

Appendix C1: Batch Kinetics Tests

This appendix contains the entire data set for the batch kinetics tests for the potential biofilter components. These tests were performed to provide estimates of optimal contact times to maximize pollutant removal. These results also were evaluated for potential trade-offs as a result of the ion-exchange reactions occurring on the media surface. The top left graph on each page shows the raw data, while the other graphs show the pollutant removals, normalized by dividing by the concentration of the spiked stormwater that was not in contact with a treatment medium, as a function of time. The graphs are broken up into the following groups:

Common Constituents (Conductivity, Hardness, Oxidation-Reduction Potential, pH)

Indicators of Carbon Behavior (Apparent Color, UV-254 Absorbance, Chemical Oxygen Demand)

Major Cation and Anions (Calcium, Magnesium, Sodium, Potassium, Sulfate, Fluoride)

Nutrients (Ammonia, Nitrate, Total Nitrogen, Total Phosphorus, Phosphate)

Heavy Metals and Other Trace Constituents (Aluminum, Antimony, Arsenic, Boron, Cadmium, Chromium, Copper, Iron, Lead, Manganese, Nickel, Thallium, Zinc)

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Common Constituents

Conductivity: Initial Batch Kinetics Testing

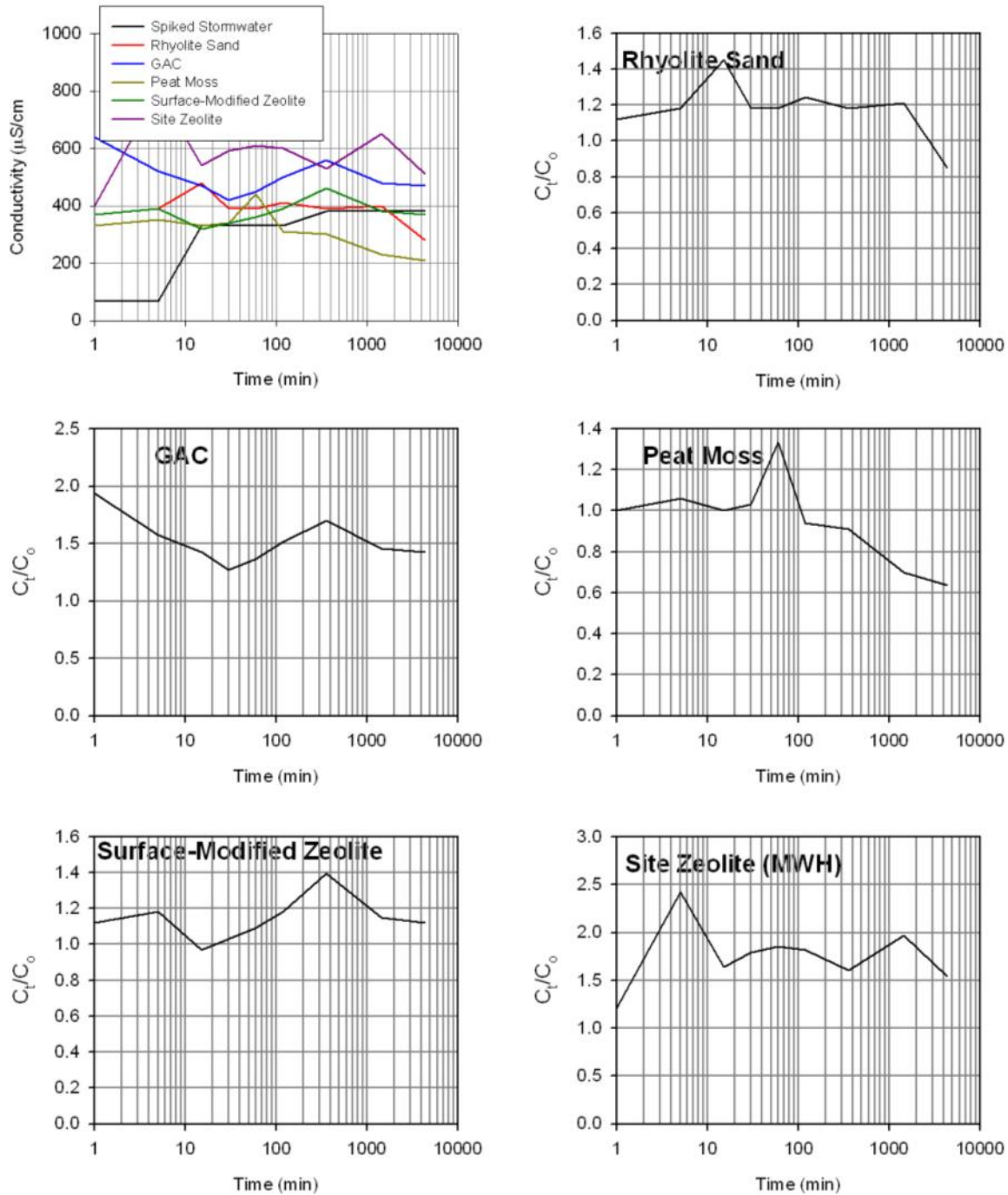


Figure C1-1. Conductivity Behavior as a Function of Time

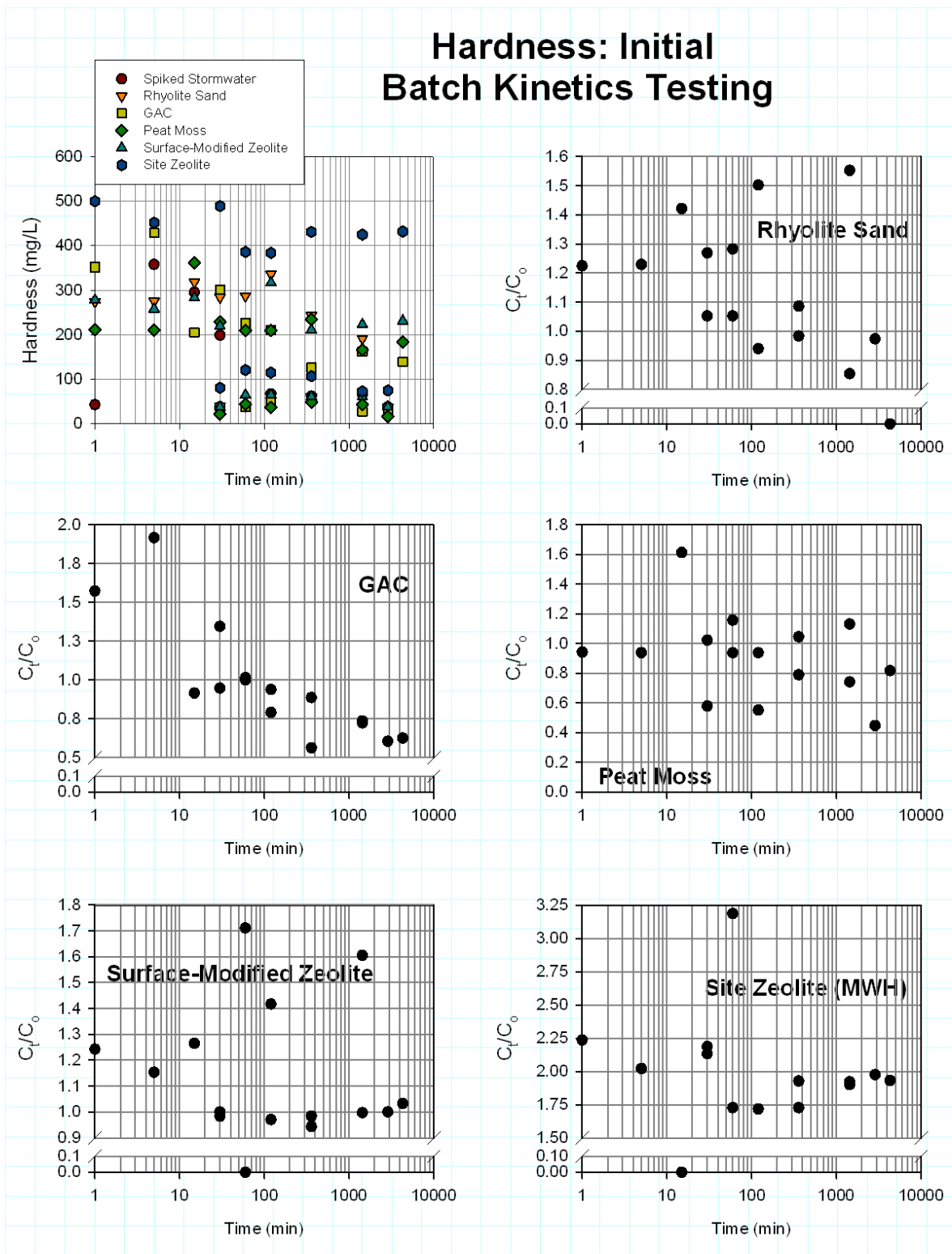


Figure C1-2. Hardness Behavior as a Function of Time

