Impact of Dissolved Silicate on Uptake of As(III) by FeS-coated Sand
Under Anoxic Conditions (SERDP Project CU 1375)

Young-Soo Han, Avery H. Demond and Kim F. Hayes
Department of Civil and Environmental Engineering, University of Michigan, Ann Arbor, MI

INTRODUCTION
As part of SERDP Project CU 1375, FeS-coated sand is being evaluated for removal of As(III) from groundwater under anoxic conditions. When FeS-coated sand proposed as use as a permeable reactive barrier (PRB) material, dissolved Si is present. Dissolved Si has been noted to reduce the sorption of arsenic using sorbents targeted to remove arsenic under oxic conditions, (e.g., iron oxides and activated carbon [Roberts et al. 2004, Gu et al. 2005]). However, it has yet to be demonstrated whether dissolved Si hinders the removal of As(III) by FeS under anoxic conditions. This study reports on the impact of dissolved Si on As(III) uptake by FeS.

METHODS AND RESULTS
1. FeS-Coated Sand

The unmodified natural sand surface was optimally coated at pH 5.5 using 2g/L FeS suspensions yielding a coating of 4.0 mg FeS/g-sand as the highest coating amount measured by HCl-HNO3 extraction.

2. Surface Characteristics of FeS-Coated Sand (KPS)

3. Dissolved Silicate Concentration with varying pH

4. Effect of Dissolved Silicate on As(III) uptake on FeS (Mackinawite)

5. Effect of Dissolved Silicate on As(III) Uptake on FeS-coated Sand (pH9)

CONCLUSION
No impact of dissolved silicate on sorption to mackinawite. In the presence of dissolved silicate, As(III) uptake by FeS-coated sand can be impacted by iron-oxide due to competitive sorption.

REFERENCES

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Graphs and figures are included to illustrate the findings and methods used in the study.