ENVIROGEN TECHNOLOGIES

A Lifecycle Performance Company

Nuese River Emissions Control Installation

The Integrated Biotrickling/Biofilter System

Today's Envirogen Technologies

AIR TREATMENT

WATER TREATMENT

MATERIALS RECOVERY

PROCESS IMPROVEMENT

We're an **environmental technology** and **process solutions provider** that combines experience in **water** and **vapor phase treatment** with **process development expertise**, delivering **long-term, guaranteed solutions** in a broad range of treatment and process-related applications

Today, the company provides **system design**, **process engineering**, **equipment** and **operating solutions** for the treatment of **groundwater**, **wastewater**, **VOC treatment** & **odor abatement** as well as **materials recovery** for a range of **industrial** and **non-industrial** customers throughout North America.

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Cutting-edge Technology Platforms

In developing environmental and process solutions for our customers, Envirogen employs a distinctive range of high-performing technologies that are often ‘best-in-class’ in the applications in which we use them.

Bioreactors	Biofilters	Ion Exchange		Adsorptive
Fluidized Bed Reactors (FBR)	Built-in-Place (BIP) (High flow)	SimPACK™ (400 gpm+)	FlexSorb™ (5-150 gpm)	EnviroHPA™ Systems
Membrane Bioreactors (MBR)	B, P, BTF, & I- Series (mid-flow)	MinX™ (100-850 gpm)	HyperSorb™ (35-3000+ gpm)	
Suspended Carrier Reactors (SCR)	H-Series (low flow)	MinFlex™	Reverse Osmosis	
	Biotrickling Filters (Biotower Scrubbers) (air) BT-Series	Service Exchange / Customer Supplied		

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Markets We Serve

Today, Envirogen operates over a broad spectrum of industrial and non-industrial markets, providing a range of technology solutions for environmental & process applications in each area.

Industrial Markets	Non-Industrial Markets	Applications	
Mining/Metals	Municipal	Groundwater	Filtration
Chemical Processing	Federal (DOE/DOD/Other)	Wastewater	Boiler Feed
Oil & Gas (refinery)	Utilities/Districts	Process Water	VOC/Odor Control
Power	Water Service Companies	Resource Recovery	Chemical Purification
Manufacturing	Food & Beverage	Media regeneration	Residual Management
Pharmaceutical			

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Sustainable Emissions Control – Air treatment technologies

Technology	Applications
EnviroHPA™ Systems	Treatment, minimization & recovery from: - Sumps - Slop tanks - Tank venting - Flare systems - Other
Biofilter/bioscrubbers	H_2S & biodegradable VOCs/HAPs

A comprehensive offering that removes a wide range of contaminants – H_2S, reduced sulfur compounds (RDS), and Volatile Organics (VOCs) from vapor phase applications

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We're a Lifecycle Performance Company

Collaboration with Envirogen to guarantee performance & maximize the value of systems investment

- Guaranteed performance, repair and maintenance costs, and regulatory compliance
- Risk protection via performance and cost guarantees
- Improved budget management (avoid unbudgeted cost excursions)
- Cost-effective access to industry specialists
- A comprehensive EH&S Program
- Better utilization of capital (with DBO option)
- Predictable and guaranteed costs for the lifetime of the asset

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Value Proposition

The Elements of a Lifecycle Performance Company

- Deliver **solutions** to client needs based upon long-term relationships
- Integrate process steps built on a base of **proprietary technologies** that offer advantages on a lowest-total-cost basis
- Focus on **targeted applications** where our technologies offer advantage relative to the competition
- Always include service and support offers with **performance guarantees** for elements of operating cost within Envirogen's control, maintenance and process support

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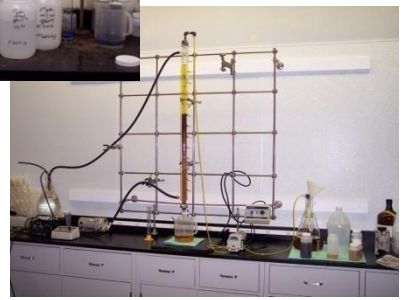
Laboratory & Pilot Capabilities

- Current staff has 50+ years of industrial chemistry, laboratory and pilot experience
- Analytical equipment includes Graphite Furnace AA, Flame AA and Ion Chromatograph
- Wet chemistry capabilities include standard procedures and specific tests that relate to ion exchange evaluations
- Small-scale testing includes glass column media evaluations, precipitation and filtration tests



Kinetic Column

Cross Flow Filtration

Large-Scale Media Pilot

- Media and ion exchange evaluation using columns to several inches in diameter
- Kinetic column testing for media and ion exchange evaluations
- Testing of ion exchange resins and specially formulated selective resins and media
- Cross flow filtration pilots include ceramic, sintered metal and polymeric membranes
- Pilot RO system with 2.5-inch vessels
- Biological reactor pilots for on-site validation

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Envirogen Biofilter Technology

Proven performance. Low operating costs.

Biofilters and Biotowers

- Safely and effectively remove odor-causing compounds
  - Hydrogen Sulfide (H_2S) and Reduced Sulfur Compounds (RSC)
  - VOCs
  - HAPs
- Cost-effective alternative to traditional treatment methods
  - Lower operating expenses
  - Reduction in media replacement costs
  - “Green Technology”
- Small system footprint
- **Currently 127 operating units at 90 sites**
- Standardized base designs, with numerous options, covering applications from 100 cfm to over 100,000 cfm

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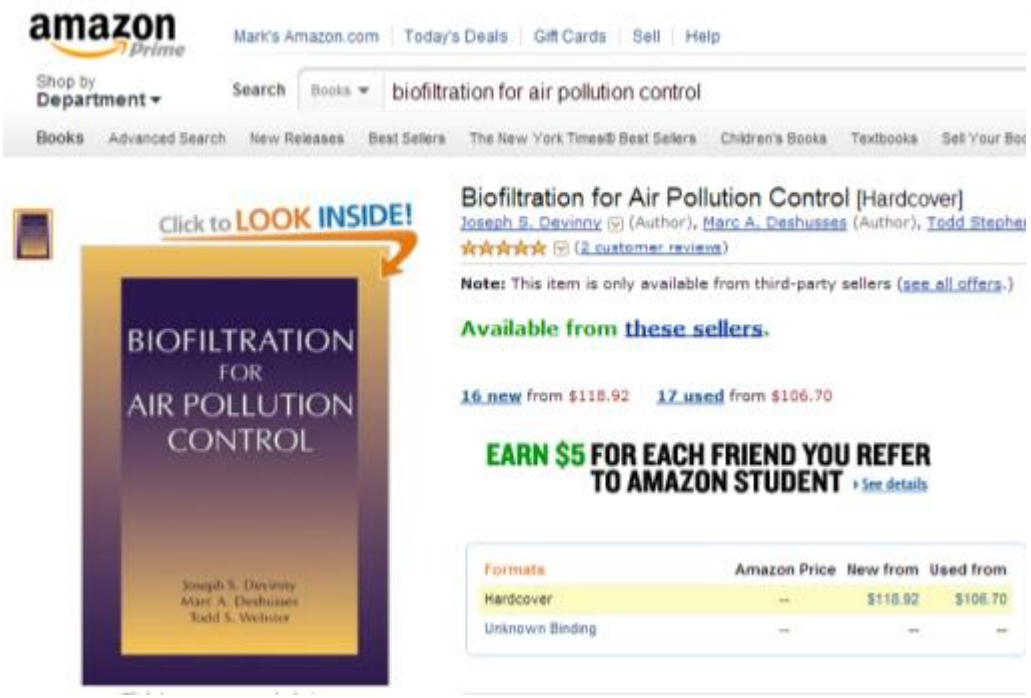
The Envirogen Experience Advantage