ORP: Initial Batch Kinetics Testing

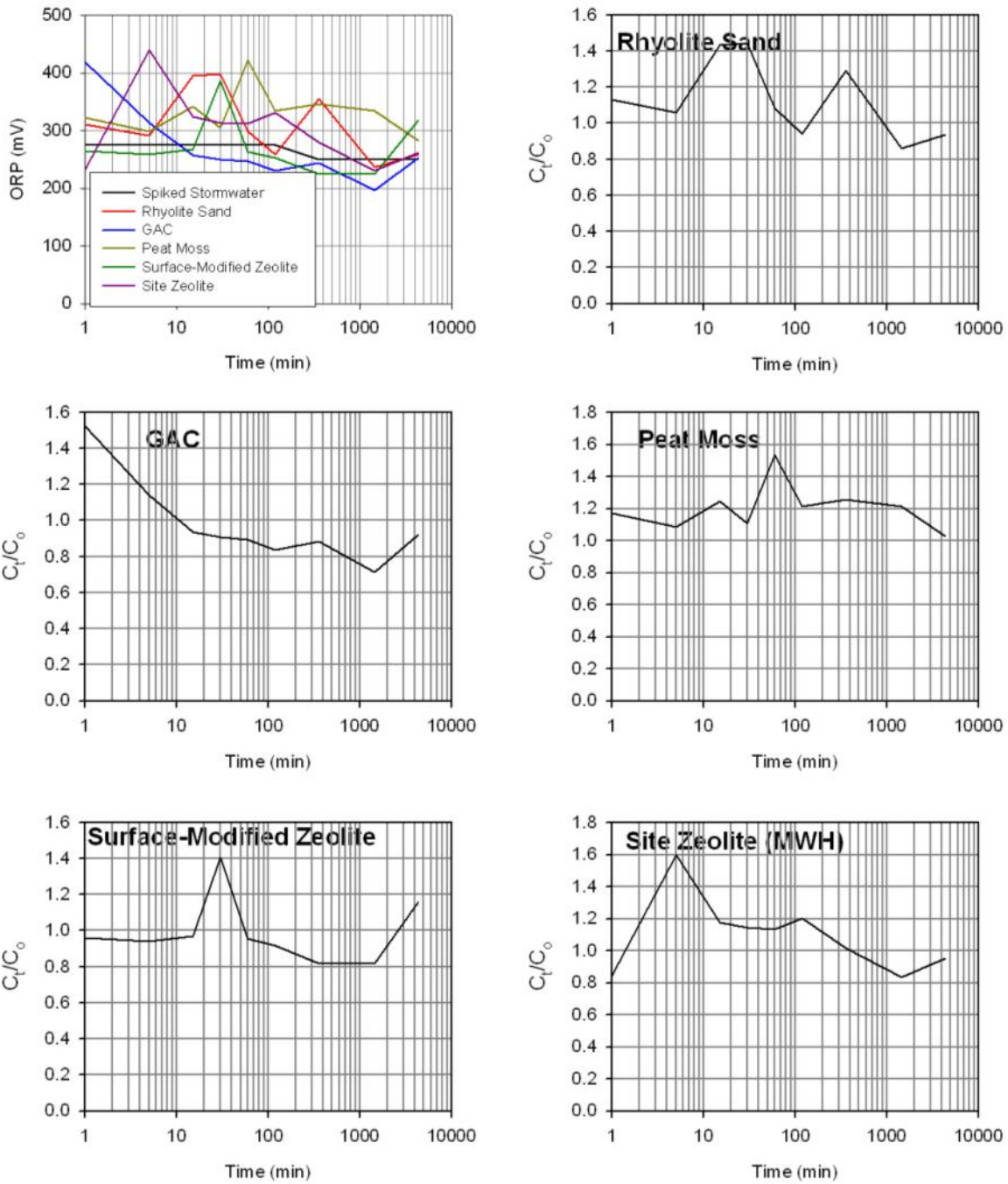


Figure C1-3. ORP Behavior as a Function of Time

pH: Initial Batch Kinetics Testing

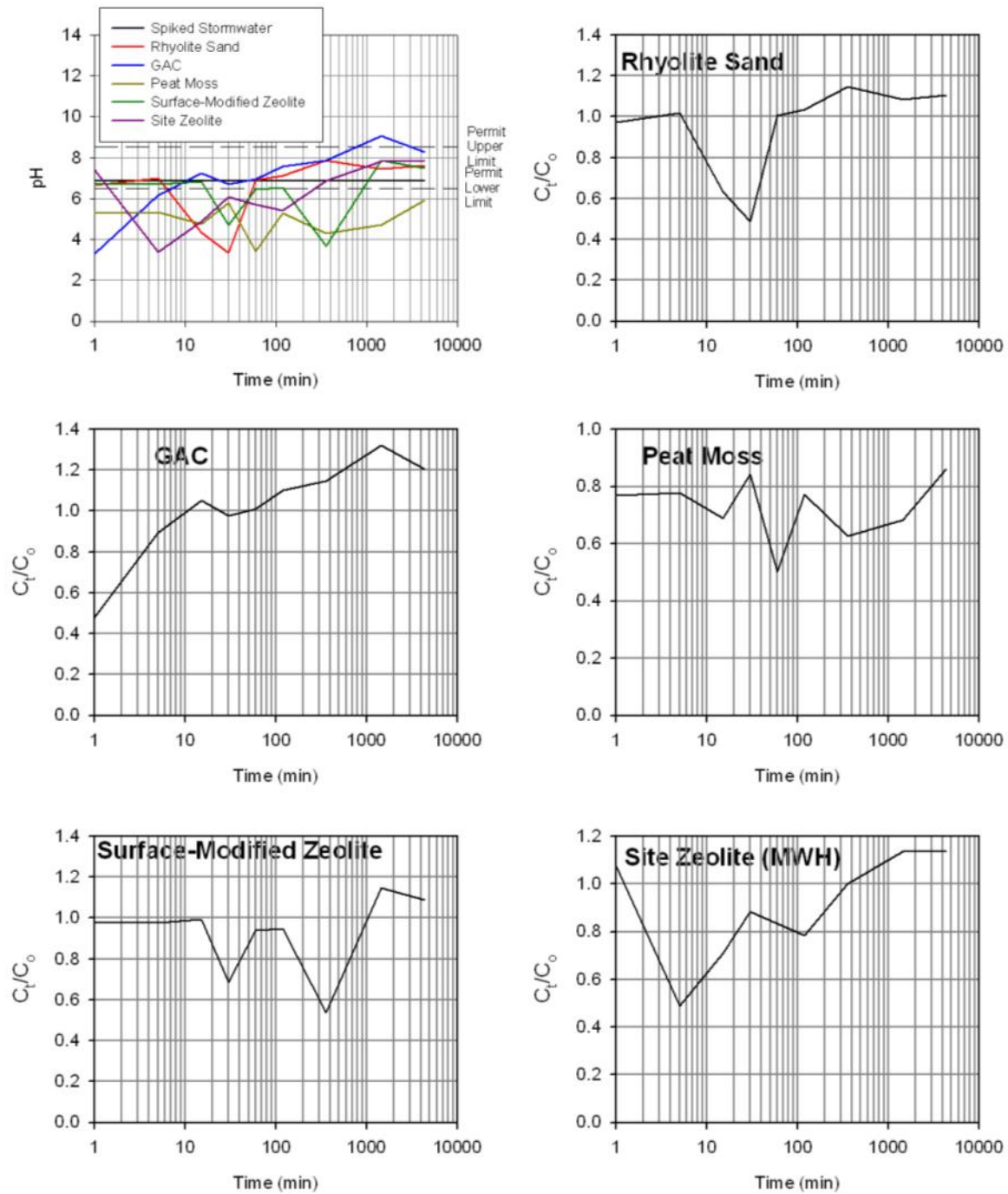


Figure C1-4. pH Behavior as a Function of Time

Indicators of Carbon Behavior

Color, Apparent: Initial Batch Kinetics Testing

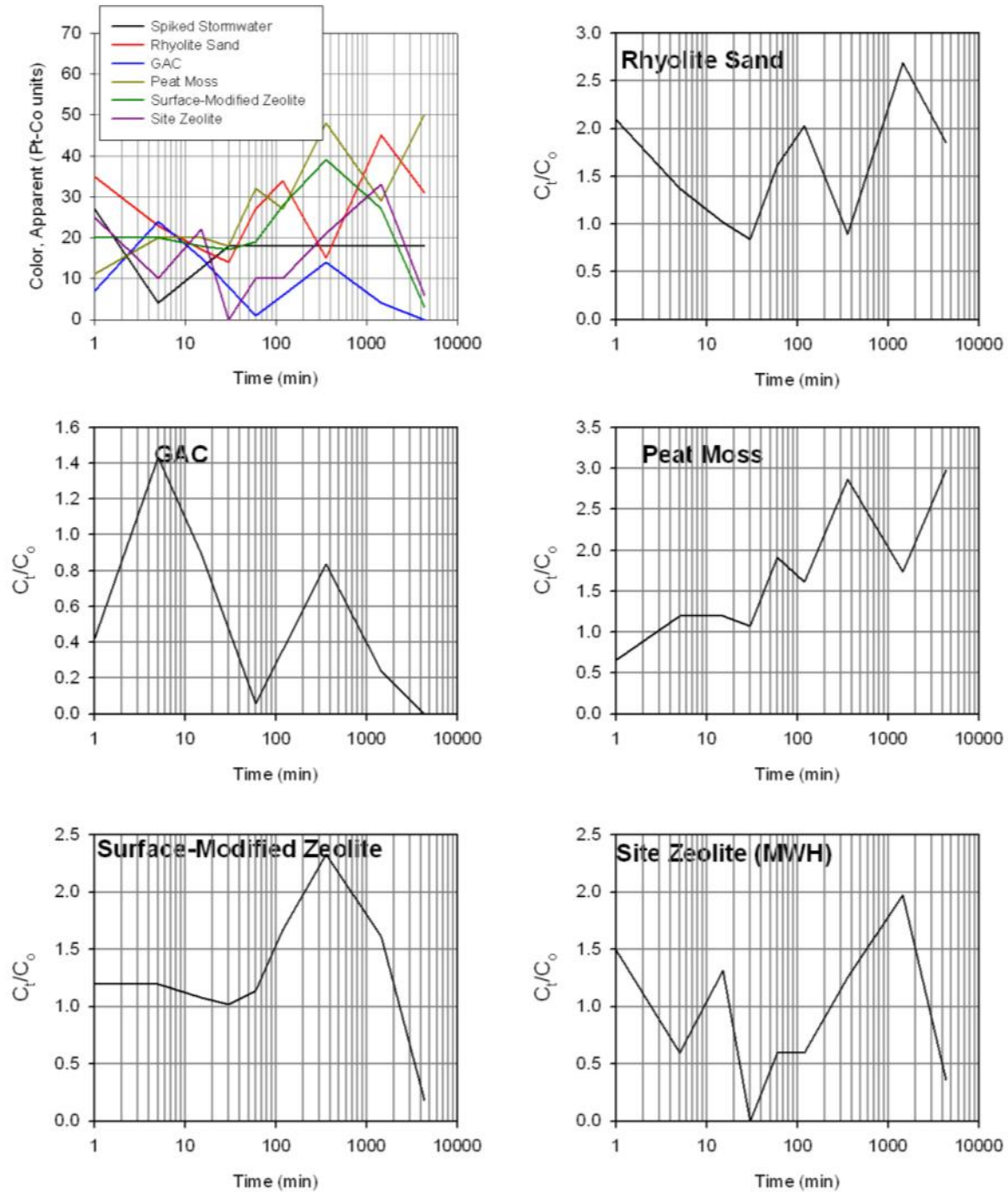


