

From Laboratory to Site;

# **Field Performance of Liquid Activated Carbon**

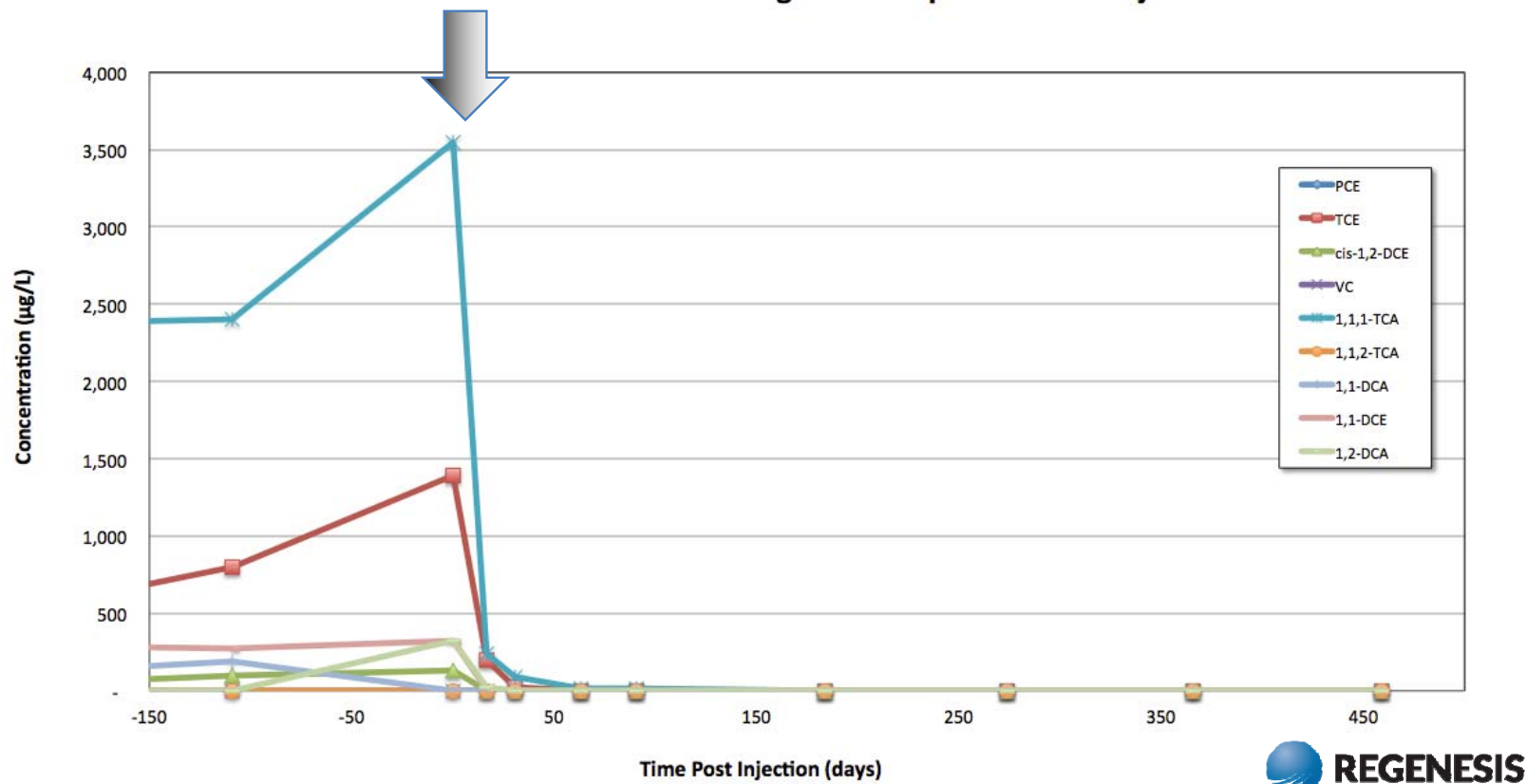
Lessons Learned from Multiple Sites and Geological Settings

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**REGENESIS**

# Introduction

- What is Liquid Activated Carbon?
- The effect of permeable and less-permeable zones
- Composite results from 24 sites across the US and EU
- Example sites;
  - Two flux zones
  - Running sands