- Envirogen team pioneered the use of biological technology for H_2S & reduced sulfur compound treatment as far back as the 1990s
- **Currently 127 operating units at 90 sites**
- From small to very large systems
- Predictive capability based on large experience base
- **Todd Webster, PhD, PE** – "Wrote the book" on biological treatment for air pollution control. 20 years of leading edge bio treatment experience
- **Yonghua Yang, PhD** – 25+ years of experience in biological treatment with 100+ systems designed and 15+ papers published



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Biofiltration for Odor Control

Brief History –Biofilter Systems

- *60-70's:* Biofiltration in Europe
- *80's:* Biofiltration in United States – mainly large in-ground compost type systems.
- *90's – Present*: Engineered Biofilter Systems & Biotrickling Filters (BioScrubbers)

"In-Ground" Designs

Early Biofilter Design Limitations

- Subject to weather effects (drying, cold)
- "Non-Engineered" media (compost, mulch)
- High Pressure Drops
- Limited Media Heights
- Relatively Short Media Life – **Not Acid Resistant**
- Short Circuiting
- 45 – 120 Seconds Retention Time - **Large Footprints**

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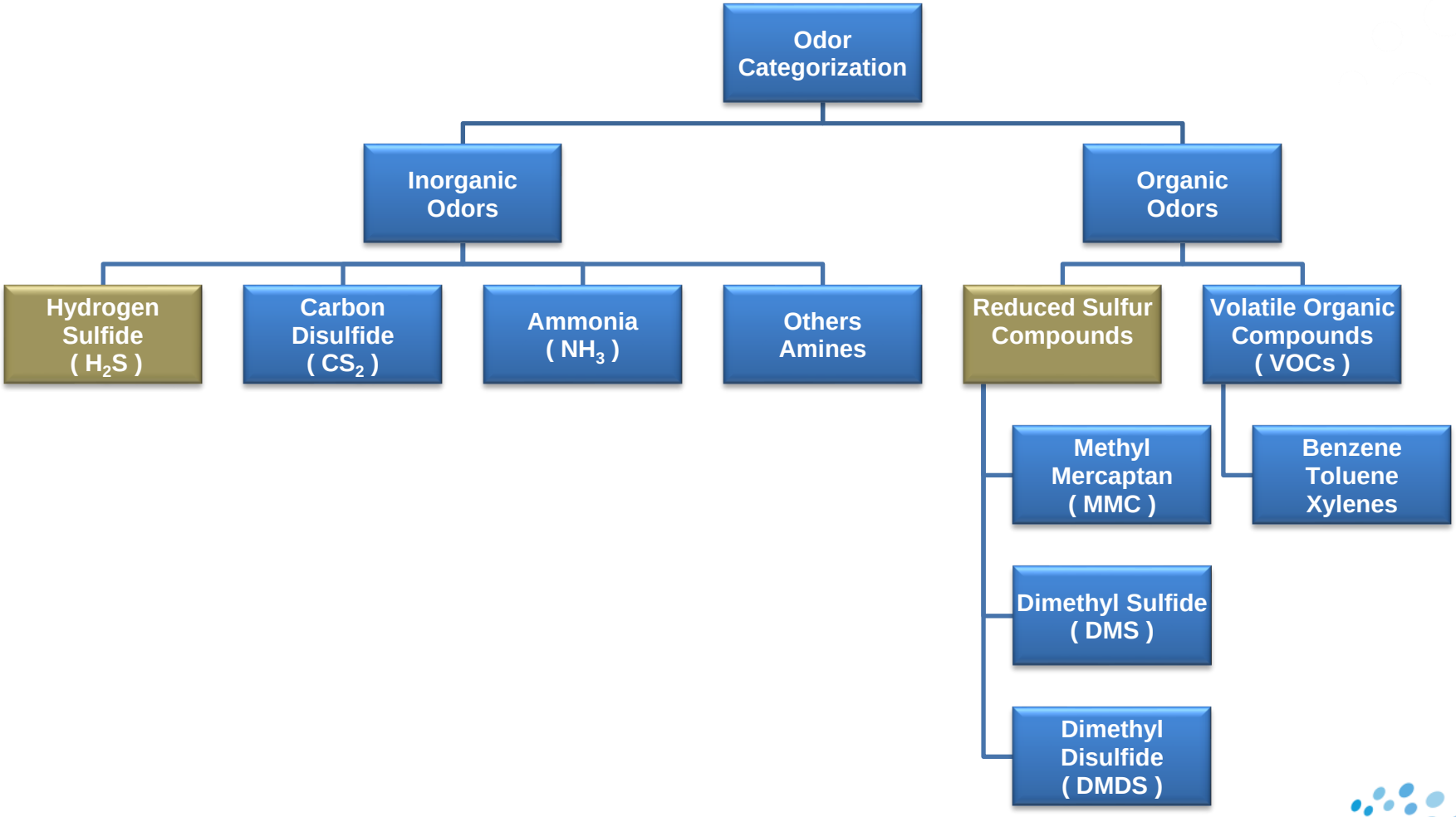
A Look at Odor Types



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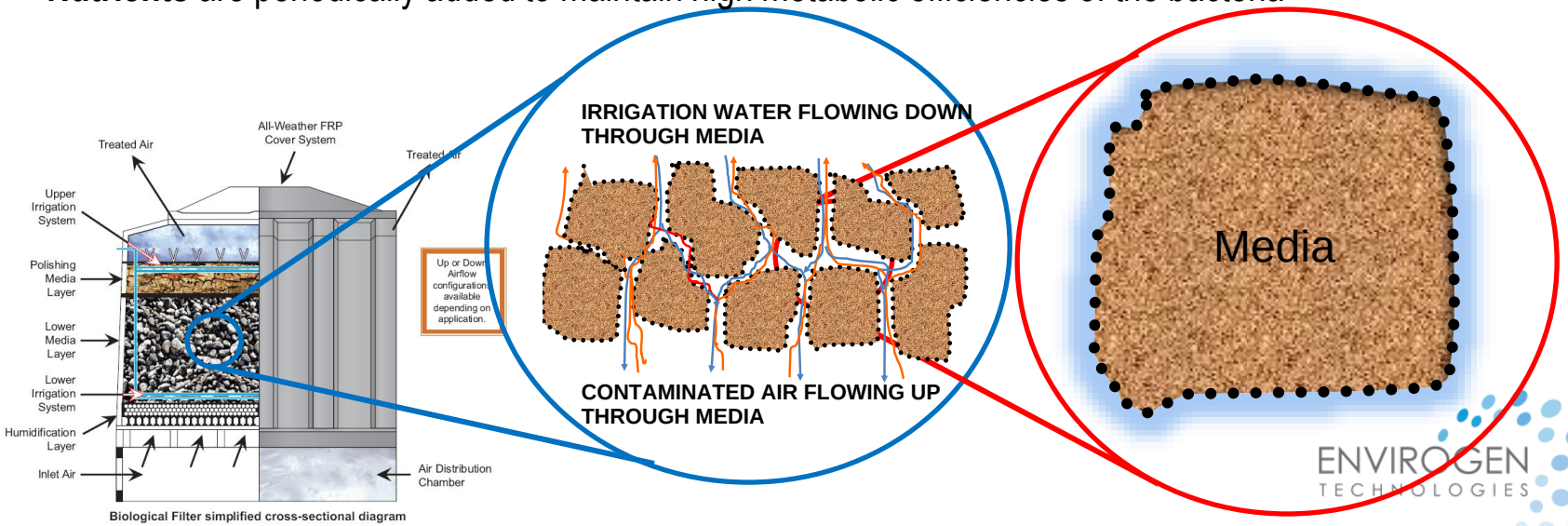
Biofiltration for Improving Air Quality

