ElectroChemical Arsenic Remediation

ECAR

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Outline

• Arsenic problem in the U.S.
• ECAR- a novel solution
• Demonstration project in India
• Future of ECAR
• Q&A
The Arsenic problem in the United States

**Private wells:** An estimated 2.1 million people are exposed to Arsenic at levels above the EPA Maximum Contaminant Limit of 10 part per billion (ppb). Source: USGS 2017

**Public water systems:** As of 2014, 538 public water systems had an arsenic MCL violation. Assuming these systems serve a maximum of 10,000 people this means at most 53.8 million people exposed. Source: EPA 2015

**Importance of regulation:** Columbia University School of Public Health finds that compliance with EPA regulation has led to a decline of 17% in levels of urinary arsenic. Source: The Lancet Public Health
Arsenic presents the highest lifetime cancer risk of any regulated carcinogenic water contaminant.
ECAR the solution - how it works

Dissolved Fe(II)  
Aqueous As(III)  
Aqueous As(V)  
Fe(III)(oxyhydr)oxides
Prototype Progression: 2006

(Bench-top Research in a 1-L beaker)

Berkeley, 2006
Prototype Progression: 2010
(Small-scale 100-L reactor)

West Bengal, 2010
Prototype Progression: 2013

(J practical-scale 600-L reactor)

Jadavpur University, West Bengal, 2013
Prototype Progression: 2016

(Large-scale 2,000-L reactor)
Current pilot plant operating in West Bengal, India
Results from pilot plant from April 2016 to Jan 2017

Initial Arsenic Concentration: \(252 \pm 29\) parts per billion (ppb)

Environmental Protection Agency - Max Contaminant Level: 10 ppb

Average: 2.9 ppb
Future of ECAR

1. **Next Generation**
   - Increase output (sufficient for small water systems in the U.S.)
   - Shrink footprint

2. **Demonstration plant in Allensworth, California**
   - Prove that ECAR is robust with different groundwater matrices and that it can be a cost competitive technology in the U.S. water market
Current team members - UC Berkeley

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Thanks!

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