IMPLICATIONS FROM AN OVERVIEW OF VOLATILE FATTY ACID OBSERVATIONS

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Volatile fatty acids (VFA 's) have long been recognized for their ability to stimulate reducing conditions in ground water. However, the ability to measure a spectrum of VFA concentrations in ground water in a sensitive and reliable manner has only recently become available. While biochemists recognize the many roles of VFA's, concentrations have been interpreted for little more than their potential to stimulate reducing conditions.

By enabling practitioners not only to measure very low acid concentrations, but also to measure a wider suite of acids, a great deal more insight is possible. The calculations made with thermo-chemical data have previously been discussed and have predicted some of what this broader analysis suite can provide. Additionally, there has been an abundance of very well characterized case studies that lacked sensitive VFA concentration data because it simply was unavailable. Both of these observations led to the development of a more sensitive analysis. The goal of this paper is to gather the lessons from the application of that analysis to a broad range of sites.

We have carried out sensitive analyses of VFA concentrations for a year. With client approval, we have collected the results of those analyses, and a large quantity of associated data about each site. The data consists of dissolved gas (hydrogen, methane, ethane, ethene, oxygen and carbon dioxide) concentrations, redox pair (nitrate/nitrite, ferric/ferrous, sulfate/sulfide) concentrations, daughter product (both the chlorinated daughter products and the chloride) concentrations, maps, and interviews about the history of the site, as well as a timeline of sampling events and remediation activities. We have built that data into a searchable database.

We have used that database to summarize the observations that have been made and the conclusions that were drawn. We have also analyzed that database seeking trends that practitioners who study a small number of sites would not observe. These can be understood in terms of interpreting existing geochemical scenarios and manipulating and managing future geochemical scenarios.