Figure C1-5. Color Behavior as a Function of Time

UV-254: Initial Batch Kinetics Testing

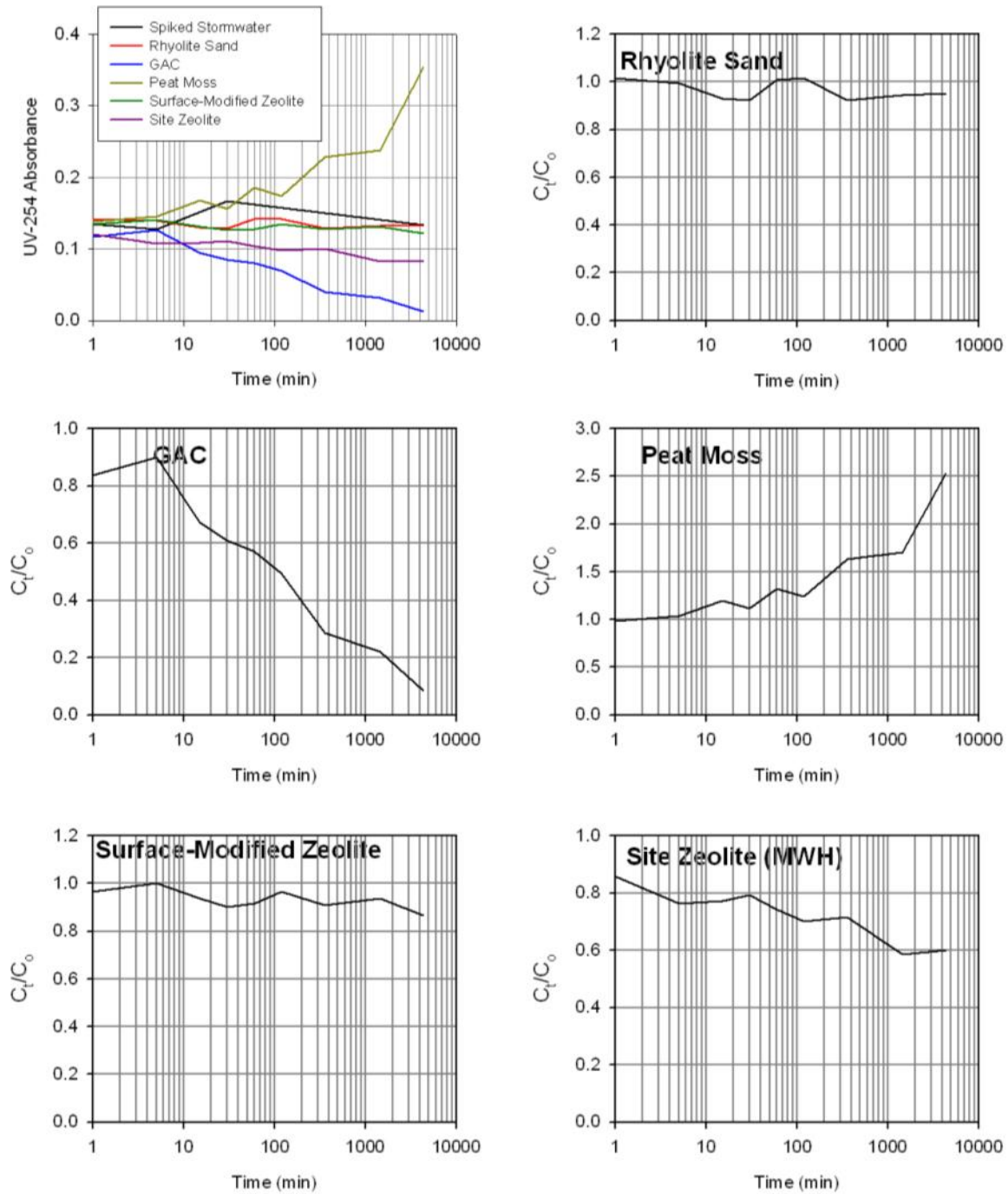


Figure C1-6. UV-254 Absorbance Behavior as a Function of Time

COD: Initial Batch Kinetics Testing

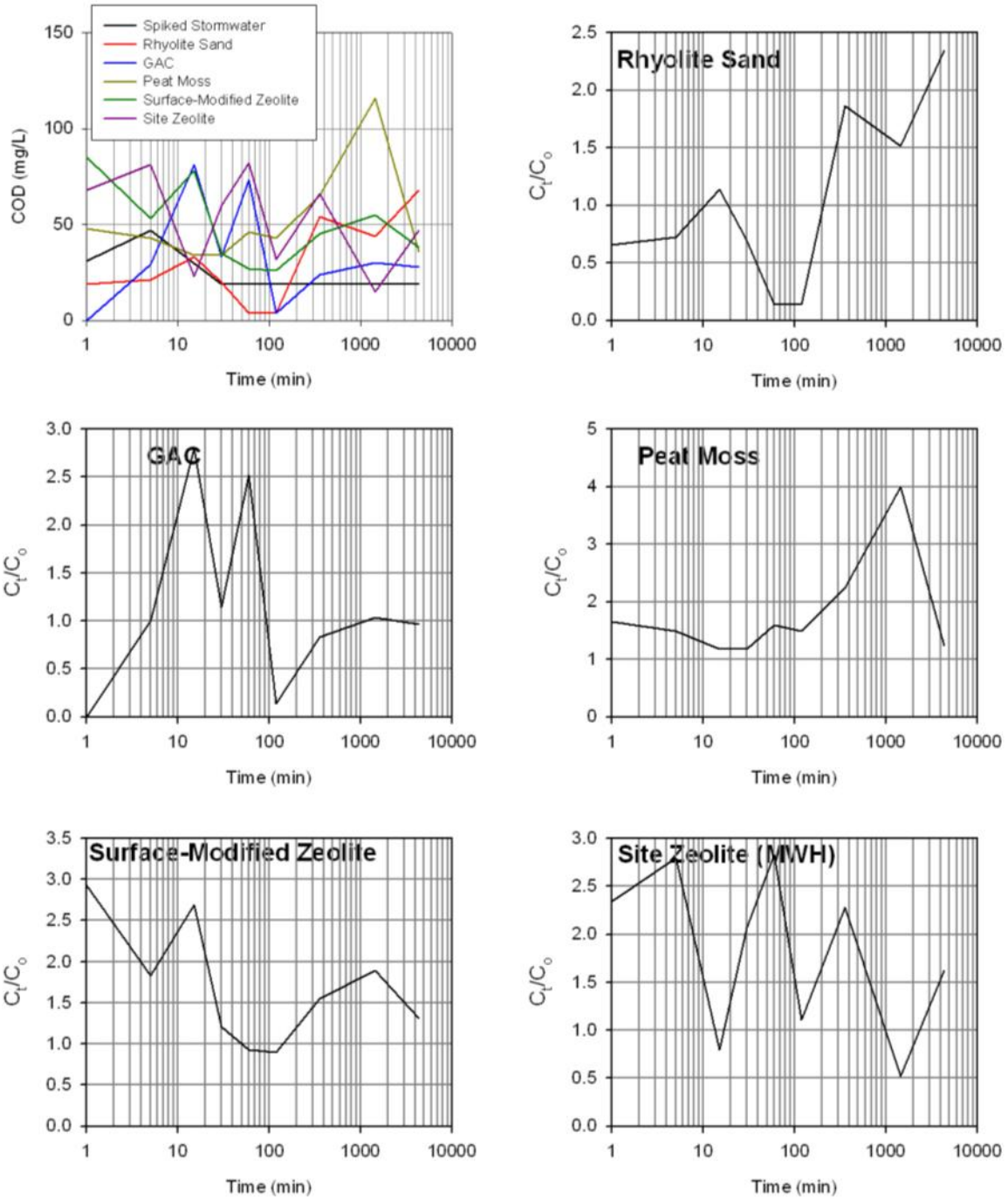


Figure C1-7. Chemical Oxygen Demand Removal as a Function of Time

Major Ions (Cations and Anions)

