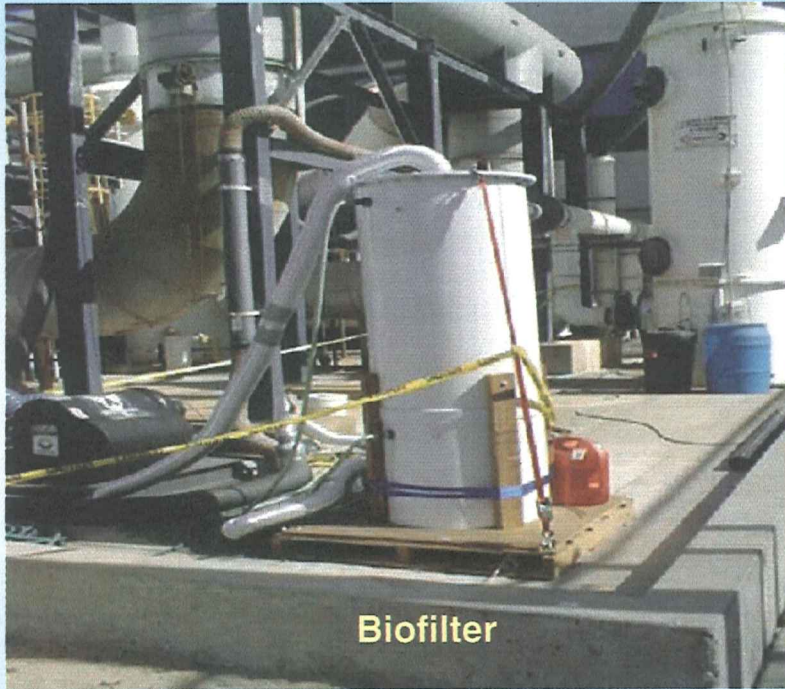


# Biological Control of Odor and VOCs Wastewater Treatment Plants



Biofilter



Biotrickling  
filter

Applied Research/Energy Mgmt., WESD, Bureau of Sanitation, City of Los Angeles



University of California at Riverside

University of California at Davis

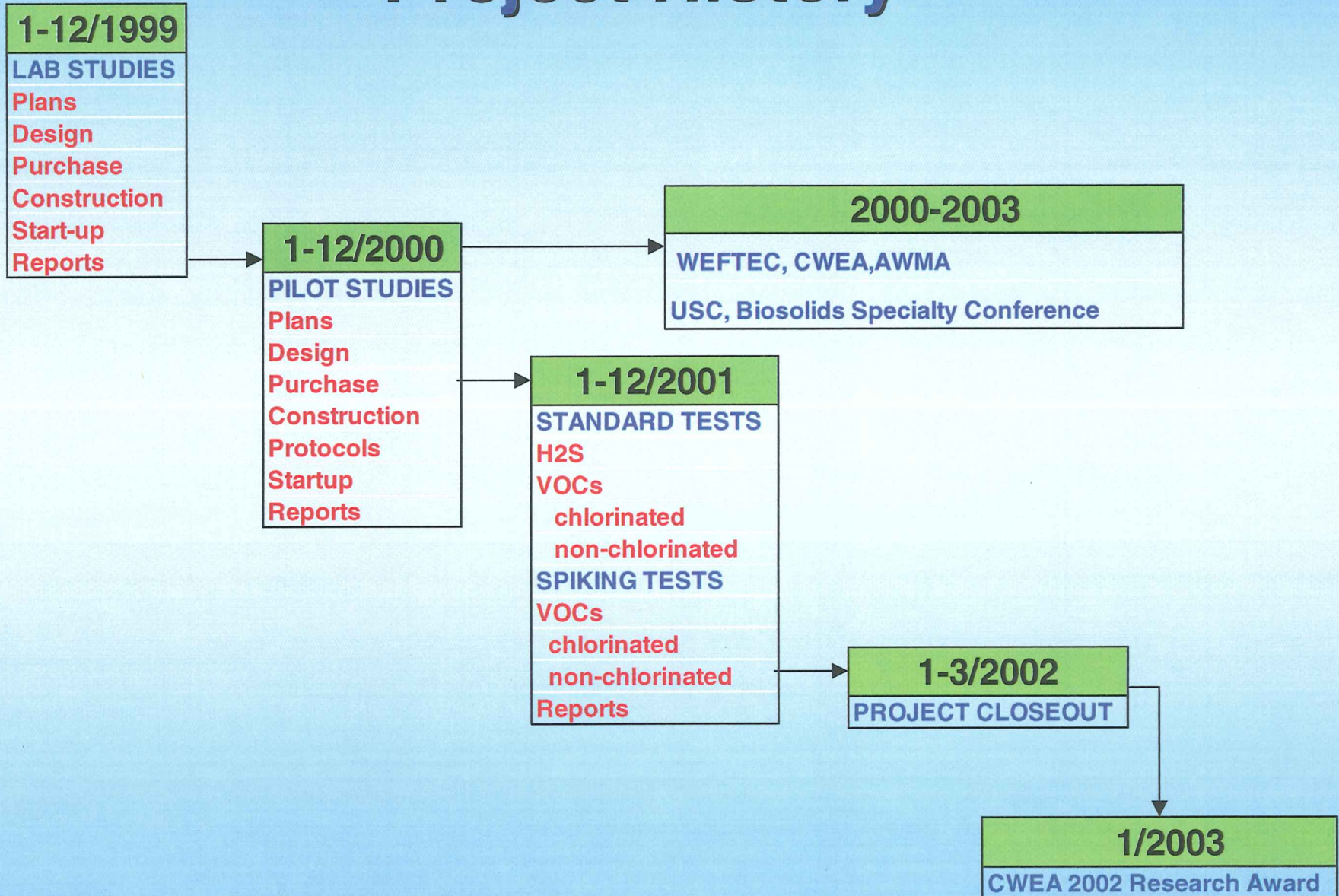
Water Environment Research Foundation