VOC Groundwater Concentrations Following PlumeStop™ and HRC® Injection

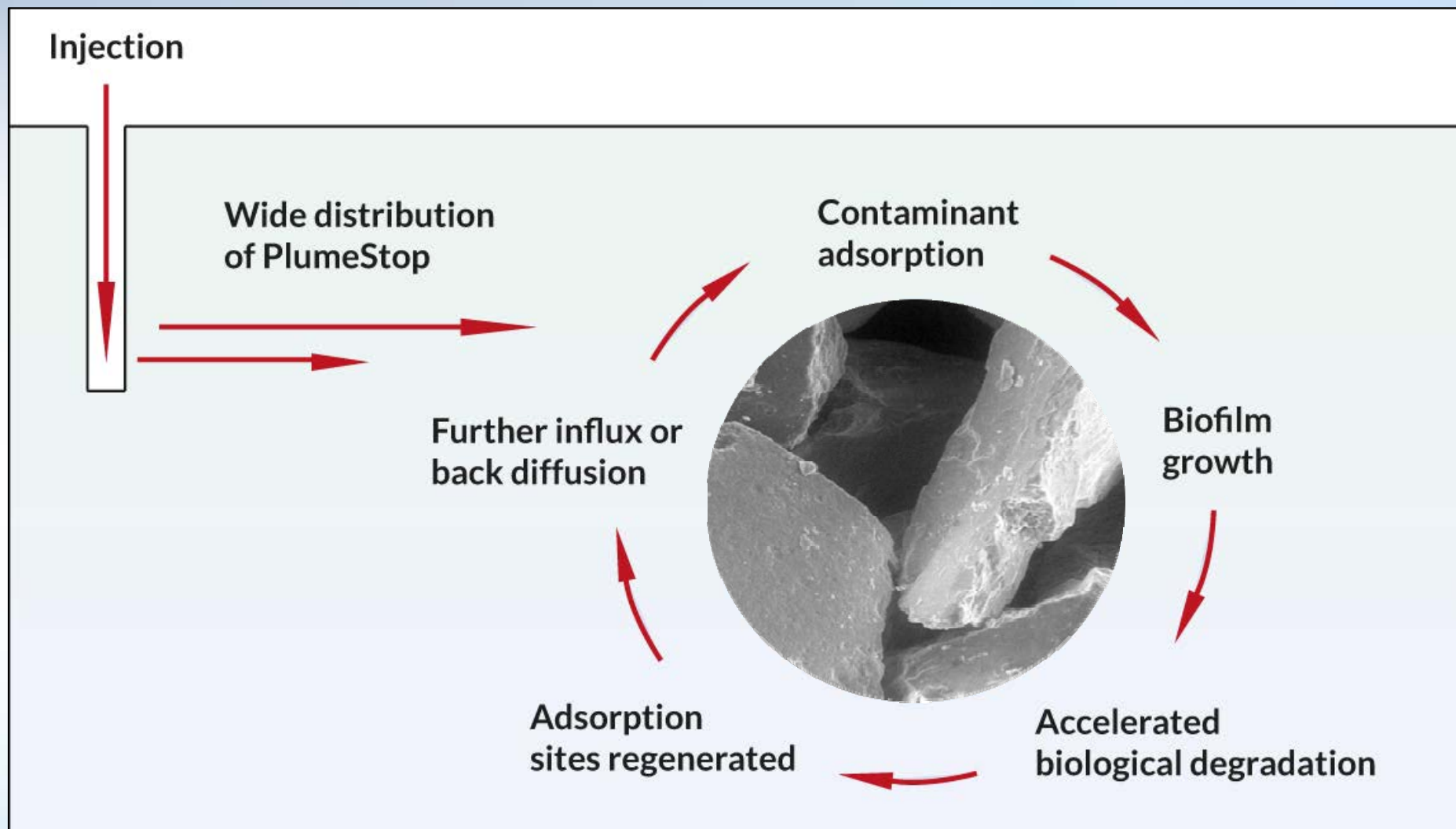


# Liquid Active Carbon

- Colloidal remediation agent
  - Liquid Activated Carbon
  - 1-2 micron colloids
  - polymer/dispersive agent
- Distributes widely in subsurface
  - No clogging pore-throats or clumping
- Adsorbs contaminants rapidly
  - Removed from aqueous phase
  - Concentrates contamination within biomatrix
- Accelerated biodegradation
  - Host to bacteria (biofilms)
  - Close contact with sorbed contaminant
- Rapid and sustained contaminant destruction
- Very low targets achieved