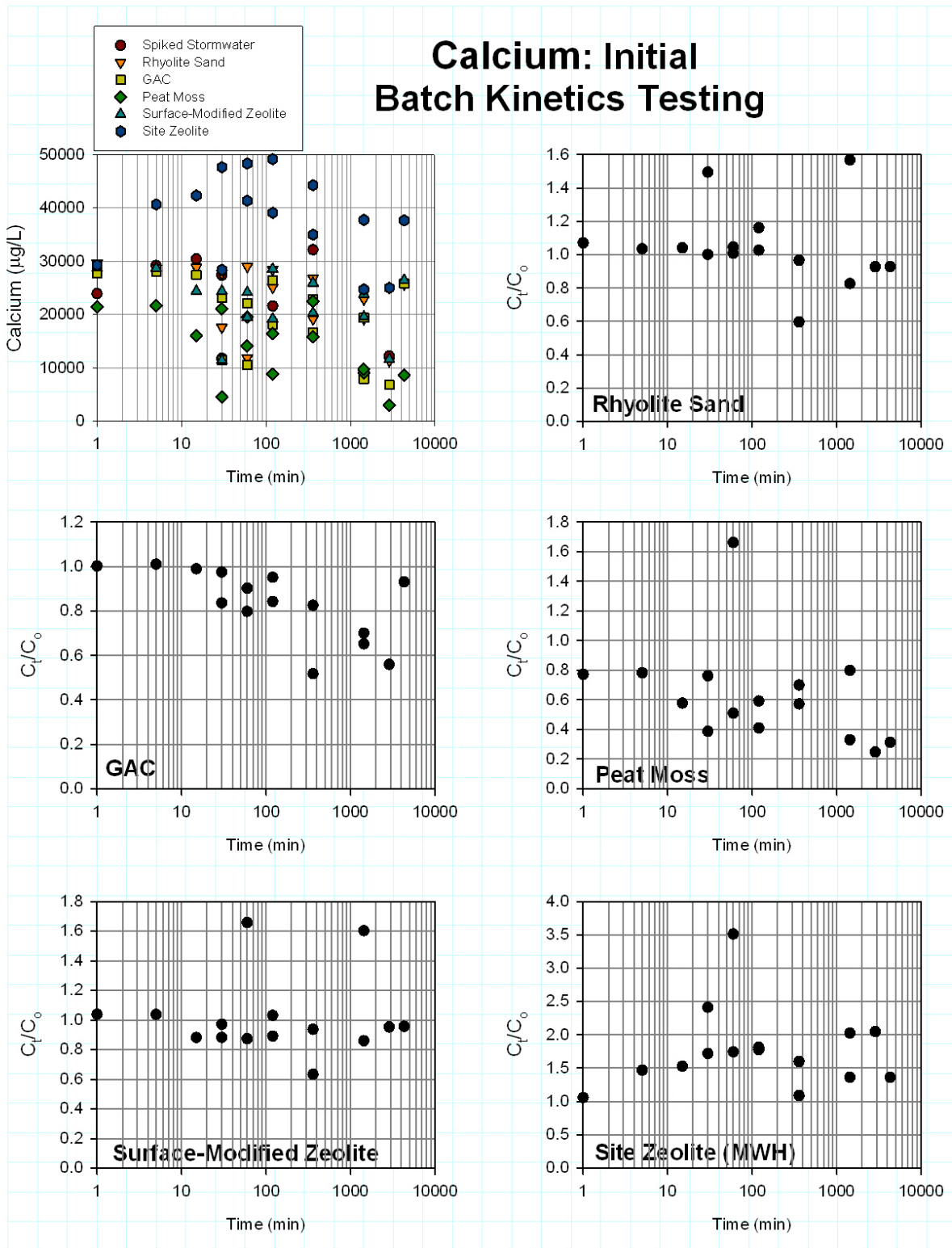


Figure C1-8. Calcium Removal as a Function of Time

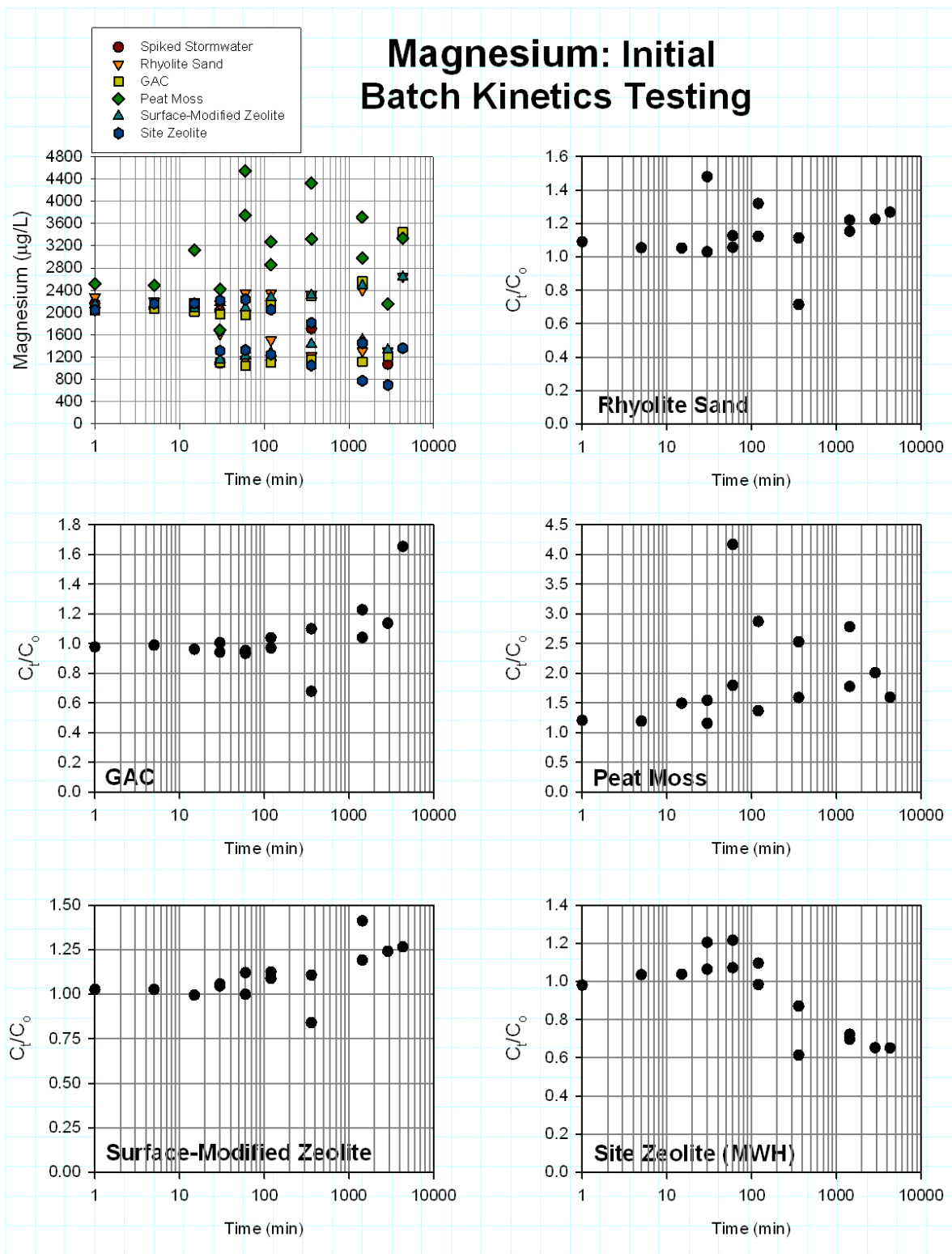


Figure C1-9. Magnesium Removal as a Function of Time