It's an assisted biodegradation process

- The natural process of biofiltration uses **microorganisms** fixed to a **porous filter bed medium** (media) to **metabolize pollutants** present in an air stream.
- The microorganisms grow in a **biofilm** on the surface of the media or are suspended in the water phase surrounding the **media**. High surface area media can support higher biomass area.
- Air containing gaseous compounds (H_2S, VOCs, etc.) are moved through the media. As the air passes through the biofilter media, the **contaminants in the air transfer into the biofilm and onto the media**.
- Microbes **consume the contaminants** as a food or energy source
- The end products of this degradation are typically **water vapor, carbon dioxide, and mineral salts.**
- **Water** is periodically added to replace evaporation losses and to flush toxic salts and acids.
- **Nutrients** are periodically added to maintain high metabolic efficiencies of the bacteria



Biological Filter simplified cross-sectional diagram

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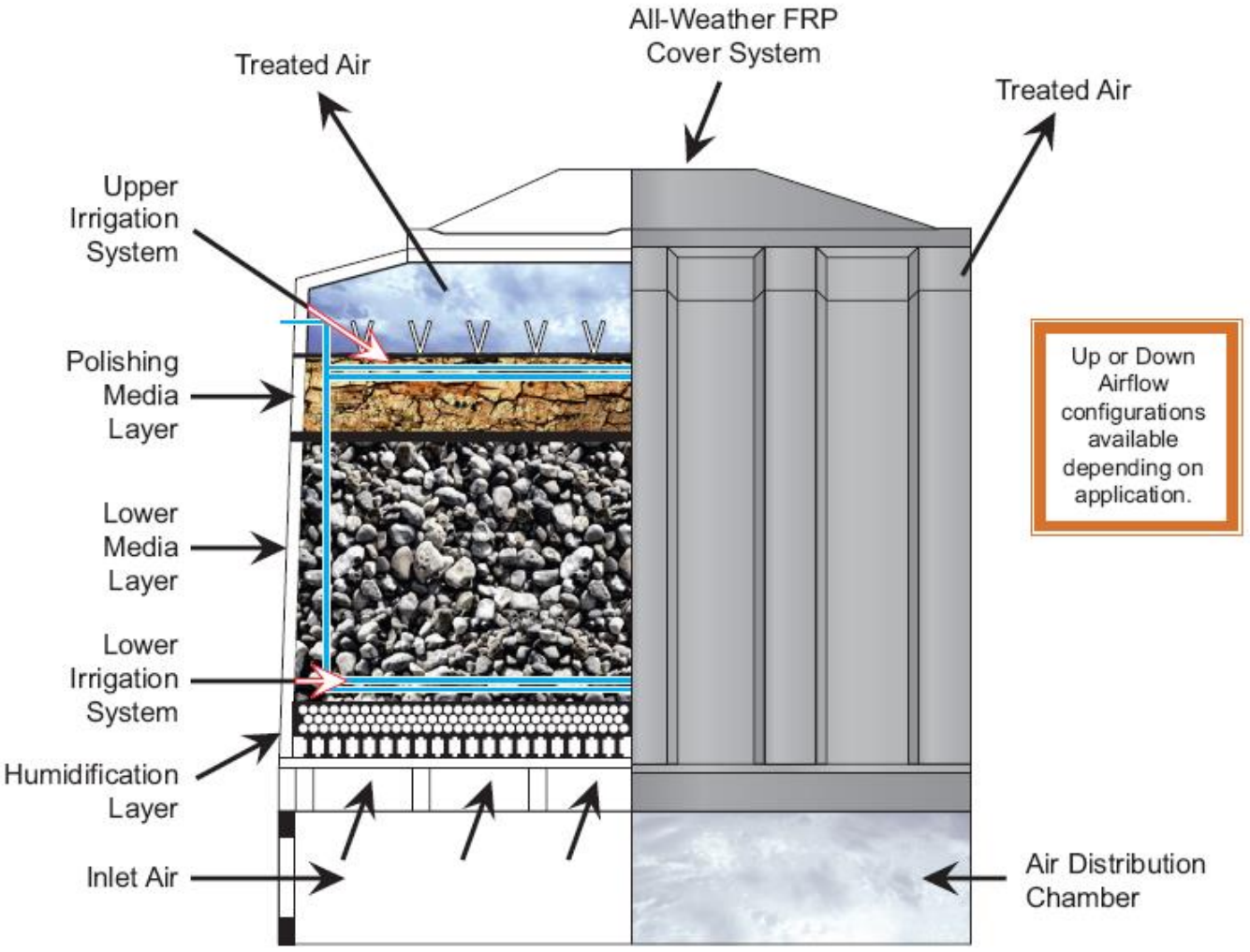
Biofilter Components

Other Items (not shown):

- Nutrient addition system
- Control systems – PLC Based or timer relay
- Blowers
- Duct
- Stack (Optional)



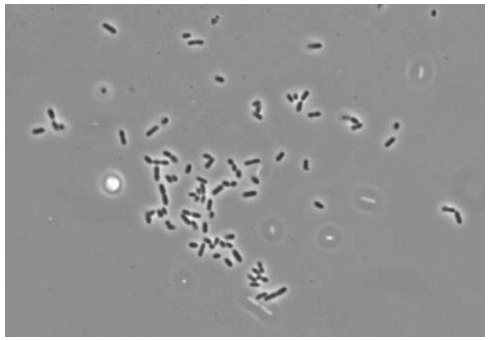
Biological Filter simplified cross-sectional diagram

H_2S Degradation

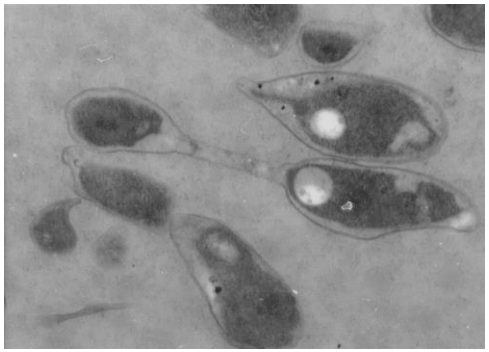
MECHANISM:

$$H_2S \xrightarrow{O_2} [S^0] \xrightarrow{O_2} H_2SO_4$$

Autotrophic BACTERIA:



Thiobacillus



Hyphomicrobium

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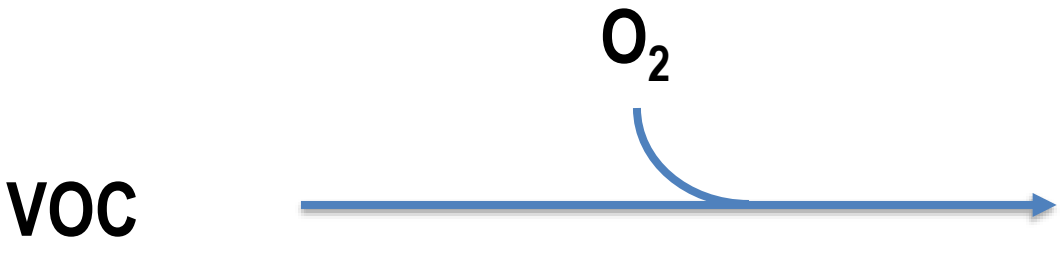
VOC degradation



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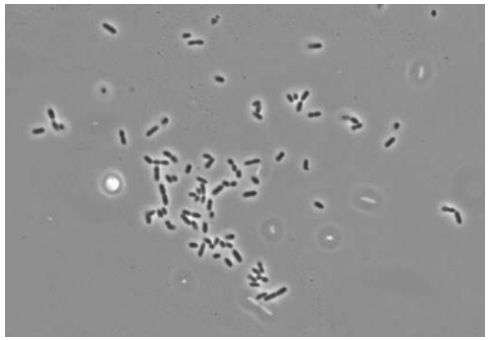