**PLUME** **STOP**<sup>TM</sup>  
Liquid Activated Carbon



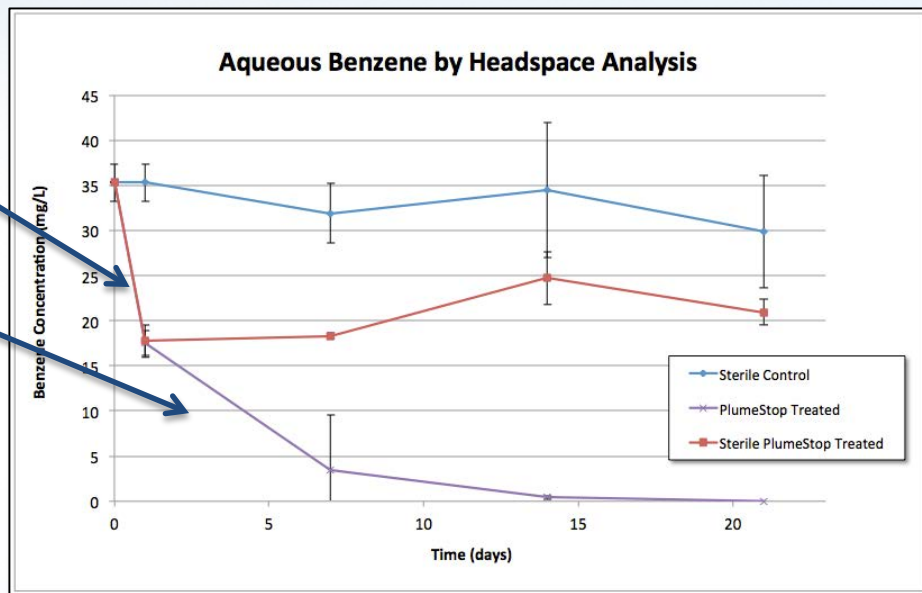


# Combined Adsorption and Biodegradation

Equal sorption in both  
PlumeStop treatments  
<1 day

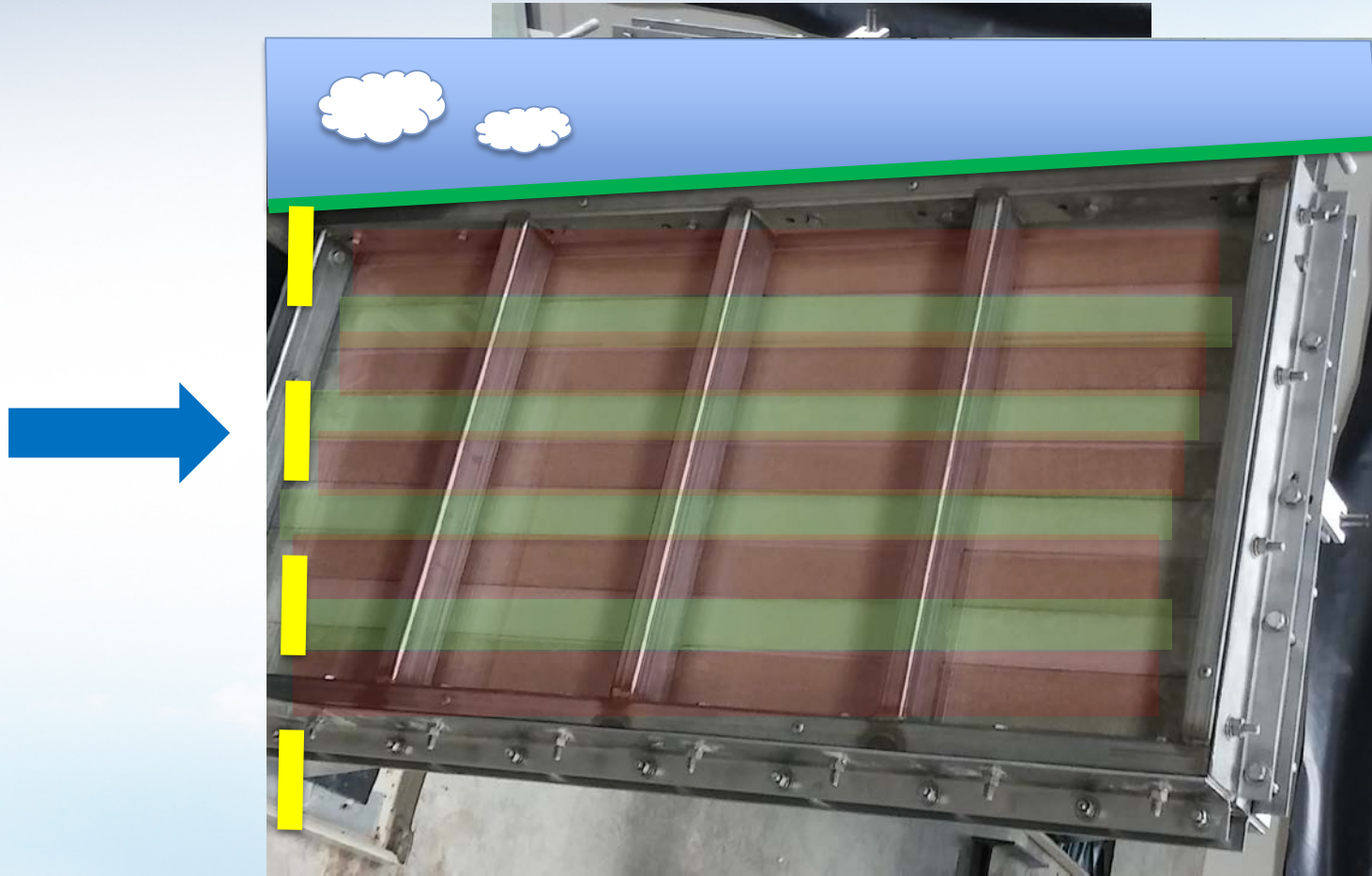
Ongoing drop in live  
PlumeStop treatment  
vs. sterile PlumeStop

