Leach Test Results: 

- After a period of three months of injection under anaerobic conditions, fully aerobic groundwater was passed through two columns for five months. Only 3% of the sequestered As was dissolved after 116 pore volumes of aerobic groundwater had passed through one of these columns for a period of five months.
- The results of the column studies demonstrated that a gradual shift towards more reducing conditions is resistant to dissolution under aerobic conditions.

Task 2—Field Pilot Demonstration

Successful sequestration of As in the lab-scale column studies led to implementation of a small-scale (30 ft x 30 ft) field plot in the surficial aquifer (5 to 15 feet below land surface) at Site ST-65:

- A groundwater recirculation and electron donor amendment system modeled after the column studies was installed at the Site in order to control groundwater movement and effectively deliver amendments within the treatment zone. The treatment zone was equilibrated for one month with natural groundwater from the Site.
- GW amendments included sodium sulfate, ammonium phosphate, ethanol, sodium lactate, ferrous iron and sulfate. The addition of column sediments indicated the presence of As-bearing sulfides, including arsenopyrite and realgar. Aerobic water was then passed through one of these columns for a period of five months. Only 3% of the sequestered As was dissolved. A decreased frequency of amendment doses between August and September was observed. A second spike (July 2008) is pulling in dissolved As from locations outside the test plot on a continuous basis.

Task 1—Laboratory-Scale Column Studies

Columns packed with sediment collected from Site ST-65 were added during the final injection to target arsenic sulfides. A small-scale field demonstration for this technology was initiated at Site ST-65 in April 2008. Measurements of geochemical parameters in Site groundwater indicated that groundwater is naturally reducing. Subsequent monitoring wells (MW-1 through MW-4) were used to construct four flow-through columns for a bench-scale laboratory study conducted at Princeton University.

Sulfide precipitation was concentrated in the lower 14 cm of the column #1 where nutrients were entering from below. Similar profiles were observed on the other columns.

Aerobic water was then passed through two of these columns for five months. Only 3% of the sequestered As was dissolved after 116 pore volumes of aerobic groundwater had passed through one of these columns for a period of five months. Only 3% of the sequestered As was dissolved. Aerobic water was then passed through one of these columns for a period of five months. Only 3% of the sequestered As was dissolved after 116 pore volumes of aerobic groundwater had passed through one of these columns for a period of five months.

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Samples collected over the course of the pilot study indicate successful amendment distribution, precipitation of As, and co-precipitation of SO4.

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