Bacteria

Fungi

Protozoa

VOC degradation is typically performed by **heterotrophic** organisms that consume carbon as their energy source

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Applications

- **Pump stations:** H_2S, VOC
- **Screening areas:** H_2S, VOC
- **Grit cyclones:** H_2S, VOC
- **Primary clarifiers:** H_2S
- **Trickling filters**: H_2S, Ammonia
- **Secondary clarifiers** (not typically treated)
- **Aeration tanks:** VOC, Ammonia (not typically treated)
- **Final clarifiers** (not typically treated)
- **Sludge holding tanks:** H_2S, NH_3 VOC, Mercaptans, Organosulfides
- **Sludge processing – BFPs, Centrifuges**: H_2S, NH_3 VOC, Mercaptans, Organosulfides

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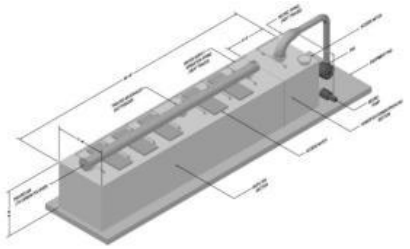
Envirogen Biofilter Lineup

Line	Models	Media (ft^3)	CFM	EBRT (default)
Biofilter (H-Series)	8	120-680	120-2720	10-60 (30)
Biofilter (I-Series)	13	450-3900	224-8350	30-120 (75)
Biofilter box (P&B Series)	14	448-4176	450-1670	15-60 (30)
Biotrickling Filter (BT)	30	120-3500	200-14000	10-30 (15)
Integrated BT/BF (BTF Series)	8	140-4500	1500-9000	30-55 (40)
BIP 1-bay	8	2000-16000	2000-24000	20-60 (30)
BIP 2-bay	8	4000-32000	4000-48000	20-60 (30)
BIP 3-bay	8	6000-48000	6000-72000	20-60 (30)



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Media Selection Considerations

How we do it. Why it matters.

Design Criteria for Biofilters

- Biofilters are **mass transfer limited**
  - Dependent on solubility and biodegradability of contaminates
- Primary design parameters:
  - What are the contaminants?
  - What are the level of the contaminants in the feed stream?
  - What are the contaminant removal criteria?
  - What are the total odor removal criteria?
  - What media's should be used for the contaminants?
  - What is the flow rate (CFM)?
  - What EBRT is required for the contaminants?
  - What are the CFM/ft^2 requirements based on the contaminants?
  - What are the grams (X)/m^3 media /hr. mass limit?
- These design parameters:
  - Determine the specific media designed into the system
  - Dictate the volume of media required
  - Determine the system type and model
  - Determine the pressure drop of the system

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Purpose of Biomedia

1. Provide high surface area biofilms to the gas stream, containing the contaminants;
2. Allow biomass attachment to the biomedia surface;
3. Allow gas and liquid to be distributed evenly within the biofilter bed; and
4. Allow excess biomass growth to slough-off and exit the bed, without plugging the biomedia





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Favorable Characteristics of Biomedia

- High biologically active surface area
  - Typical ranges: 30 – 250 ft^2/ft^3 or 100 – 820 m^2/m^3
- High void fraction (% of open space)
  - Varies from 15% to 98%
  - Desired > 80%
- Large free passage diameter
  - Provides resistance to clogging or plugging
- Low cost per unit surface area
- Low bulk density & good mechanical strength
- Low gas-phase pressure drop
- Ability to distribute water evenly and prevent gas channeling
- Inorganic nutrient content – trace elements/nutrients
- Organic content – alternate food source
- Water content – holding capacity
- pH – Neutral
- Sorption properties/porosity – large surface area
- Bacterial attachment – rough, porous, hydrophilic
- Material – density, strength, durability, chemical
- Low pressure drop
- Low maintenance, No change-out- > 10 year life

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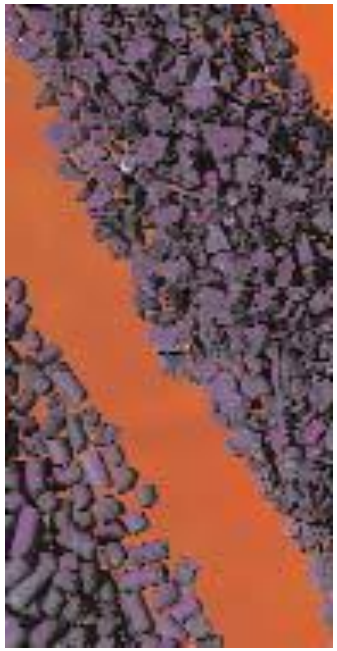
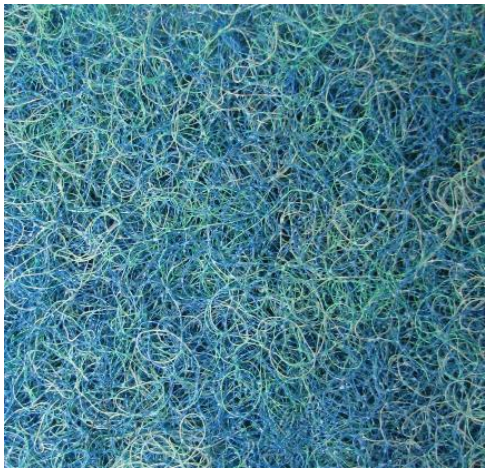
Media variants

Clay balls

Hard Polymer



Pelletized and/or Extruded



Polymer Meltblown

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Media variants

Coated Media

Oyster Shells
Primarily $CaCO_3$ and reacts with H_2SO_4

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Media Variants

Foam

Coated Media

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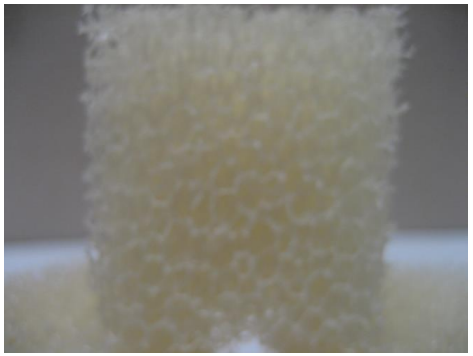
Envirogen Media Portfolio

- **ScorFil™** – inorganic, scoria lava
- **VamFil™** – aged bark, engineered
- **FlexFil™** – synthetic structural or random packed media
- Up to 10-year warranty

