



Bioavailable Ferric Iron Analysis

Supporting Monitored Natural Attenuation

Bioavailable ferric iron is one indicator of natural attenuation

Ferric iron is used by iron-reducing bacteria under anaerobic conditions to degrade benzene, vinyl chloride, and various other organic compounds. In the process, ferric iron (FeIII) is reduced to ferrous iron (FeII).

Successful natural attenuation requires an adequate quantity of bioavailable ferric iron. However, predicting the amount of bioavailable ferric iron present is difficult.

To be bioavailable, ferric iron must be capable of being reduced by microorganisms that oxidize another chemical species and derive energy from the electron transfer. The amount of bioavailable ferric iron is affected by many factors, such as surface area, groundwater pH and specific conductivity, concentrations of divalent cations, and concentrations of electron shuttles.

Microseeps offers a suite of solid phase analyses for bioremediation, that can be used to assess the quantity of iron that can participate in bioremediation as well as the quantity of reduced iron and sulfide which bioremediation produces.

Bioavailable Ferric Iron Assay measures the amount of ferric iron in soil or sediment that can be reduced to ferrous iron (FeII) by iron-reducing bacteria. In the process, the test also identifies the amount of bioavailable manganese.

The BAF_{FeIII} test is used in conjunction with other analyses to evaluate site suitability for natural attenuation; and for monitoring effectiveness and efficiency of ongoing natural attenuation.

The analysis is performed using test kits developed by CDM and manufactured by New



Some of the reasons to use BAF_{FeIII} include:

- To prove that iron added in an “iron wall” treatment can also increase the bioremediation capacity of an aquifer by measuring the quantity of iron that can be used in bioremediation.
- To measure how much carbon substrate (e.g. HRC[®], ethanol or molasses) would be consumed in “burning through” the bioavailable ferric iron and establishing methanogenesis.
- To assess the assimilative capacity of an aquifer into which a petroleum product has been released.

Horizons Diagnostics Corporation. BAF_{FeIII} test kits have been demonstrated and validated at multiple sites by the Naval Facilities Engineering Service Center (NFESC) and CDM under the Department of Defense Environmental Security Technology Certification Program (ESTCP).