Due to Biological Degradation





# PlumeStop Installation into Contaminant Flux Zones - Model



# PlumeStop Installation into Contaminant Flux Zones - Model





# PlumeStop Installation in Contaminant Flux Zone - Field

Low permeability  
Low contaminant flux

High permeability  
High contaminant flux

Low permeability  
Low contaminant flux

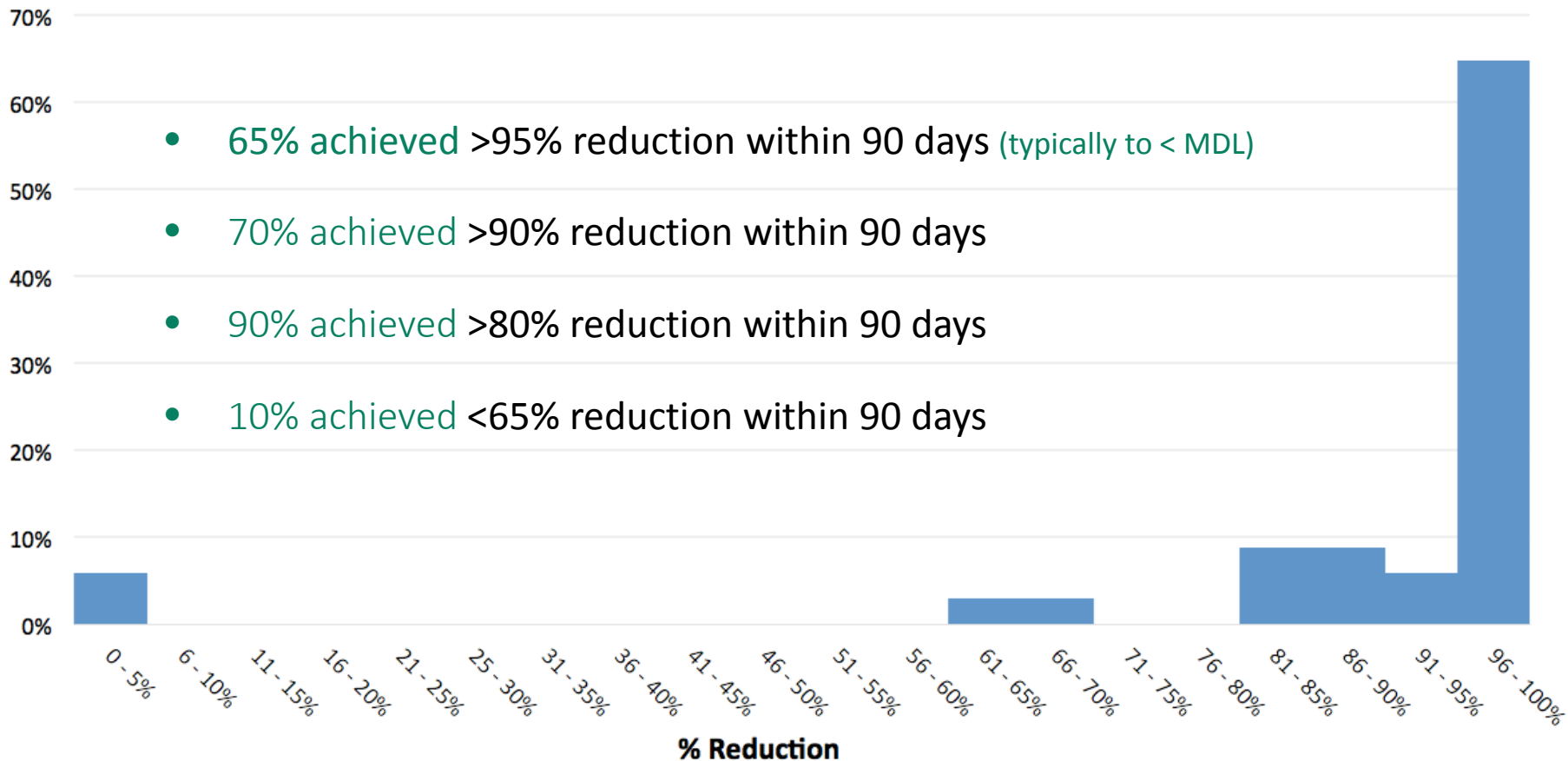


PlumeStop  
installed

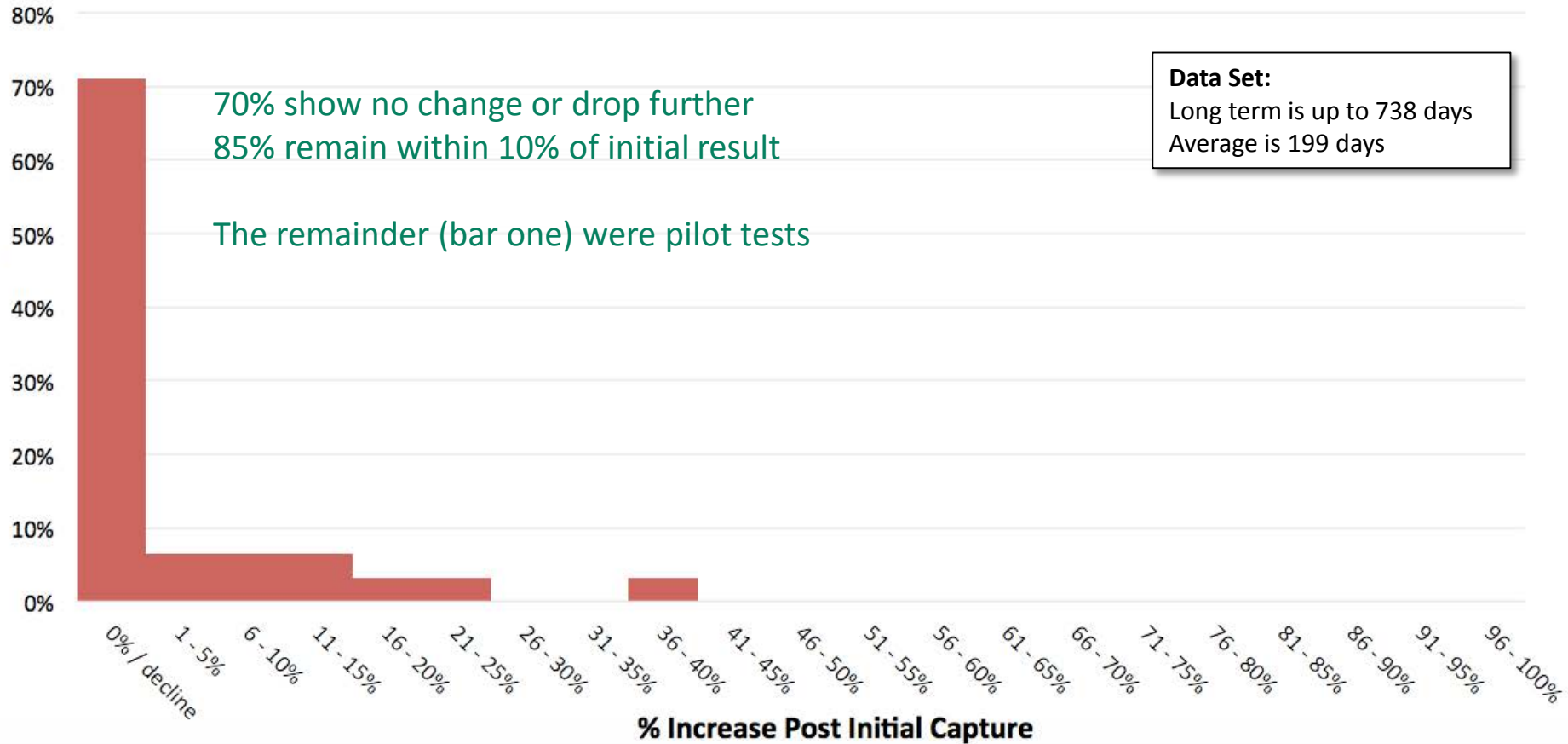
# PlumeStop Applications – May 2016



## PlumeStop Site Performance - Target Well Reductions First 1 - 3 Monitoring Rounds (n = 34)

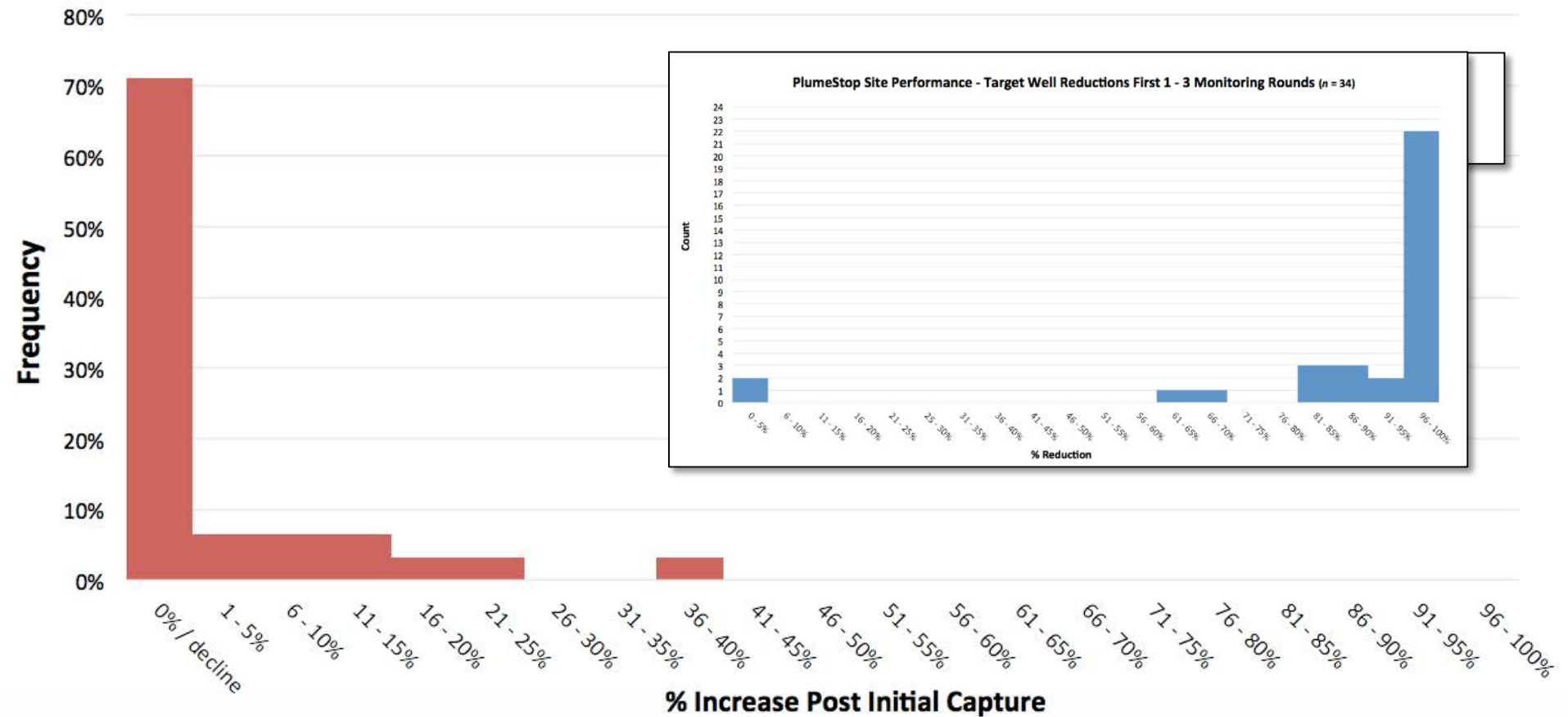


