

U.S. Environmental Protection Agency



USEPA Capabilities and Directions to Advance Innovative Remediation Technologies

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1

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Selected Remediation Technologies of the Sustainable & Healthy Communities National Research Program

Outline

- Arsenic Remediation in Groundwater
- Geochemical Tracers for Groundwater Remediation
- Biochar-laden Vertical Wetland to Adsorb Metals
- Managing Plume Back Diffusion

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2

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Arsenic Remediation in Groundwater

- EPA Report: Investigation of a Sustainable Approach to In-situ Remediation of Arsenic Impacted Groundwater ([EPA/600/R-19/102](#))
- Collaborative work between ORD, EPA Region 2, and Army Corps of Engineers
- Large-scale pilot testing of air sparging in low-pH, Fe(II) groundwater – Vineland Superfund Site (NJ)



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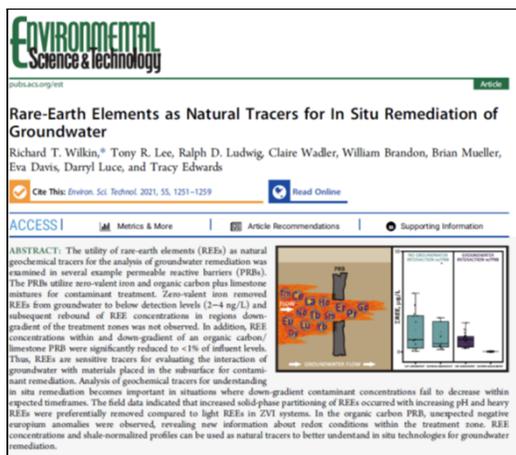
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3

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Geochemical Tracers for Groundwater Remediation

- Journal Article: Rare Earth Elements as Natural Tracers for In Situ Remediation of Groundwater
[Wilkin et al. \(2021\). ES&T, p. 1251-1259.](#)
- Collaborative effort between ORD, EPA Region 1, & EPA Region 6
- Provides a tool for evaluating groundwater interaction with reactive materials and for understanding remedy failures/delays



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4

4

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Biochar-laden Vertical Wetland to Adsorb Metals

- Passive adsorption of high metal concentrations in very acidic MIW with biochar

Vertical wetlands schematic with biochar used as a substrate

Column reactors used for MIW treatment

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5

5

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Managing Plume Back Diffusion

- Journal Article: Strategies for Managing Risk due to Back Diffusion.
Brooks et al. (2021). *GW Monitor & Remediation*, p. 1-23.

Summary of strategies and treatments to address plume persistence due to back diffusion. Implementation cost/difficulty and remedial performance, generally increases from left to right.

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6

6

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References

- North, T., Sehayek, L., Wilkin, R., Cutt, D., Klaber, N., and Young, H. (2019). Investigation of a sustainable approach to in-situ remediation of arsenic impacted groundwater, EPA Report, EPA/600/R-19/102, 59 pp.
- Brooks, M.C., Yarney, E., and Huang, J. (2021). Strategies for Managing Risk due to Back Diffusion. Groundwater Monitoring and Remediation, v. 41(1), p. 76-98.
- Wilkin, R.T., Lee, T.R., Ludwig, R.D., Wadler, C., Brandon, W., Mueller, B., Davis, E., Luce, D., Edwards, T. (2021). Rare-earth elements as natural tracers for in-situ remediation of groundwater. Environmental Science and Technology, v. 55, p. 1251-1259.

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