# Bioaugmentation of Chemours Chambers Works AOC1 Inactive Locations

Daisy A. Hernandez[1], Haider Al Mnehlawi[2], Rachel Dean[2], and Donna E. Fennell[2]

[1]Department of Biological Sciences, California State Polytechnic University, Pomona, CA;

[2]Department of Environmental Sciences, Rutgers University, New Brunswick, NJ

## Introduction

The goal of this study was to determine if bioaugmentation could be used to enhance biodegradation of pollutants at biologically inactive locations at a large contaminated site. The industrial site, Chambers Works, is located along the eastern shore of the Delaware River in New Jersey. The project focused on the degradation of aniline under aerobic conditions and anaerobic dechlorination of tetrachloroethylene (PCE) and trichloroethylene (TCE). This study is important for providing site managers at Chemours Chamber Works with information on the most effective and efficient ways to remove the contaminants that have been found on the site for the past century. This project falls under the GET UP thrust: energy management systems for civil structures and sustainable energy generation, conversion/remediation, and storage.

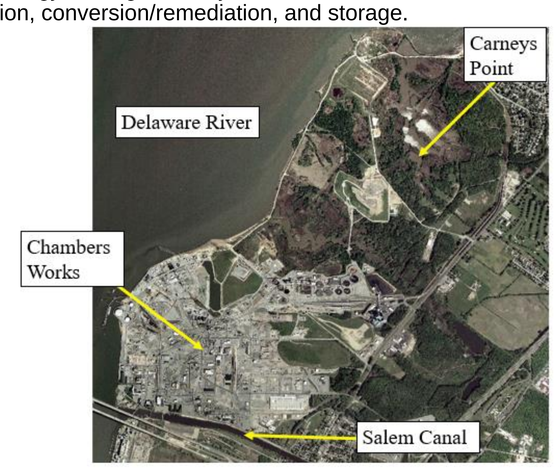


Fig 1. Site map of Chemours Chamber Works

## Methods

- After months of inactivity, anaerobic microcosms with anaerobic minimal growth medium, PCE, TCE, and sediment from the Chemours site were bioaugmented with *Dehalococcoides* to initiate dechlorination (Fig 3).
- Aniline degrading bacteria were grown using sealed culture bottles with minimal growth medium, aniline, and sediment from the Chemours site (Fig 2) and were isolated on aniline agar plates (Fig 4).
- Degradation of aniline and lactic acid was monitored using high performance liquid chromatography (HPLC), while dechlorination of PCE and TCE was monitored using gas chromatography-flame ionization detection.

Fig 2. Aerobic bottles

Fig 3. Anaerobic bottles

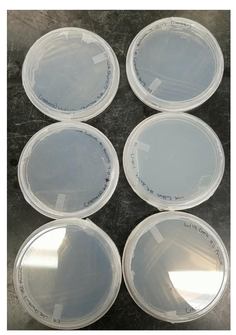

Fig 4. Aniline agar plate

## Results

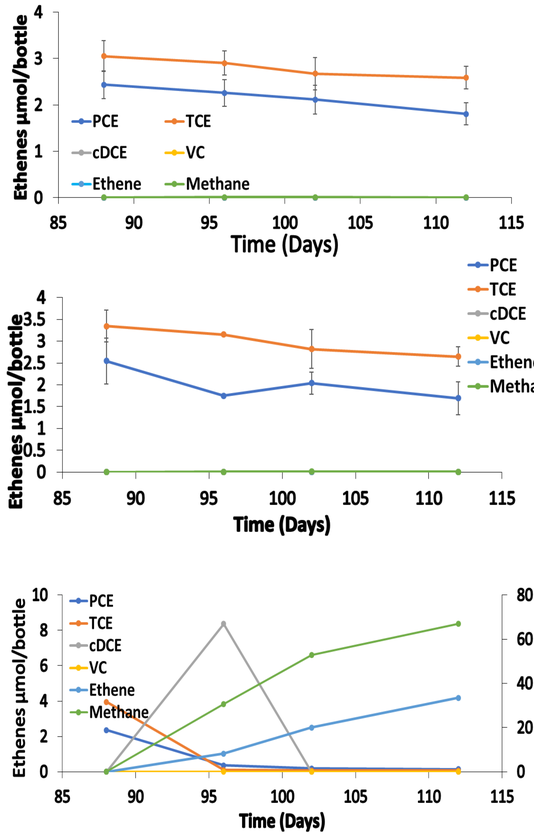


Fig 5. PCE, TCE and their dechlorination byproducts in (A) killed, (B) live and (C) bioaugmented treatments.

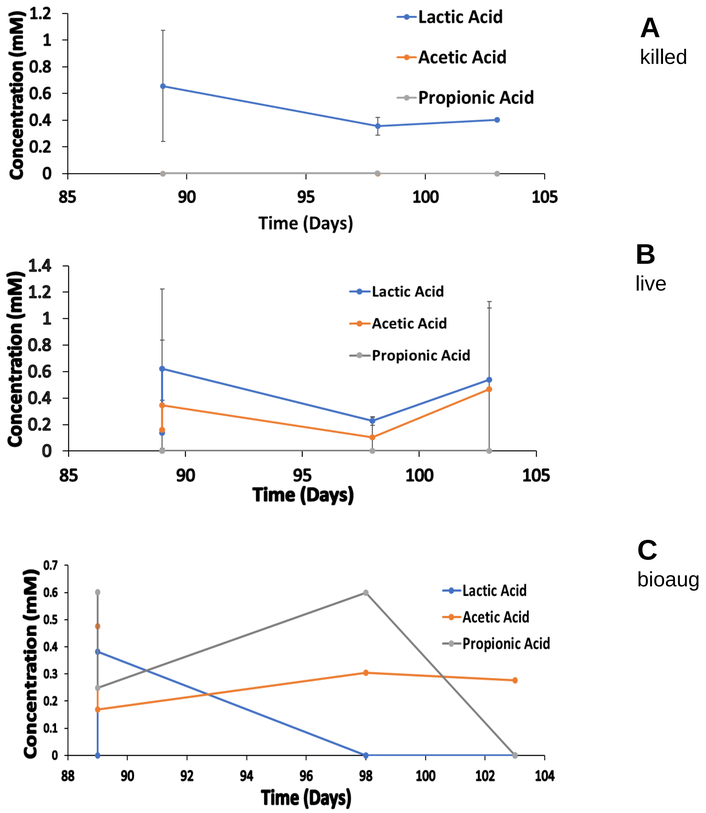


Fig 6. Concentration of lactic acid and its metabolic byproducts in (A) killed, (B) live and (C) bioaugmented treatments.

## Conclusions

- No dechlorination of PCE/TCE by intrinsic bacteria was observed.
- Some fermentation of lactic acid was observed in live bottles.
- PCE and TCE were dechlorinated completely to ethene, and lactic acid was completely degraded to metabolic byproducts, in bottles bioaugmented with a mixed culture containing *Dehalococcoides*.
- This was conclusive with previous studies (Lendvay et al. 2003) describing bioaugmentation success.

## Future Work

- Inactive aerobic aniline Chemours microcosms will be bioaugmented with aniline degrading isolates obtained from this study.
- To get a better estimate of error and precision and reduce variability, future projects should be executed with an increased number of replicates.
- A field study could be performed at the Chemours site to determine bioaugmentation effectiveness with *in situ* temperature and geochemistry.

## References

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