## PlumeStop Long Term Performance - April 2016 ( $n = 31$ )



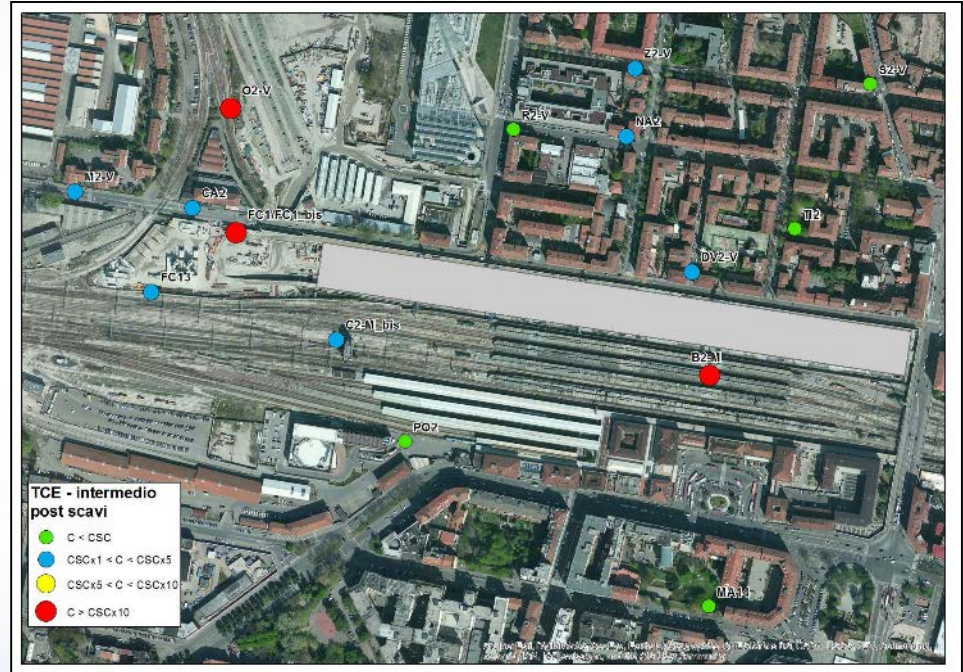


## PlumeStop Long Term Performance - April 2016 ( $n = 31$ )



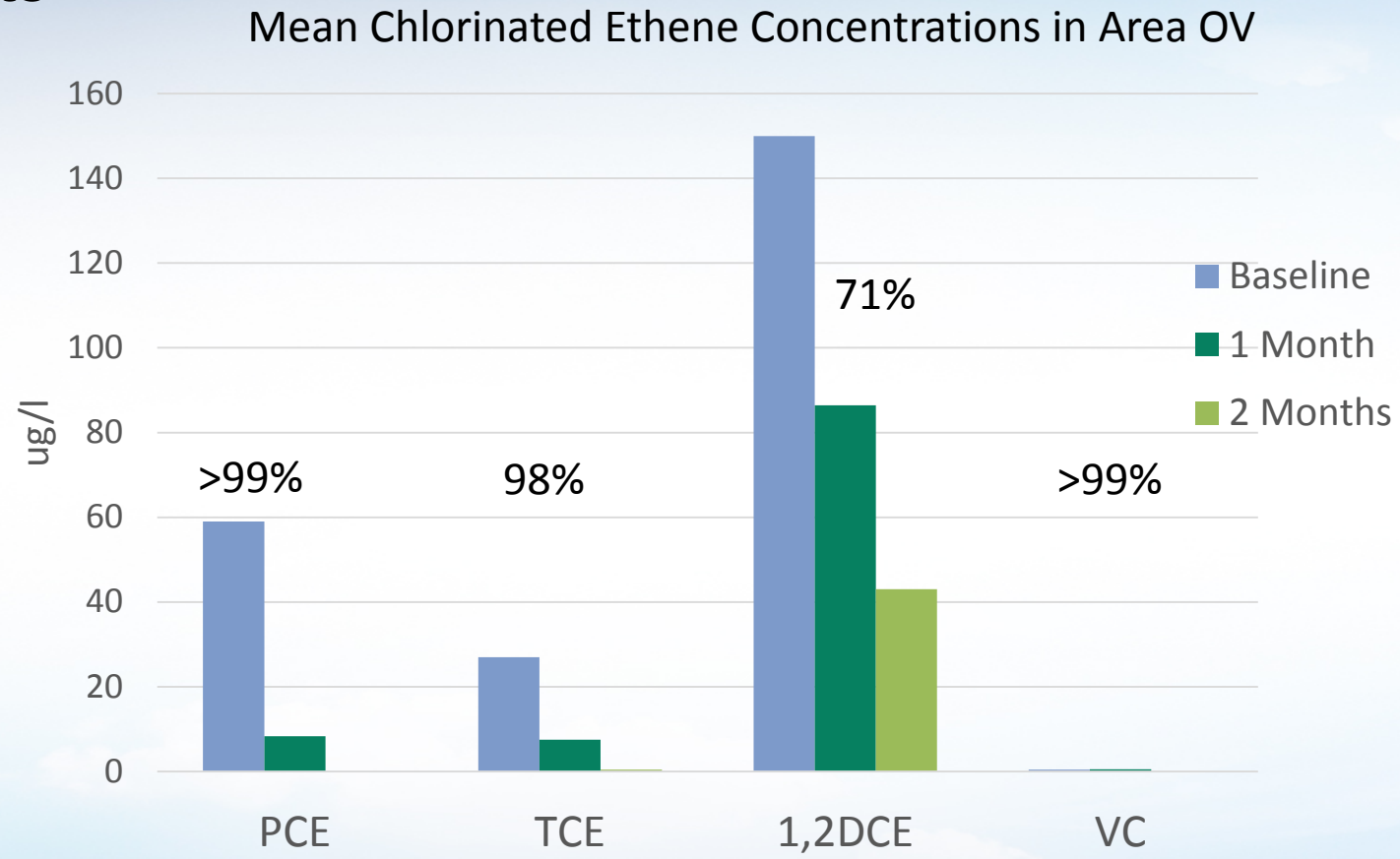
# Case Study Focus - Two Treatment Layers

