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HYDROGEOLOGICAL CHARACTERIZATION OF A BANK FILTRATION EXPERIMENT SITE AT THE RIO GRANDE, EL PASO, TEXAS, USA.

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An experiment site was constructed along an artificial channel of the Rio Grande in El Paso, Texas. The experiment was funded by the EPA and is designed to measure the effectiveness of bank filtration in an arid environment. Regionally, the experiment is important because of the hundreds of thousands of people drinking water from shallow wells drilled in close proximity to septic systems. A pumping well was drilled 17 meters from the stream bank and screened from 3.5 to 8 m depth. A cruciform array of observation wells with several multilevel completions allows detection of downstream and vertical movement of water as well as flow from the stream to the well.

All of the wells were continuously cored during drilling. Analysis of the cores reveals that the site consists of two stacked channels filled with sand deposited from the meandering Rio Grande. A grid of ground-penetrating radar lines provided three-dimensional coverage between wells and showed bedding to 6.5 m depth. Constant head hydraulic conductivities show that the aquifer consists of two more permeable units separated by the less permeable upper fill of the lower channel complex, with vertical hydraulic conductivities of (1x10-6 to 2x10-6 m/s?). The intervals above and below this interval have the highest vertical conductivities (up to 3.5x10-5 m/s).

A multiple pumping and tracer test was conducted using the cruciform array of the field site that consisted of a pumping well, 16 observation wells, and a stream sampling point. The average hydraulic conductivity of the geological media at the field

site was about 2 x 10-3 m/s based on pumping test analysis. However, the type curve responses revealed significant heterogeneity of hydraulic conductivity throughout the field site. For the tracer test, bromide and microspheres were used as tracers. Microspheres were used to mimic the behavior of Giardia and Cryptosporidium. The tracers (bromide and microspheres of different sizes and colors) were injected in one observation wells screened into the riverbank, one observation wells screened into the geological medium at the field site, and into one piezometer pushed into the stream sediments within the stream. The bromide recovery in the pumping well and in the deeper observation wells showed an early and a late peak with a long tail indicating the possibility that the geological medium at the field site behaves like a double-porosity medium allowing the tracer to move relatively quickly through the higher conductivity units while being significantly retarded in the low hydraulic conductivity units. The analysis of the microspheres in the laboratory, which is not yet complete, will shed more light on the transport behavior of pathogens at the field site.