FlexFil™

ScorFil™

VamFil™



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Acid Resistance Testing

ScorFil Acid Resistance test – 10% Sulfuric Acid

Control and Acid bottles after
11 years, 10 months

Acid sample close-up

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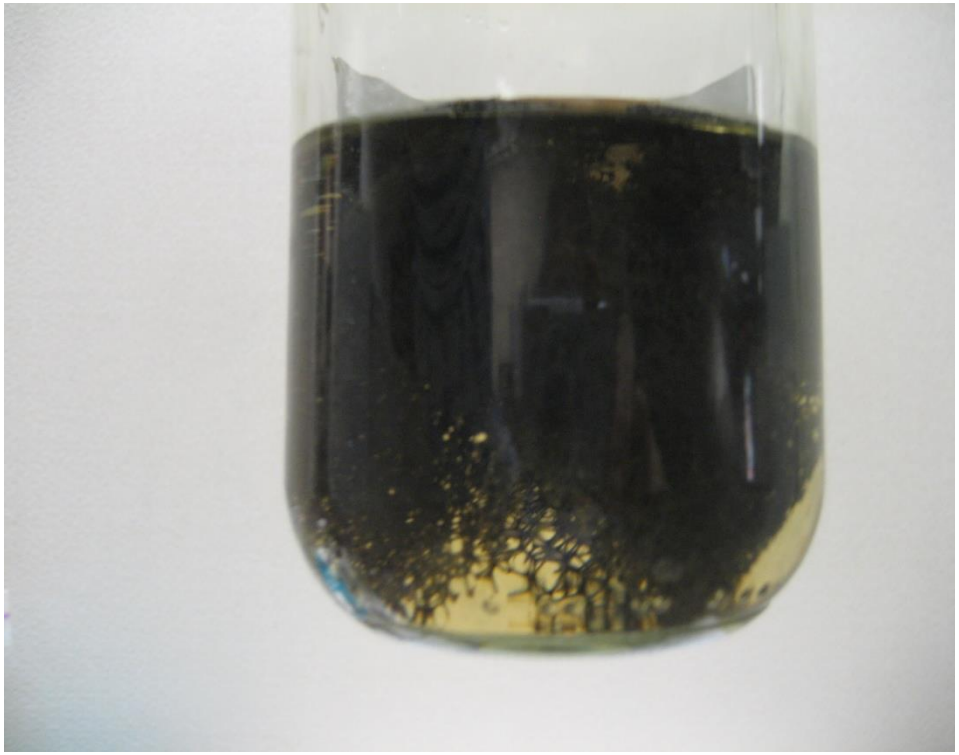
Acid Resistance Testing

FlexFil Acid Resistance test – 10% Sulfuric Acid

Control and Acid bottles after
11 years, 10 months



FlexFil Acid sample 11yrs 10 months

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The Nuese River Installation

A sophisticated, low lifecycle cost solution based on field-proven technology

Neuse River Specification Requirements

Design Parameter	Lift Station	Influent Pump Station	Primary Clarifier
Number of Vessels	1	1	1
Air Flow (CFM)	3,000	3,000	3,500
Fan Static Pressure (inches W.C.)	15	15	15
Pressure Drop thru Vessel (inches W.C.)	10	10	10
Inlet H_2S – Avg/Peak (ppm)	5 / 25	5 / 25	5 / 25
Other Sulfur Compounds – Avg (ppm)	**5**	**5**	**5**
Media Detention Time – Seconds	30	30	30
Air Temperature	40° – 110°	40° – 110°	40° – 110°
Inlet Relative Humidity	50 – 100%	50 - 100%	50 – 100%
Dimensions – Maximum.	12’ x 30’ x 12’	12’ x 30’ x 12’	12’ x 30’ x 12’
Blower Horsepower- Max	15	15	20
Drain Connection Size, inches	2	2	2
Water Supply Connection Size, inches	1	1	1
Instantaneous Water Requirement	40 gpm @ 75 psi	40 gpm @ 75 psi	40 gpm @ 75 psi
H_2S Removal Efficiency – Min.*	99.0% or <0.5 ppm	99.0% or <0.5 ppm	99.0% or <0.5 ppm
Odor Removal Efficiency – Min.*	95.0% or <500 D/T	95.0% or <500 D/T	95.0% or <500 D/T
ETI Model	**BTF-2000**	**BTF-2000**	**BTF-2400**
Total EBRT	40.4	40.4	41.2

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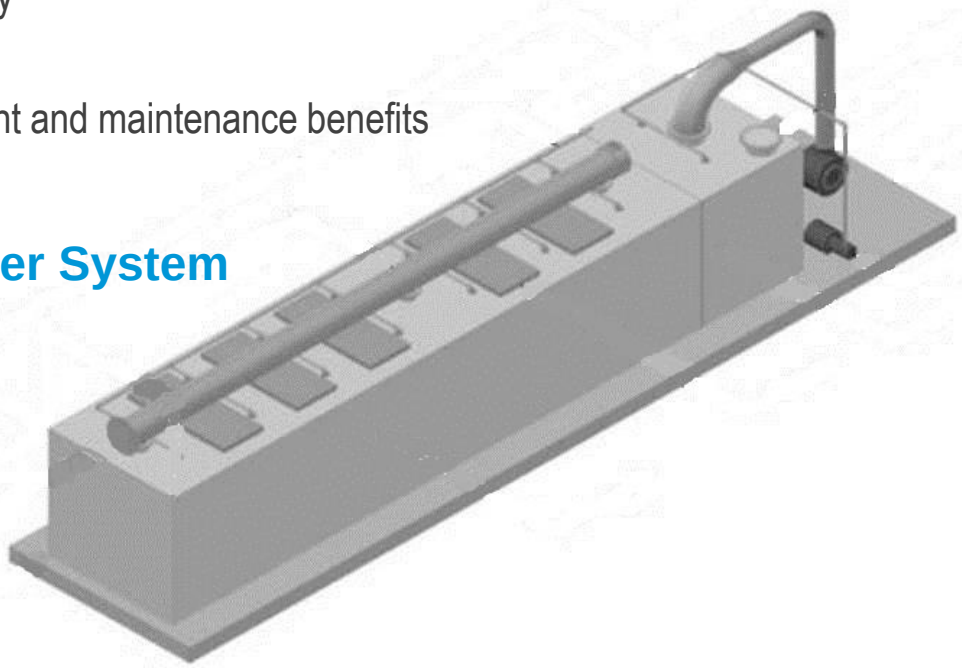
The Integrated System Approach

- Three distinct ‘ecosystems’ in a single unit
  - Low pH FlexFil biotrickling filter zone for H_2S removal
  - Suitable pH ScorFil biofilter zone for RSC removal
  - Neutral VamFil biofilter zone for RSC polishing
- Organisms that grow in these zones are different.
- Will provide better performance in each section and overall. Better than a single media system
- More efficient treatment with better reliability
- Longer media life for the project
- Better system design offers site environment and maintenance benefits

Integrated Biotrickling/Biofilter System



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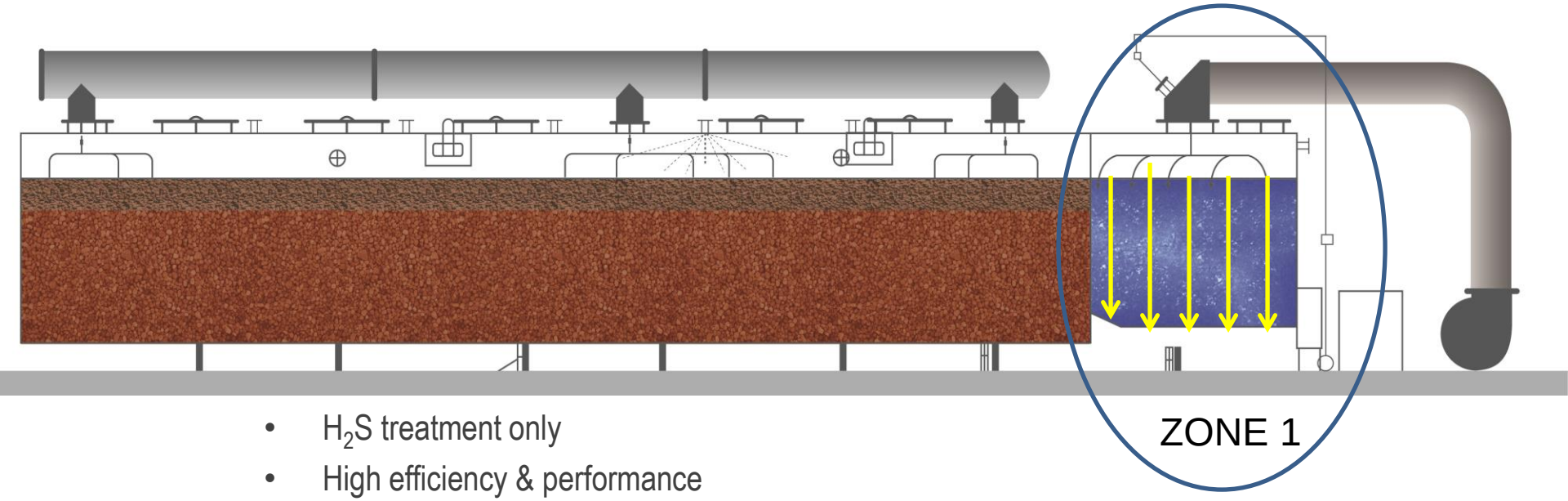
Ecozone #1