- Widespread CHC plume under train station
- Low concentrations; approx. 100ug/L
- Complex alluvial formation
  - Shallow Fine Sand + Silt
    - Low seepage velocity
  - Silty clay aquatard
  - Deeper Fine to Med Sand
    - High seepage velocity
- PlumeStop with HRC
- Hot Spot treatment
- Second phase



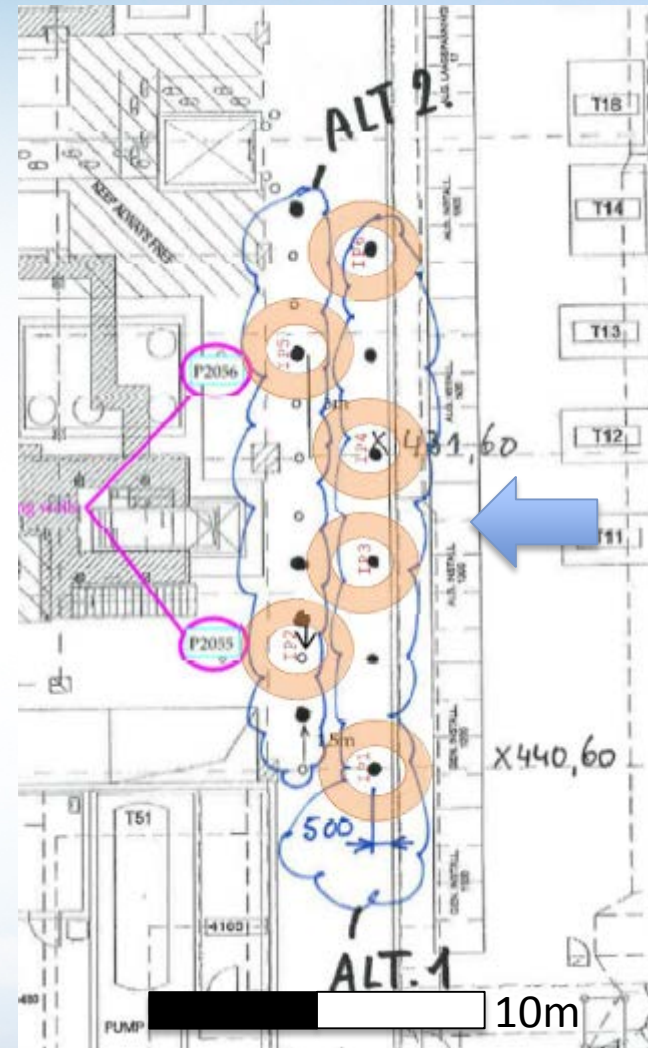


# Results



# Case Study Focus – Sand and Services

- Active car manufacturing plant, Ghent
- Contaminants of Concern;
  - BTEX –Range from  $9\mu\text{g/L}$ - $18,000\mu\text{g/L}$
- Geological Setting;
  - Fine (running) sands
  - Footings, services lines
  - Groundwater velocity; 10-20m per year
- Pilot study (complete)
  - prior to full scale barrier application (2017)

