This article is titled Quantification of aerobic biodegradation and volatilization rates of gasoline hydrocarbons near the water table under naturally attenuation conditions and is written by Matthew Lahvis, Arthur Baehr, and Ronald Baker. Lahvis received his Ph. D. in Civil Engineering from Drexel University and now does research and development for Shell. Baehr received his Ph. D. in Civil Engineering from University of Delaware and has taught as a professor at several universities and now works as a hydrologist for the USGS. Ronald Baker also works for the USGS.

This study investigated a gasoline spill in Beaufort, NC that resulted from a leaking underground storage tank at a gas station. The gasoline plume was left under natural attenuation conditions meaning that aside from monitoring, no remediation efforts were performed. The goal of this study was to calculate the extent at which the various hydrocarbons in the gasoline plume were volatilizing and to find out how much of the volatilized constituents were being degraded by microorganisms.

When gasoline leaks out of an underground storage tank it tends to infiltrate through the soil until it reaches the water table at which point it floats on the water. It then volatilizes upwards into the unsaturated zone where it is aerobically degraded by microorganisms.

At the spill site in Beaufort SC, vapor wells were installed above the plume and measurements of the gaseous-phase concentrations of CO2, O2, and various hydrocarbons were taken. It was found that the concentration of hydrocarbons and CO2 decreased with distance above the water table and the concentration of O2 increased with distance above the water table. Using this data, a mathematical model was developed to simulate concentrations of constituents at different depths in the soil, and to calculate volatilization and biodegradation rates.

When hydrocarbons are aerobically degraded, oxygen is used up and carbon dioxide is produced. Knowing this, and using their modeled data for oxygen, carbon dioxide, and hydrocarbon concentrations, biodegradation rates were calculated.

It was found that biodegradation rates decreased with distance above the water table and that rates were highest in the capillary zone, where 68% of the total hydrocarbon mass that volatilized from the water table was estimated to have been biodegraded. All hydrocarbons were nearly completely degraded within 1 meter above the water table.