BTF Series



- H_2S treatment only
- High efficiency & performance
- 99+% removal of H_2S
- Autotrophic bacteria
- Continuous Recirculation
  - Humidification
  - Low pH ~ 2
- FlexFil synthetic polymer media
  - High surface area
  - Acid resistance

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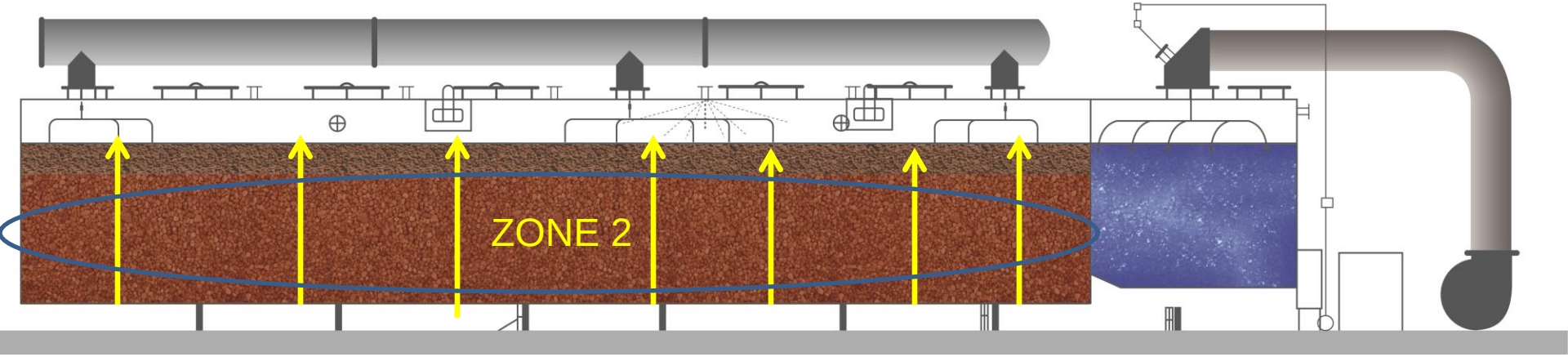
Ecozone #2

BTF Series



- High efficiency & performance
- Demisting of acetic vapor in lower section
- pH profile 4-7 Gradient lower to upper portion
- Reduced sulfur compounds
- Heterotrophic bacteria
- Long Empty Bed Retention Time (EBRT)
- ScorFil media
  - High surface area
  - High acid resistance
  - 90+% TRS reduction
  - High moisture content

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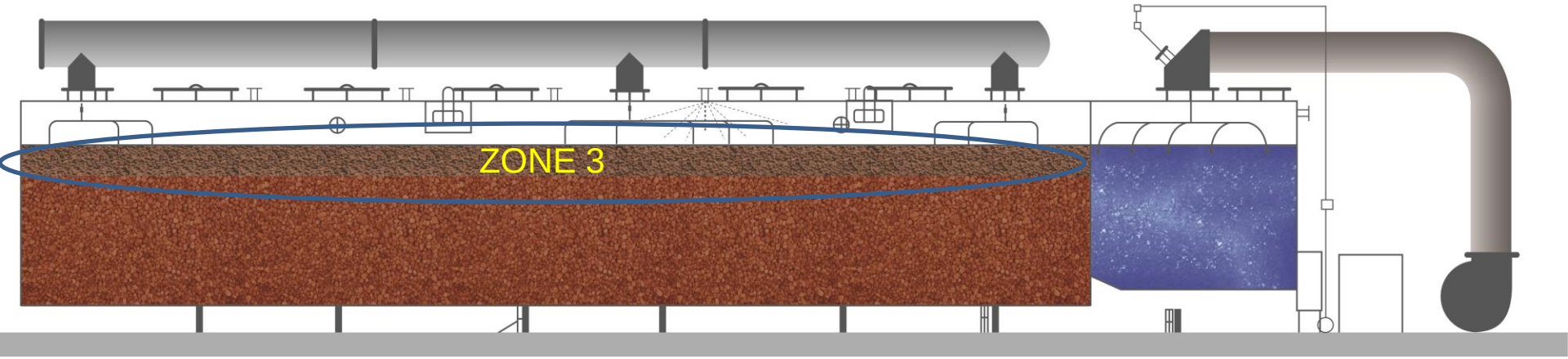
Ecozone #3

Polishing Zone



- High organic/lower moisture zone –
  - VamFil – NC supplier
  - Pre-composted & screened
  - Long media life
- High efficiency & performance on tough odor compounds
  - Reduced sulfur compounds
  - VOC
- Neutral pH ~ 7
- Heterotrophic bacteria
- 95+% TRS reduction

