Surfactant-Enhanced Aquifer Remediation at the Portsmouth Gaseous Diffusion Plant[1]

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Abstract

During the period July to early October 1996 INTERA has conducted a partitioning tracer test to measure the volume of dense, nonaqueous phase liquid [DNAPL] in a shallow alluvial aquifer at the Portsmouth Gaseous Diffusion Plant in southern Ohio and a surfactant flood to remove the DNAPL from the aquifer. This work was conducted in collaboration with the environmental remediation group of Lockheed Martin Energy Service at PGDP, the University of Texas and SUNY.

The partitioning interwell tracer test [PITT] measures the volume of DNAPL in the volume of the subsurface pore space known as the swept volume. This same swept volume was subjected to surfactant flooding during September and then to another partitioning tracer test to determine the volume of DNAPL left in situ. In this sense, the partitioning tracer test acted as a performance assessment of the surfactant flood. The DNAPL is principally composed of trichloroethene or TCE.

The PITT conducted in July produced the following results:-

- the average residual TCE saturation in the swept volume is in the range of 0.2% to 0.4%;
- the volume of TCE in the swept volume is of the order of 5 to 10 gallons;
- the swept volume is approximately 200 ft^3 or approximately 1500 gallons;
- the TCE DNAPL is confined to the lower gravel unit of the Gallia formation; and
- the presence of DNAPL in the lower gravel indicates that the DNAPL moved into the area laterally rather than from

[1]Research sponsored by the U.S.Department of Energy's Morgantown Energy Technology Center, under Contract DE-AC21-92MC29111 with INTERA Inc., Suite 300, 6850 Austin Center Blvd., Austin, TX 78731.

above.

The surfactant flood was conducted in September over a period of 5 days using a 4% surfactant + 4%alcohol + 0.2% electrolyte solution. It was injected and extracted in the same manner as was the PITT. Results of both partitioning interwell tracer tests and the surfactant flood will be presented at the October annual contractors meeting in Morgantown.

Acknowledgments

We wish to acknowledge the assistance and advice from Dr. Kelly Pearce of METC, our contractor officer's technical representative over the past year, and the continuing help of Lynn Kantner, Tom Houk, Frank Anderson and Tullus Crawford at PORTS.