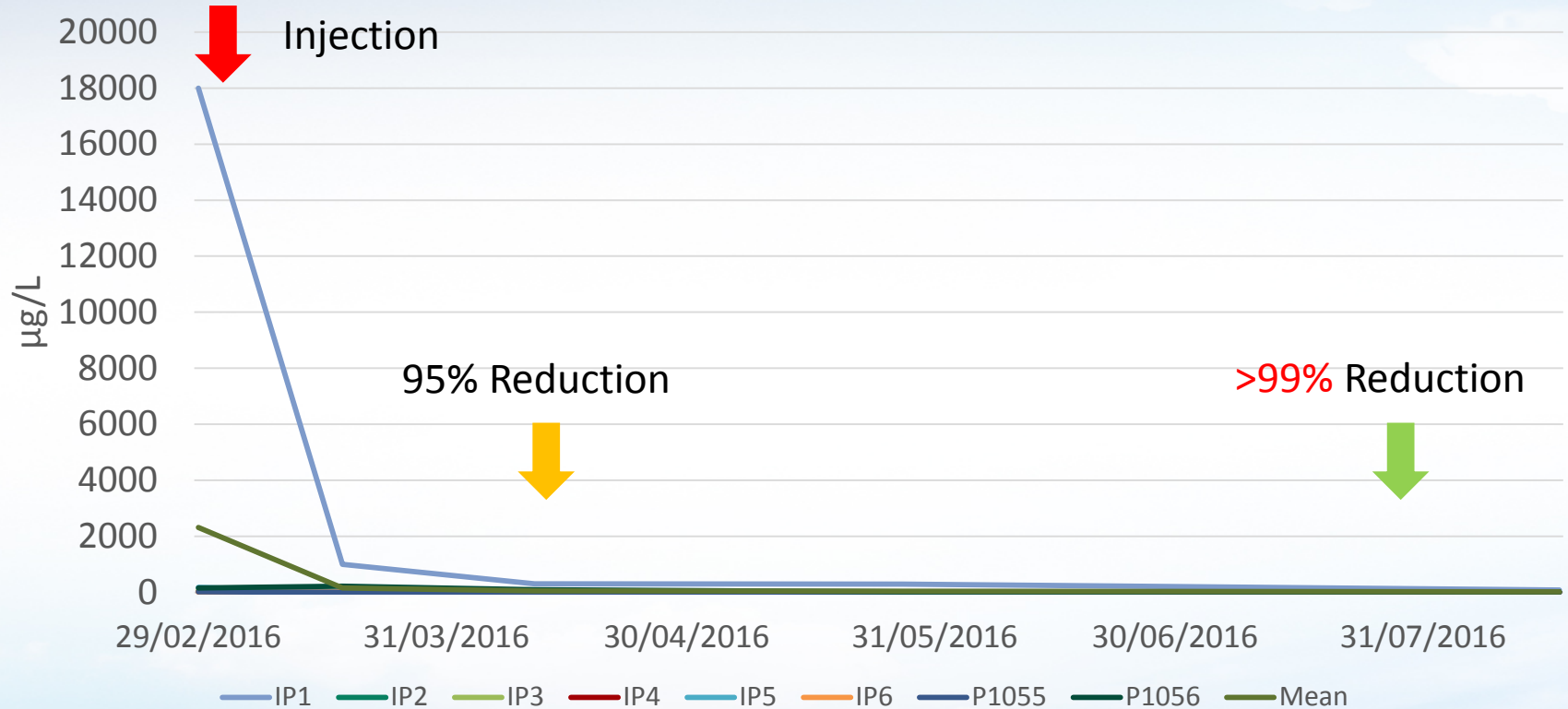


# Field Application

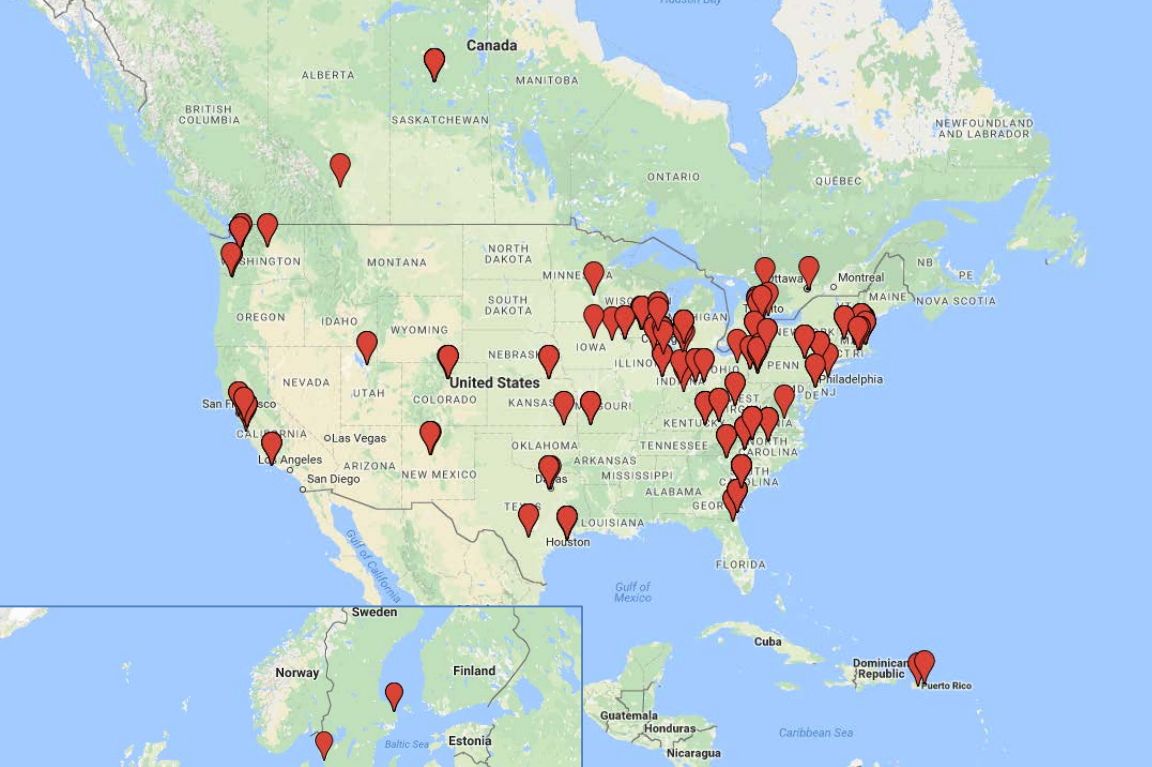


# Results

## Total BTEX Concentration Over 6 Months Following Application







Thank You!

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