MICROAEROPHILIC IRON-OXIDIZING BACTERIA AND OXYGENIC PHOTOTROPHS IN THE CHESAPEAKE BAY: IMPLICATIONS FOR MICROBIAL ROLES IN THE PRODUCTION OF ANCIENT IRON FORMATIONS. E. K. Field[1], S. Kato[1], A. J. Findlay[2], D. J. MacDonald[2], G. W. Luther III[2], C. S. Chan[1,2], [1]Department of Geological Sciences, University of Delaware, Newark, DE, 19716 (ekfield@udel.edu, cschan@udel.edu), [2]School of Marine Science and Policy, University of Delaware, Newark, DE, 19716.

Introduction: A commonly postulated model of BIF formation involves Fe(II)-rich water upwelling onto continental shelves, bringing Fe(II) into the vicinity of oxygenic phototrophs. Here, microaerophilic, chemolithotrophic iron-oxidizing bacteria (FeOB) may also have played a role in precipitating iron minerals. Because this Fe(II)/O_2 interface was in the water column, these FeOB would have been planktonic. However, there are currently no studies of FeOB in marine water columns, so it is not known if planktonic marine FeOB exist. Therefore, the goals of this study were to demonstrate the presence of planktonic FeOB in a saline, redox stratified system and determine any associations with their presence and corresponding geochemical conditions. Often during summer months, the Chesapeake Bay becomes stratified with oxic top water and anoxic bottom water, representing an analog of ancient ocean conditions. Water samples were collected at various depths for geochemical analyses and inoculation of iron-oxidizer culture medium. Detection of microaerophilic FeOB correlated with regions in the water column where oxygen was below the detection limit (< 3 µM) and particulate Fe(II) was greatest. These results demonstrate that iron-oxidizers may be particle-associated and active at lower oxygen concentrations than previously documented. Microaerophilic enrichment cultures were dominated by *Zetaproteobacteria*, a known marine iron-oxidizer, though unlike other *Zetaproteobacteria* cultures, no extracellular iron oxyhydroxide structures were observed. Anoxic phototroph enrichments were positive for growth and iron oxidation from all depths, and were comprised largely of *Cyanobacteria*, with a small proportion of *Zetaproteobacteria*. The *Cyanobacteria* produced oxygen that could directly oxidize iron, but may also support microaerophilic iron oxidation at the oxic-anoxic interface, as well as in the anoxic zone. Overall these results support a revised conceptual model for the role of microorganisms in BIF genesis that includes cooperation between oxygenic phototrophs and microaerophilic, chemolithotrophic iron-oxidizers.