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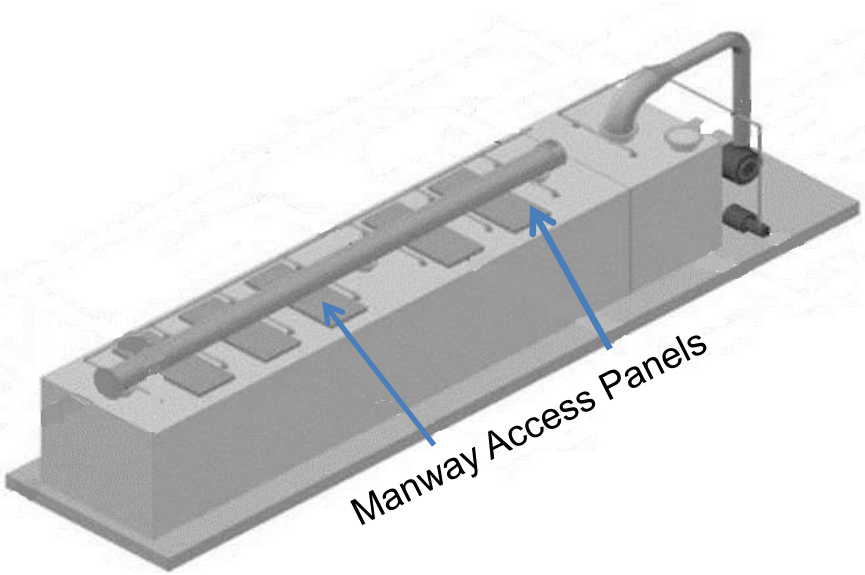
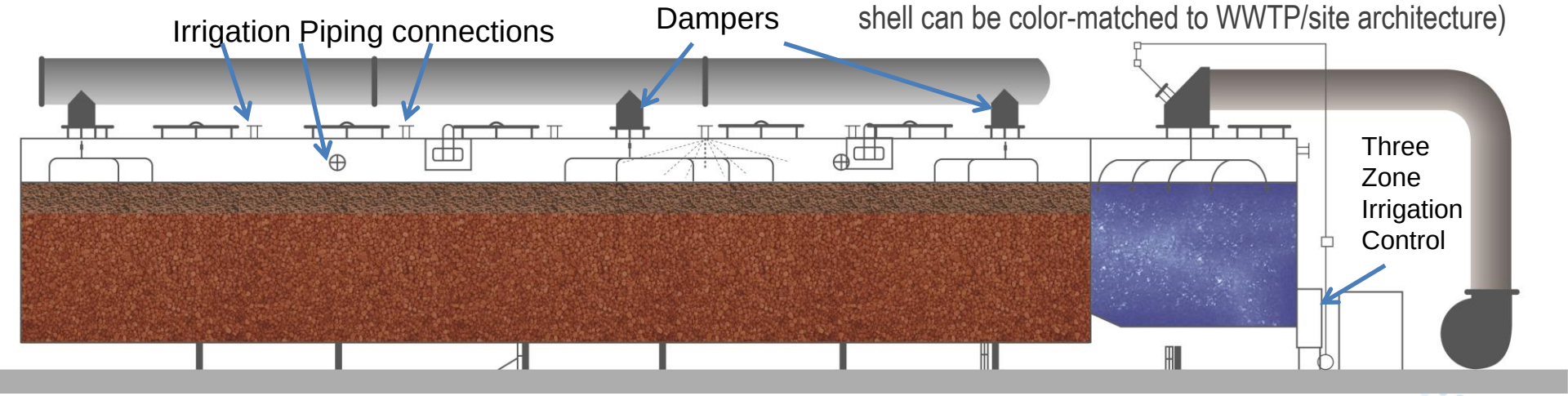
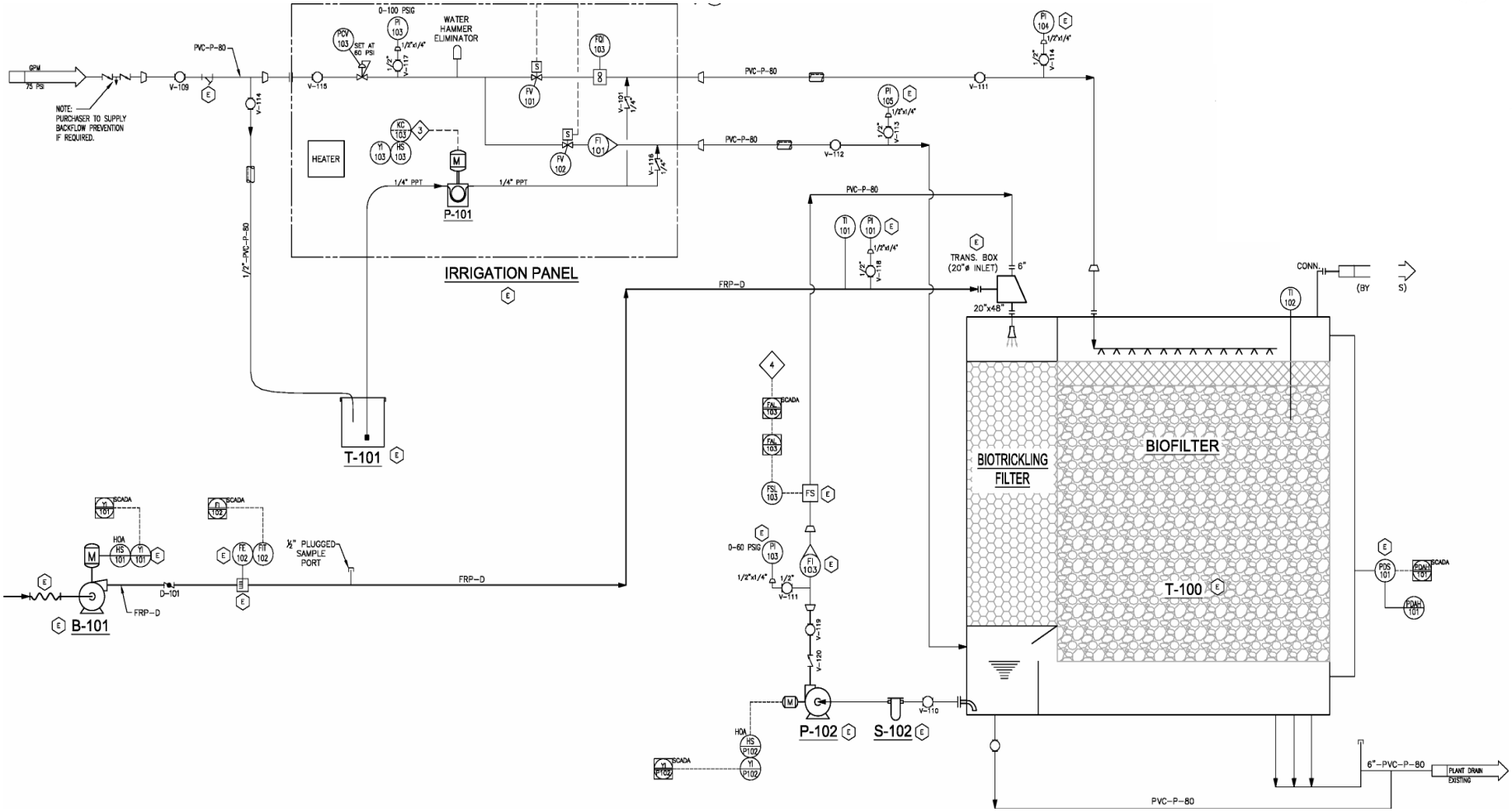
Important System Features



- FRP box – limited metal exposure: no H_2S0_4 corrosion issues
- Easy access manway hatches
- External irrigation piping for easy inspection and maintenance with drop in upper nozzle assembly
- FRP frame and panel construction without metal support structure
- Zonal irrigation control
- Ease of Installation (modular)
- “Drop and Load” (i.e., Position unit on eqpt. pad, then load media)
- No Sectional bolt and gasket construction
- Overall “box” profile is sleek and clean (as option, exterior shell can be color-matched to WWTP/site architecture)



BTF Series – Generic PID



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The Nuese River Installation

Lifecycle operating costs

Lift Station: BTF-2000 (3,000 CFM)
Estimated Annual Operating Expense

Description	Estimated Usage	Estimated Rate	Annual Cost (per Biofilter Unit)
Water Usage	70,000 gal/yr	$ 0.00394 *	$275.80
Nutrient Usage	54 lbs/year	$1.20/lb.	$64.80
Electrical Usage	57,236,74 kW-hr/yr	$0.06/kW-hr **	$3,434.20
Media Replacement	2,023 CF	$9,710/event	$971.00 ***
Total			$4,745.80

* Raleigh NC Non-Residential Unit Water Rate (Inside City Limits)
** Assumed Electric Unit Consumption Rate to be verified against local electric consumption rate.
*** Annualized Media Replacement Cost Estimated at 10-years Media Life. Does not include Labor and Equipment Rental. Owner to prepay and add for media shipping.

Annual Electrical Operating Cost per Biofilter Unit Calculation:

Equipment	Volts	Amps	Watts	Usage	kW-hr	kW-hr/yr	Unit Cost	Annual Cost
Blower Motor	460		5,406.3	Continuous(1)	5.4063	47,359.2		
Recirculation Pump	460		1,118.5	Continuous(2)	1.1185	9,798.06		
Nutrient Pump	120	1.7	204	Intermittent(3)	0.24	70.08		
Water Panel	120		32.2	Intermittent(4)	0.0322	9.4		
				Totals		57,236.74	$ 0.06	$3,434.20

(1) 10-HP Blower Motor operating continuously at 7.25 bhp x 0.7457 kW/hp = 5.4063 kilowatts-hr
(2) 1.5-HP Recirculation Pump Motor operating continuously at 1.5 bhp x 0.7457 kW/hp = 1.1185 kilowatts-hr
(3) 1/30-HP Nutrient Pump operating 48 minutes/day
(4) Two (2) Solenoid Valves operating 48 minutes/day

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Pump Station: BTF-2000 (3,000 CFM)
Estimated Annual Operating Expense

Description	Estimated Usage	Estimated Rate	Annual Cost (per Biofilter Unit)
Water Usage	70,000 gal/yr	$ 0.00394 *	$275.80
Nutrient Usage	54 lbs/year	$1.20/lb.	$64.80
Electrical Usage	57,236.74 kW-hr/yr	$0.06/kW-hr **	$3,434.20
Media Replacement	2,023 CF	$9,710/event	$971.00 ***
Total			$4,745.80

* Raleigh NC Non-Residential Unit Water Rate (Inside City Limits)
** Assumed Electric Unit Consumption Rate to be verified against local electric consumption rate.
*** Annualized Media Replacement Cost Estimated at 10-years Media Life. Does not include Labor and Equipment Rental. Owner to prepay and add for media shipping.