LA Quality and Productivity Commission

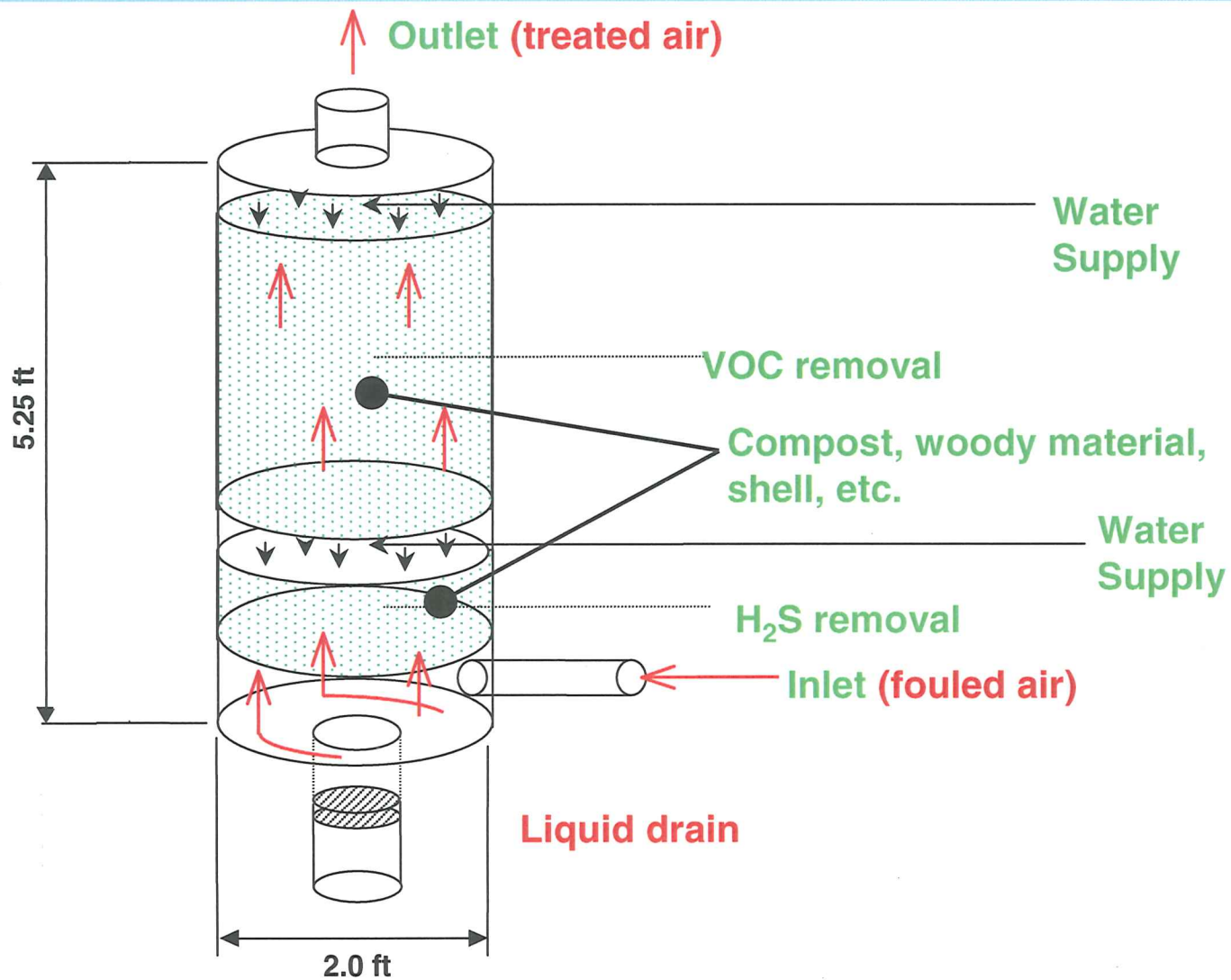
February 24, 2003



# Project History



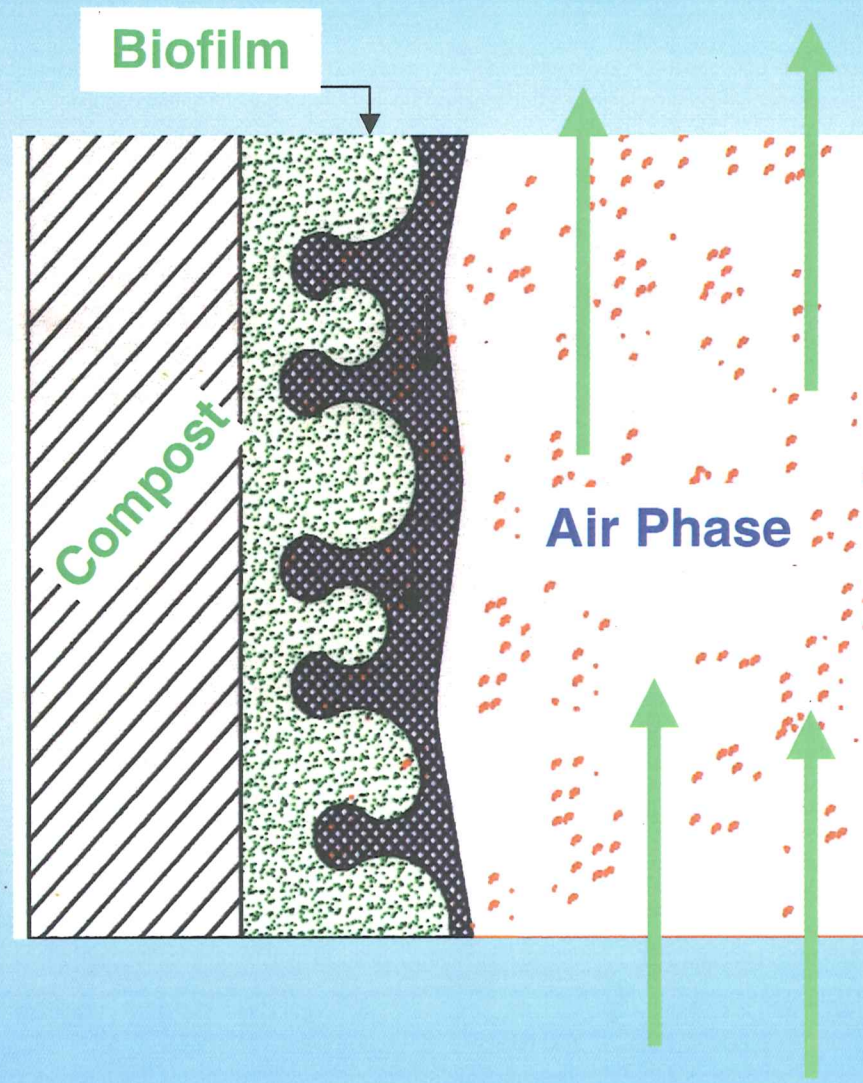
# Field Biofilter Schematic



UC Davis Biofilter

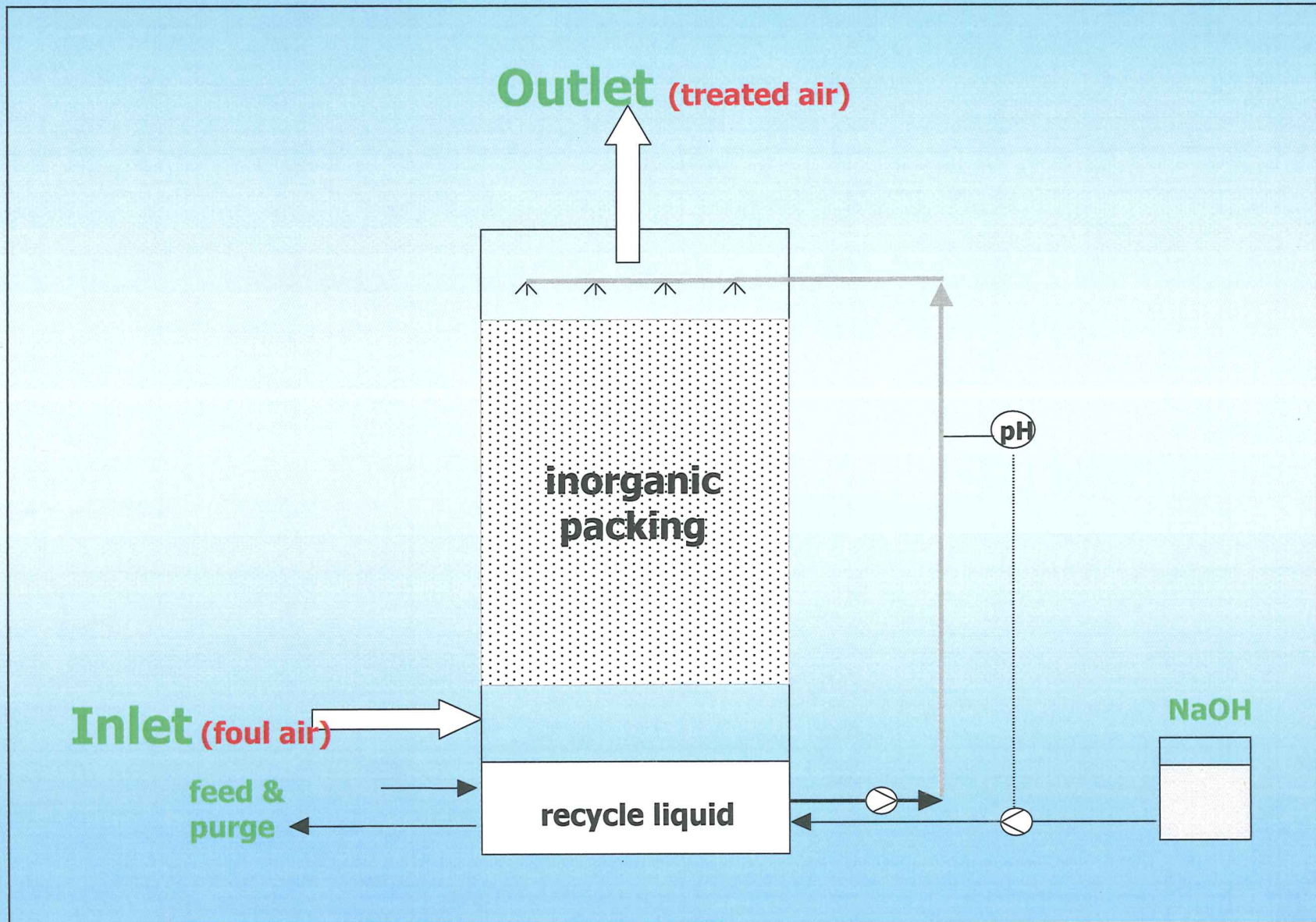


# Principle of biodegradation





# Principle of Biotrickling(BT) Filter





# Biofilter Setup at