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BIOREMEDIATION AND LOW PH

Microbes can survive over a wide range of pH values, but most microbes that are commonly active in bioremediation grow optimally at pH values between 6.5 and 8.5. Bacteria that are active in reductive dechlorination such as Dehalococcoides can be very sensitive to low pH. Activity may drop by as much as an order of magnitude when ground water pH drops from a neutral pH of 6.5 to 8.5 to 6.0 or less. Most microbial processes associated with the addition of electron donor tend to lower pH by the production of acidic fermentation products such as carbon dioxide and volatile fatty acids. Some microbial processes such as the reduction of sulfur stimulated by addition of an electron donor can increase pH.

In general sites with a ground water pH below 6.5 prior to electron donor injection are likely to produce pH values well below 6.5 after the addition of any electron donor. The natural alkalinity of site soils and ground water can be determined by titration with acid to a pH of 6.5 (note that most total alkalinity methods titrate to pH 4.5 – well below the optimal biological range). For sites where the addition of electron donor has already lowered pH below the optimal range, an acidity titration of ground water or soil slurries can be conducted to determine the amount of alkalinity needed to return to the optimal pH range of 6.5 to 8.5. Modeling tools may eventually make it easier to predict buffering needs by calculating the acid production and acid consumption reactions associated with site geochemistry and the addition of electron donors without using empirical test methods (***Robinson and Barry, 2009***, ***Robinson, et. al., 2009***).

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