Annual Electrical Operating Cost per Biofilter Unit Calculation:

Equipment	Volts	Amps	Watts	Usage	kW-hr	kW-hr/yr	Unit Cost	Annual Cost
Blower Motor	460		5,406.3	Continuous(1)	5.4063	47,359.2		
Recirculation Pump	460		1,118.5	Continuous(2)	1.1185	9,798.06		
Nutrient Pump	120	1.7	204	Intermittent(3)	0.24	70.08		
Water Panel	120		32.2	Intermittent(4)	0.0322	9.4		
				Totals		57,236.74	$ 0.06	$3,434.20

(1) 10-HP Blower Motor operating continuously at 7.25 bhp x 0.7457 kW/hp = 5.4063 kilowatts-hr
(2) 1.5-HP Recirculation Pump Motor operating continuously at 1.5 bhp x 0.7457 kW/hp = 1.1185 kilowatts-hr
(3) 1/30-HP Nutrient Pump operating 48 minutes/day
(4) Two (2) Solenoid Valves operating 48 minutes/day

ENVIROGEN TECHNOLOGIES

Primary Clarifier: BTF-2400 (3,500 CFM)
Estimated Annual Operating Expense

Description	Estimated Usage	Estimated Rate	Annual Cost (per Biofilter Unit)
Water Usage	80,000 gal/yr	$ 0.00394 *	$315.20
Nutrient Usage	62 lbs/year	$1.20/lb.	$74.40
Electrical Usage	66,316.44 kW-hr/yr	$0.06/kW-hr **	$3,978.98
Media Replacement	2,406 CF	$11,490/event	$1,149.00 ***
Total			$5,517.58

* Raleigh NC Non-Residential Unit Water Rate (Inside City Limits)
** Assumed Electric Unit Consumption Rate to be verified against local electric consumption rate.
*** Annualized Media Replacement Cost Estimated at 10-years Media Life. Does not include Labor and Equipment Rental. Owner to prepay and add for media shipping.

Annual Electrical Operating Cost per Biofilter Unit Calculation:

Equipment	Volts	Amps	Watts	Usage	kW-hr	kW-hr/yr	Unit Cost	Annual Cost
Blower Motor	460		6442.8	Continuous(1)	6.4428	56,438.9		
Recirculation Pump	460		1,118.5	Continuous(2)	1.1185	9,798.06		
Nutrient Pump	120	1.7	204	Intermittent(3)	0.24	70.08		
Water Panel	120		32.2	Intermittent(4)	0.0322	9.4		
				Totals		66,316.44	$ 0.06	$3,978.98

(1) 10-HP Blower Motor operating continuously at 8.64 bhp x 0.7457 kW/hp = 6.4428 kilowatts-hr
(2) 1.5-HP Recirculation Pump Motor operating continuously at 1.5 bhp x 0.7457 kW/hp = 1.1185 kilowatts-hr
(3) 1/30-HP Nutrient Pump operating 48 minutes/day
(4) Two (2) Solenoid Valves operating 48 minutes/day

ENVIROGEN TECHNOLOGIES

Preventive Maintenance

- Check system periodically
- Log pH of recirculation water, system pressure drop, nutrient level, water usage
- Check filter delta pressure & replace as needed. We recommend change filter elements every 2 to 3 months on water supply line to irrigation system
- Check for air leaks, water leaks
- Check air flow
- Change belts on blower drive once per year; check alignment
- Grease pillow block bearings on blower drive shaft (2 each) every 3-6 months
- Provide nutrient for dilution into nutrient tank irrigation system, as needed
- Periodic cleaning and flushing of nutrient tank
- Change irrigation sprinkler system nozzles and or clean on decrease pressure as needed
- Check temperature air every 3-6 months
- Check pH water in drain every 3-6 months
- Air flow monitoring from each source; non-invasive anemometer (non-thermal device only) every 3-6 months
- Monitor 4 to 5 day inlet and discharge for H_2S every 3-6 months
- Measure pressure drop across biofilter every 3-6 months.
- Check filters for nutrient water every 3-6 months
- Monitor pressure of gauges for irrigation system every 3-6 months
- Check pressure regulator setting (gauged) on nutrient water every 3-6 months
- Record amp L1, L2, L3 blower every 3-6 months

ENVIROGEN TECHNOLOGIES

Long Term Service Agreement Definition

At start up acclimation period: Quarterly for first year perform the following:

- Check temperature air
- Media bed temp
- pH water in drain
- Air flow monitoring from each source non evasive anemometer (none thermal device only)
- Monitor 4 to 5 day inlet and discharge for H_2S
- Measure pressure drop across biofilter and grease mist eliminators
- Check filters for nutrient water
- Monitor pressure of gauges for irrigation system
- Pressure regulator setting (gauged) on nutrient water
- Record amp L1, L2, L3 blower

Maintenance and Monitoring program. As noted below, perform the following:

- Change belts on blower drive once year check alignment.
- Grease pillow block bearings on blower drive shaft (2 each) every 3-6 months
- Change filter elements every 2 to 3 months on water supply line to irrigation system
- Provide nutrient (55 gal drum) for dilution into nutrient tank irrigation system as needed.
- Periodic cleaning and flushing of nutrient tank.
- Change irrigation sprinkler system nozzles and or clean on decrease pressure as needed
- Check temperature air every 3-6 months
- Check pH water in drain every 3-6 months
- Sir flow monitoring from each source non-invasive anemometer (non-thermal device only) every 3-6 months
- Monitor 4 to 5 day inlet and discharge for H_2S every 3-6 months
- Measure pressure drop across biofilter and grease mist eliminators every 3-6 months.
- Check filters for nutrient water every 3-6 months
- Monitor pressure of gauges for irrigation system every 3-6 months
- Check pressure regulator setting (gauged) on nutrient water every 3-6 months
- Record amp L1, L2, L3 blower every 3-6 months

On 3, 5, 7, and 10 year mark sample system to determine biomass health, and media plugging or other potential life cycle issues

- Media should be sent for testing and evaluation

ENVIROGEN TECHNOLOGIES

Summary

- Robust treatment system:
  - Three Ecosystem zones for optimum performance
    - 99+% H_2S reduction
    - 95+ % reduced sulfur compound and VOC reduction
    - Adapts to changing odor sources and levels.
- Ease of installation
  - Position and load media
  - Exterior irrigation piping for quick assembly
- Ease of Maintenance
  - Flange connections for upper nozzle removal and inspection
  - Flange connections for intermediate layer drip line inspection
  - Large manways for media loading and interior inspection
  - Irrigation panel control system versus exterior mounted solenoids, etc….
  - Unified FRP construction – No air leaks typically associated with bolt and gasket designs
  - No metal exposed to H_2S (acidic air) and stainless steel metal components (bolts, panels, etc) exposed to atmosphere..

ENVIROGEN TECHNOLOGIES

ENVIROGEN TECHNOLOGIES

A Lifecycle Performance Company

Nuese River Emissions Control Installation

The Integrated Biotrickling/Biofilter System