HTP Headworks





# Biofilter Top View





# Ventilation Air at HTP Headworks

Pollutant	Concentration
Odor	35,000 – 46,500 D/T
Hydrogen disulfide	10 – 50 ppm
Carbonyl sulfide	19 – 52 ppb
Methyl mercaptan	149 – 165 ppb
Dimethyl sulfide	8 – 12 ppb
Carbon disulfide	6 – 8 ppb
Tert-butyl mercaptan	2 – 3 ppb
Benzene	0.5 – 25 ppb
Toluene	10 – 153 ppb
Xylenes	12 – 125 ppb
Dichlorobenzenes	1 – 210 ppb
Methylene chloride	4 – 120 ppb
Trichloro ethylene	1 – 15 ppb
Perchloro ethylene	15 – 225 ppb
Chloroform	16 – 102 ppb

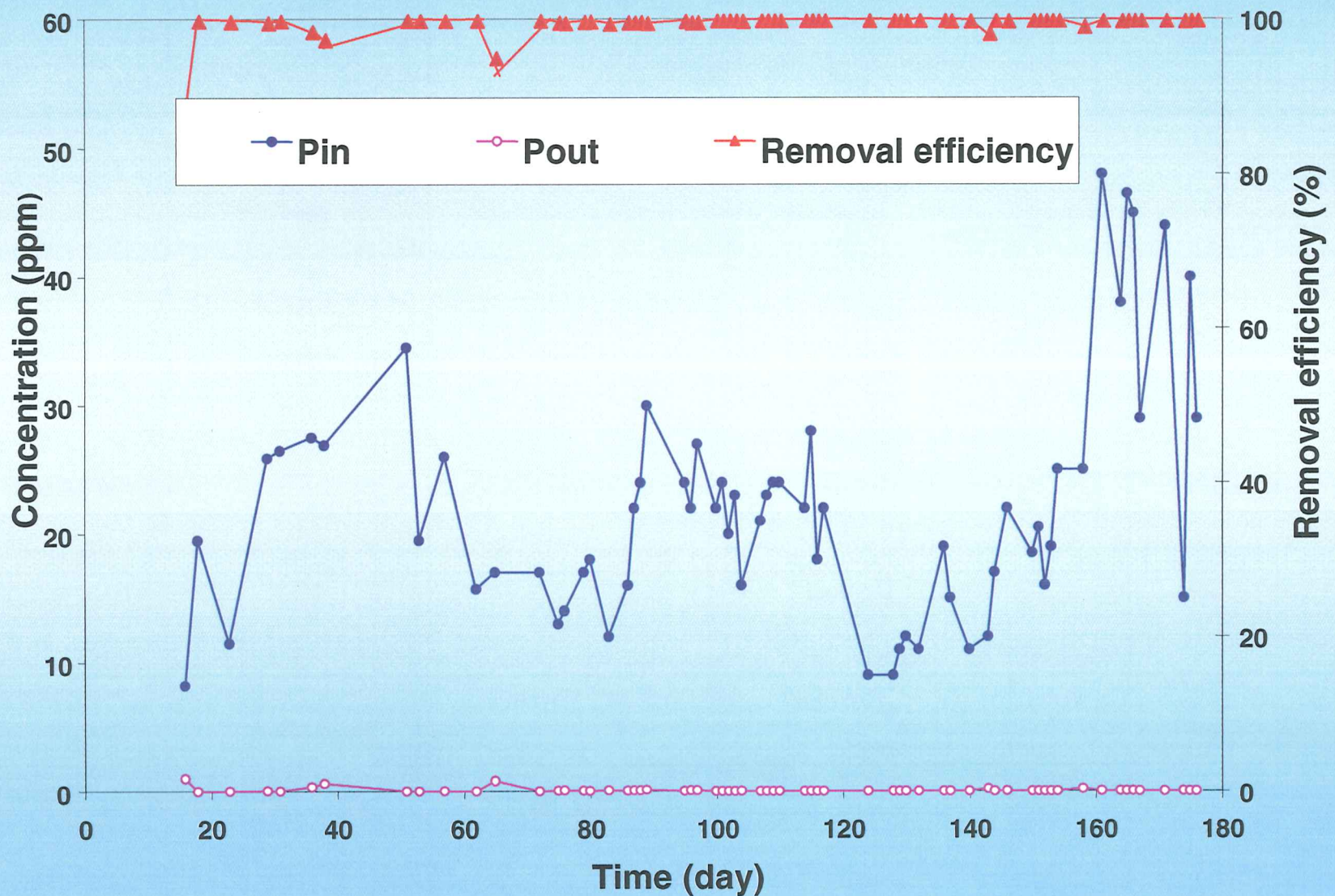


# Odor and VOC Removal at HTP

- **Objectives**
  - **Simultaneous removal of Odor/VOCs**
  - **Side-by-side comparison**
  - **Short-term (hours) and long-term (months) performance**

