handling, storage and liability issues*
- *Dramatic savings in operating costs as a result of reduced electricity consumption and eliminating the use of chemical oxidizing agents*
- *Avoidance of the potential release of harmful chemical by-products (halocarbons)*
- *99.9% reduction of inlet odor levels*

PRD Tech's synthetic media is the key factor to the successful performance and ease of conversion when retrofitting conventional chemical scrubbers. The retrofit investment is quickly offset by savings in chemical costs and energy consumption.

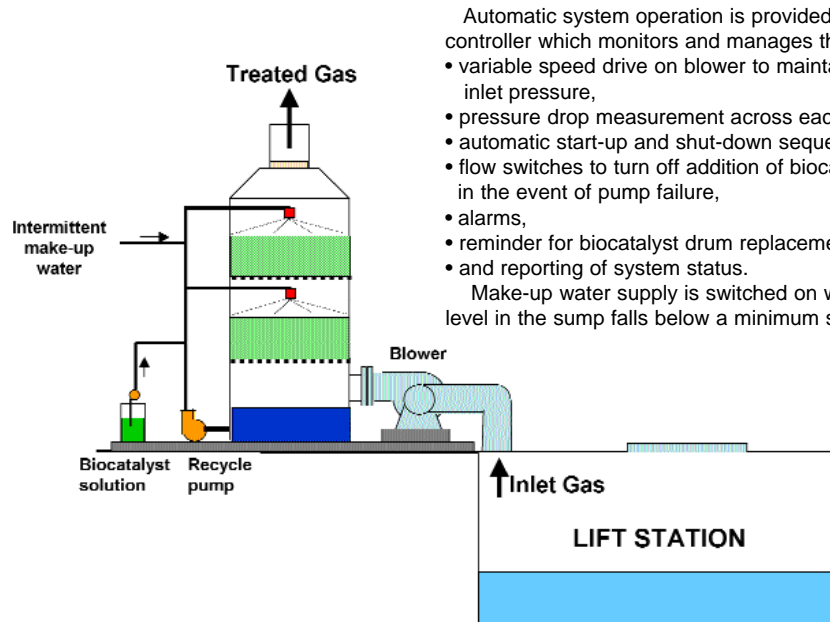


# Effective odor control for lift stations

For reliable treatment of odorous emissions from wastewater lift stations, PRD Tech offers a compact skid-mounted biotrickling filter that is sold or leased as a complete self-contained

It can be quickly and easily installed at any lift or pump station and needs only yearly maintenance for the gas blower and liquid pump. Operation of the unit requires water and 110 V, 60 Hz power and the only consumable is a concentrated biocatalyst solution (PRD-Biospeedup) that is used at a rate of just a few gallons per year.

The system includes a biotrickling filter with PRD Tech synthetic media, a blower, pumps, PLC (programmable logic controls) and the biocatalyst. In comparison to chemical scrubbing or activated carbon adsorption, PRD Tech's biofiltration system for wastewater lift stations offers a compact and cost effective alternative.



- Automatic system operation is provided by a PLC controller which monitors and manages the following:
- variable speed drive on blower to maintain a set inlet pressure,
  - pressure drop measurement across each bed,
  - automatic start-up and shut-down sequences,
  - flow switches to turn off addition of biocatalyst in the event of pump failure,
  - alarms,
  - reminder for biocatalyst drum replacement,
  - and reporting of system status.
- Make-up water supply is switched on when the level in the sump falls below a minimum set-point.

PRD Tech, Inc. - LIFT STATION ODOR CONTROL SYSTEM						
MODEL No.	DIAMETER (ft)	HEIGHT (ft)	FOOTPRINT (ft x ft)	GAS FLOWRATE (CFM)	TOTAL WEIGHT (LBS)	BLOWER HP
PRD-LS-400	2.0	14.0	4 ft x 5 ft	400	1,500	1.5 HP
PRD-LS-1000	4.0	14.0	6 ft x 6.5 ft	1,000	2,500	3.0 HP

## PRD Tech biotrickling filter applications include treatment of:

- **Aromatic hydrocarbons** – benzenes, toluenes, xylenes
- **Organics** - aldehydes, amines, ketones, alcohols
- **Inorganics** – hydrogen sulfide, ammonia
- **Reduced sulfur compounds** - mercaptans, disulfides
- **Unidentifiable odors**

## About PRD Tech

PRD Tech specializes in the design, development and manufacture of advanced biological treatment processes for a variety of environmental applications. In addition to biotrickling filters for odor and VOC control, other products developed by PRD Tech include:

- Biocatalysts to accelerate treatment rates in bioscrubbers, bioreactors, soils, lagoons, composters and digesters.
- Zero Emission technology to prevent the release of chrome into the air during electroplating processes

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