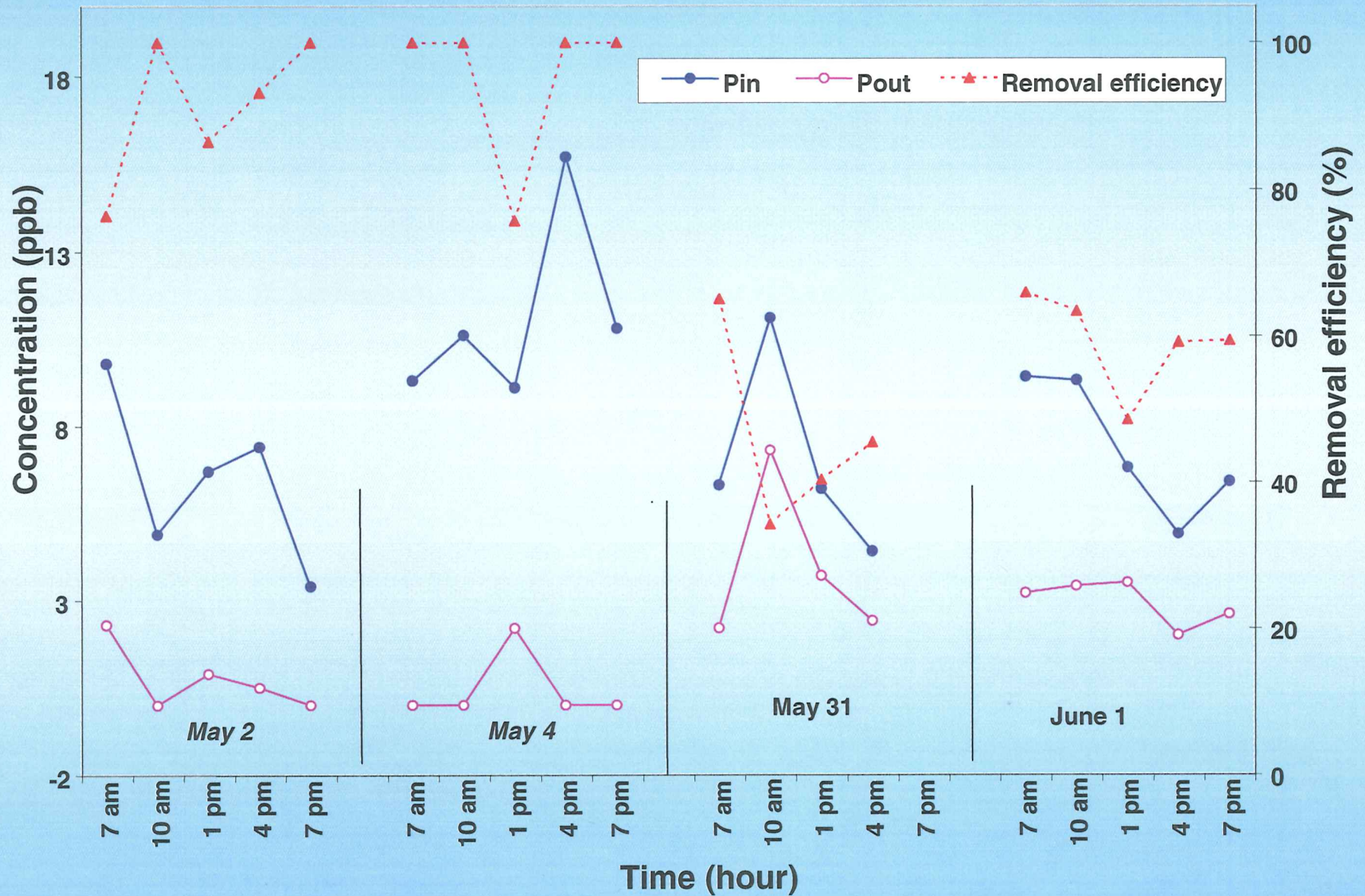


# H<sub>2</sub>S Removal in Biofilter, Long-Term



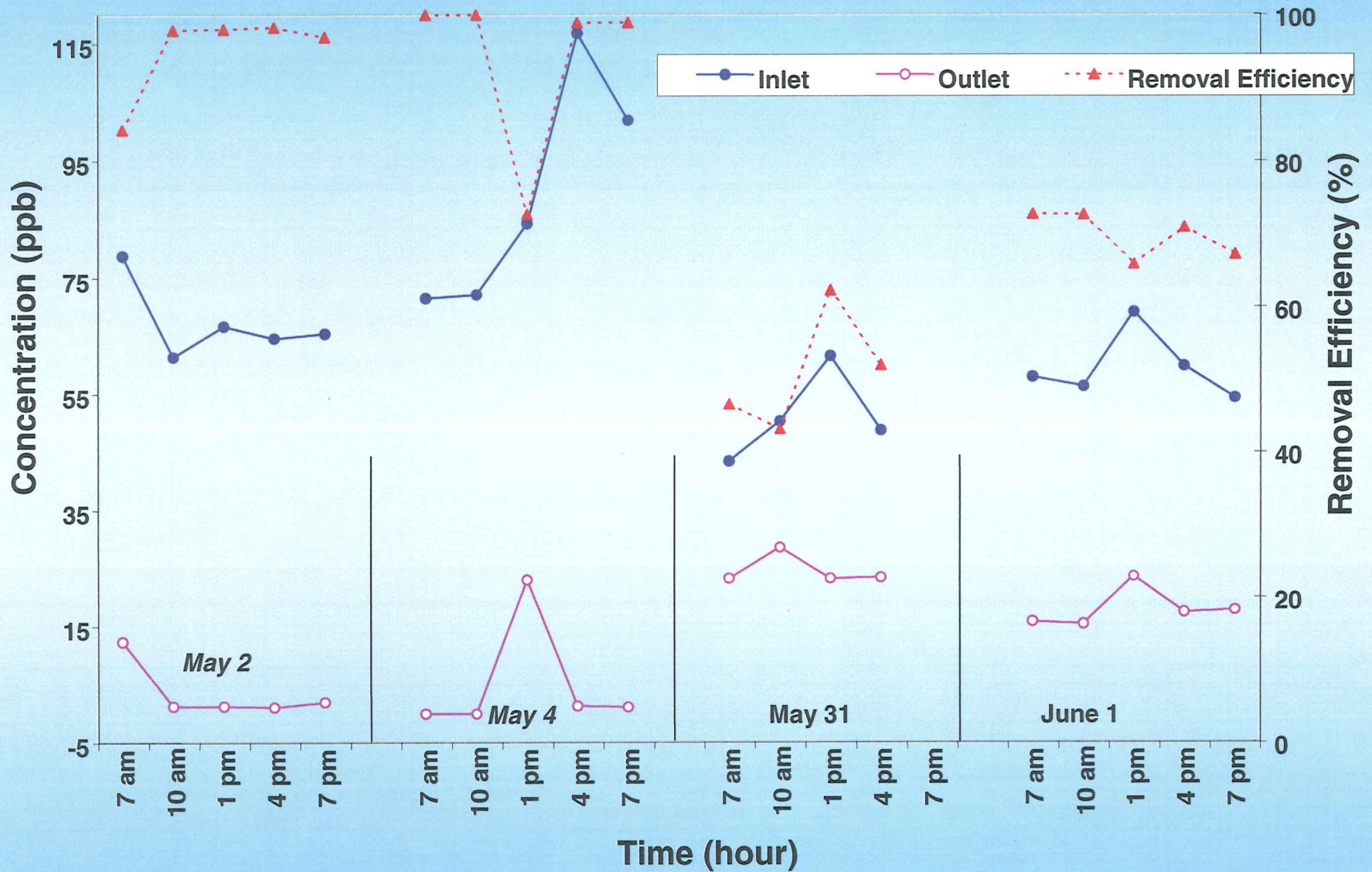


# Benzene Removal in Biofilter, Short-Term



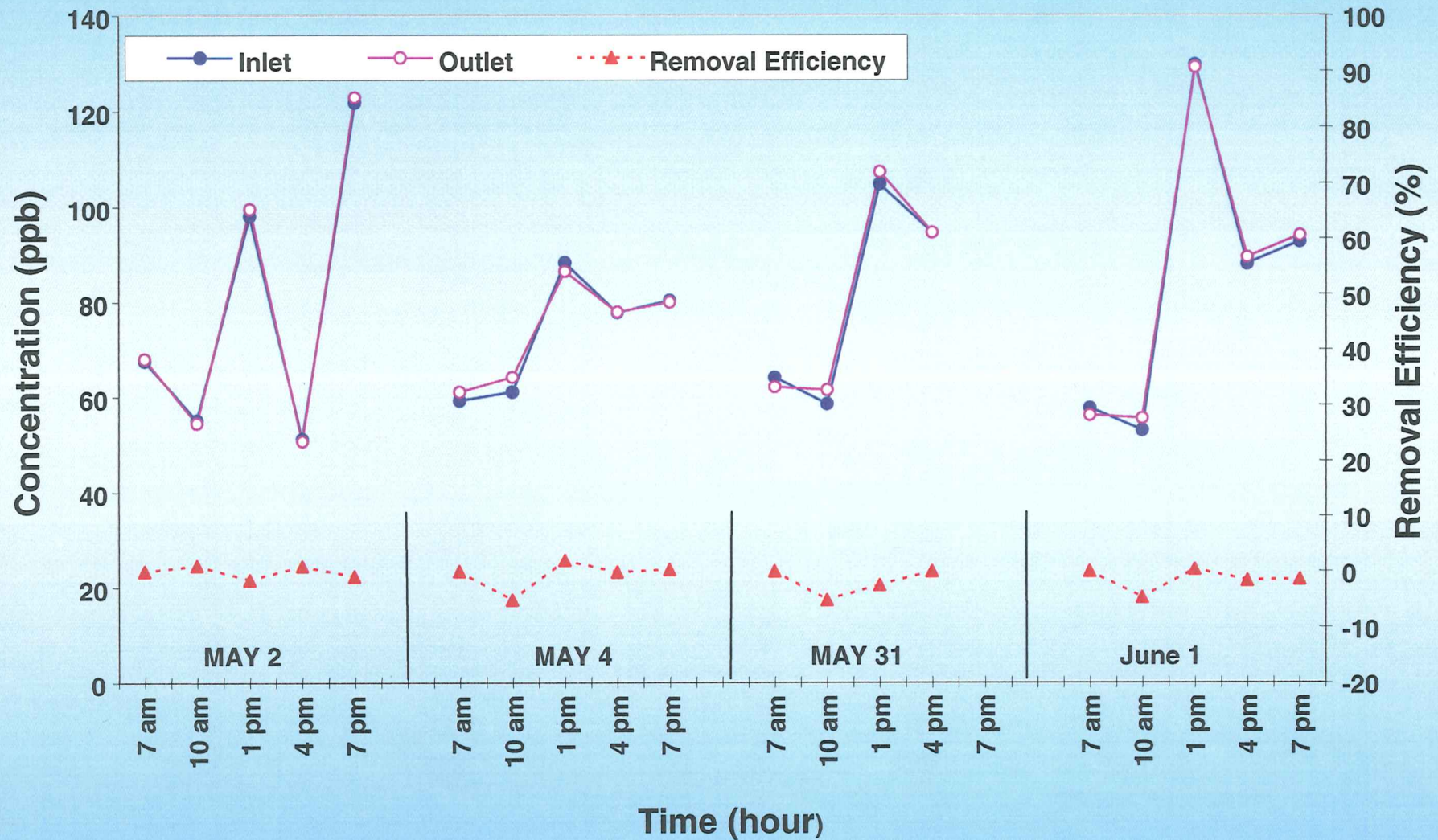


# Toluene Removal in Biofilter, Short-Term



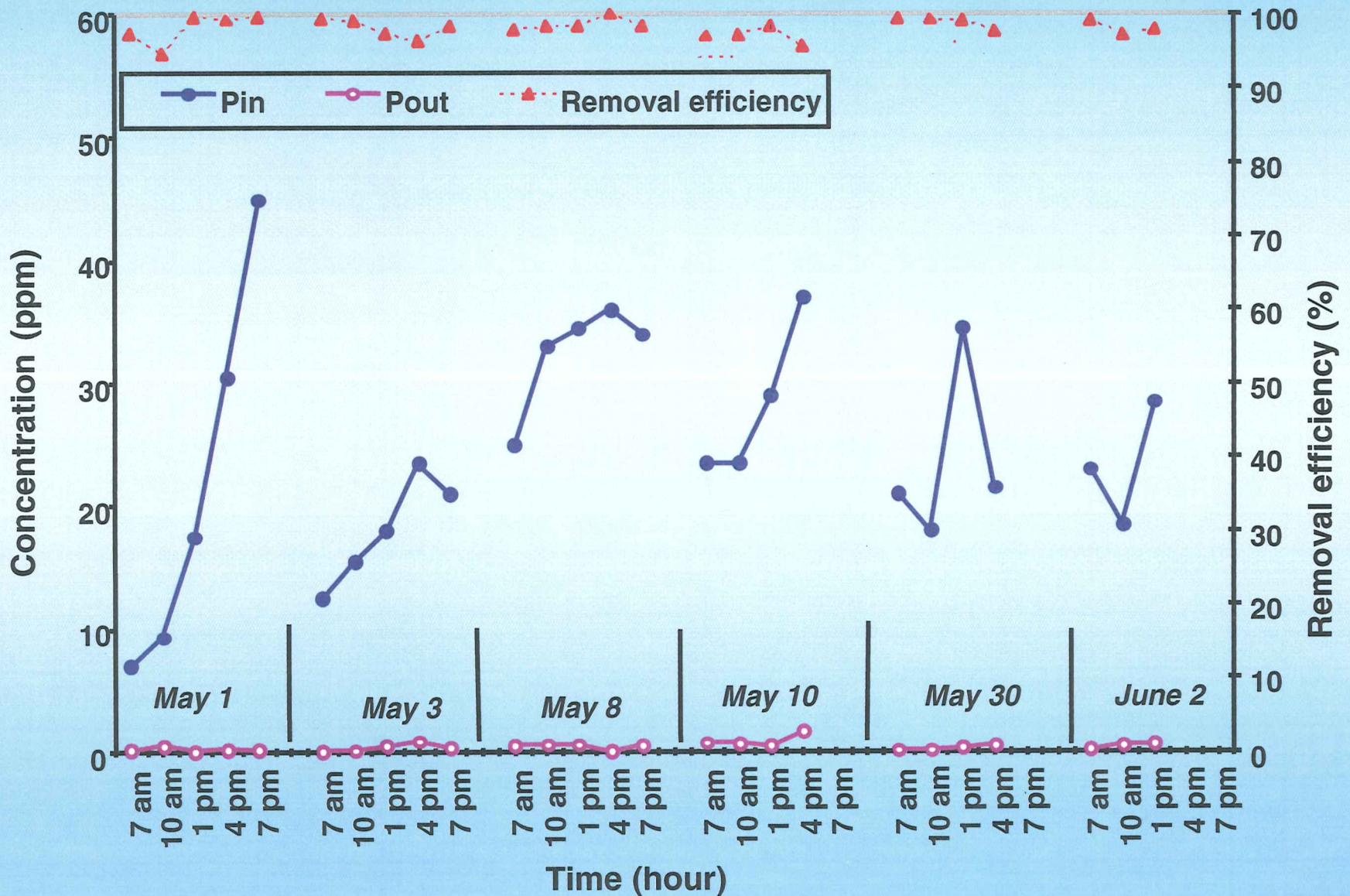


# PCE Removal in Biofilter, Short-Term



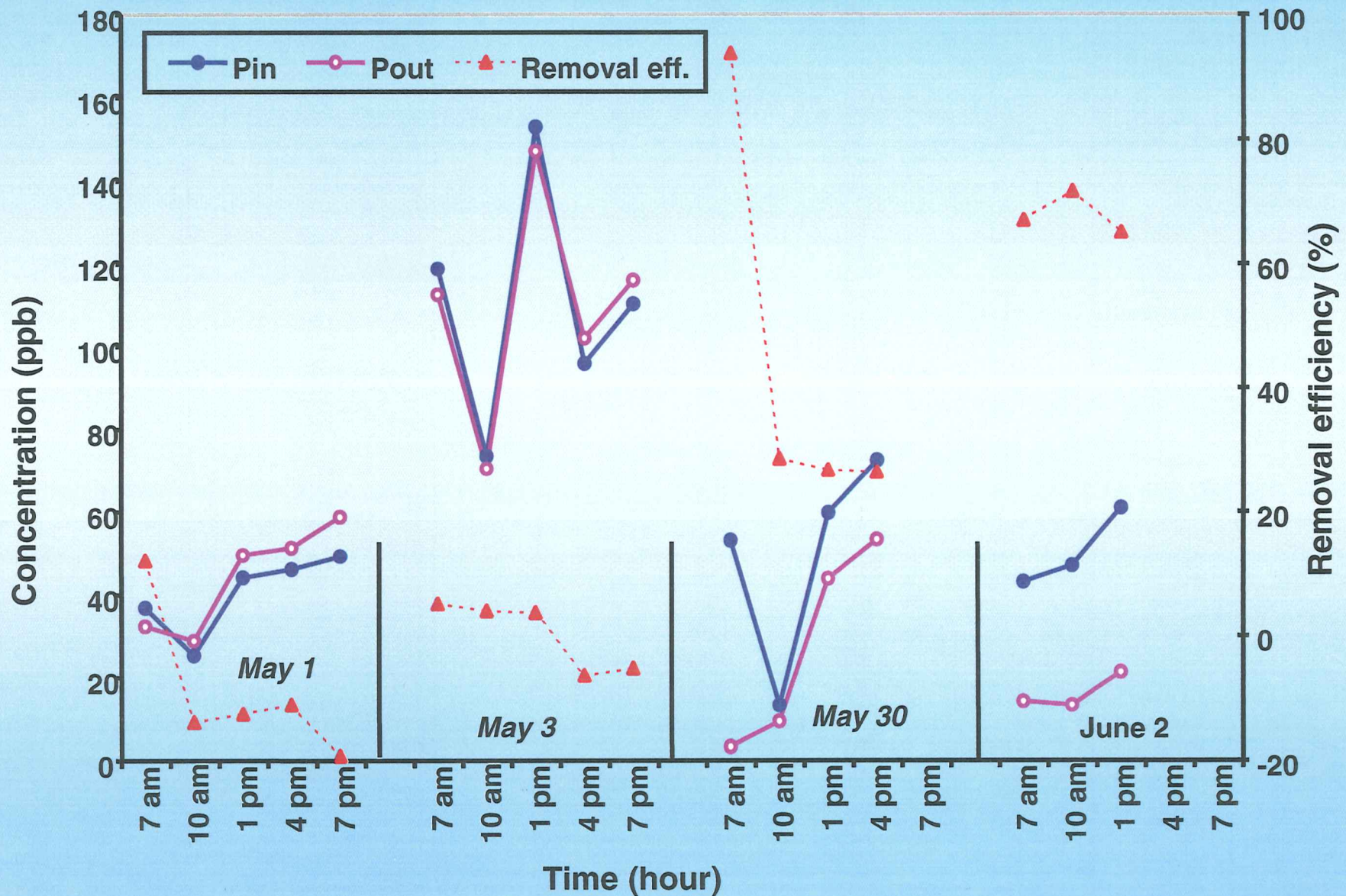


# H<sub>2</sub>S Removal in BT Filter, Short-Term





# Toluene Removal in BT Filter, Short-Term





## Benefits Till Now

- **Effective and simultaneous removal of odor and toxic VOCs in biofilters and biotrickling filters**
- **Less by-product waste**
- **Potential cost savings compared to wet scrubbers**
- **Increased Safety**
- **WERF grant + UCR contribution + UCD contribution + Consultants = **\$285,000****



# Benefits and Savings

## Future

~ **\$70,000** for each wet scrubber replaced  
+ less violations of VOC emissions

+ **increased safety** (less transport  
and storage of chemicals)



# Future Benefits

- 1. Implementation of full-scale Biofilters and Biotrickling filters at the collection system and plants**
- 2. Potential for reducing odors from sludge digestion and biosolids processes**
- 3. Potential savings: ~ \$70,000 for each wet scrubber replaced + less violations of VOC emissions**



# Publications/Presentation

## City Reports

- "H<sub>2</sub>S AND VOC Removal at Headworks Hyperion Treatment Plant" Interim Report I
- "H<sub>2</sub>S AND VOC Removal at Headworks Hyperion Treatment Plant" Interim Report II
- "Cost Study on Biofilter, Biotrickling Filter and Chemical Scrubber" Interim Report III

## Publications

- WEFTEC 2001
- AWMA 2001
- CWEA 2002, 2003
- USC – TRG 2002
- WEF Odors & Toxic Air 2002
- WERF Final Report 98-CTS-4
- Water Environment Research
- Water Research



# 2002-2003 Research Achievement Award L.A. Basin Section



Received on Jan 25/2003



# Project Team

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- **UC Davis:** Ed Schroeder & Brett Converse
- **WERF Technical Committee:** M.D. Aitken (University of North Carolina), D.S. Swanson (Washington County Service Authority), J.B. Dunson (Dupont Engineering), R. Pope (Malcolm Pirnie), M.T. Suidan (University of Cincinnati), & R. Brenner (U.S. EPA)



# Project Team