Sodium: Initial Batch Kinetics Testing

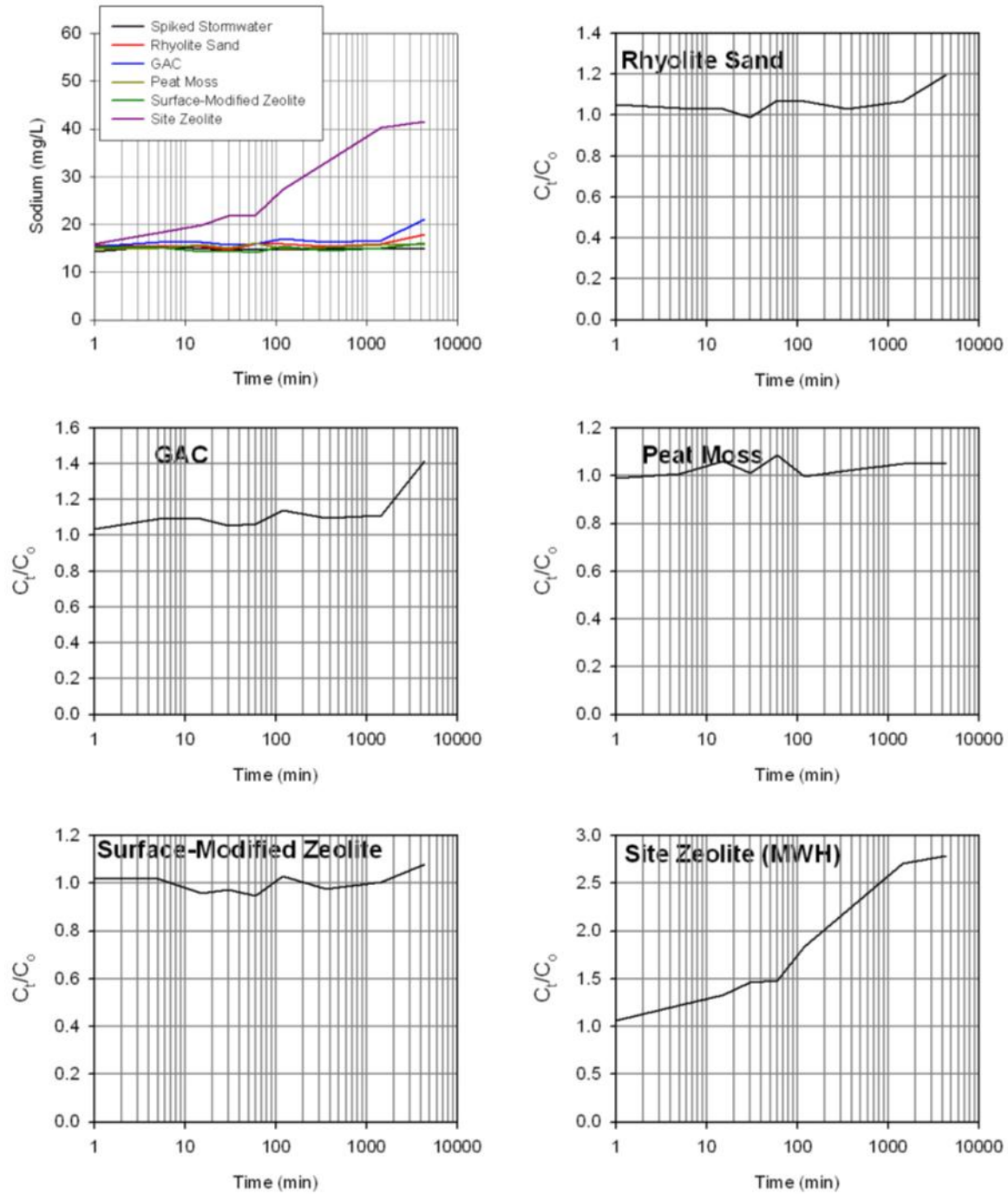


Figure C1-10. Calcium Removal as a Function of Time

Potassium: Initial Batch Kinetics Testing

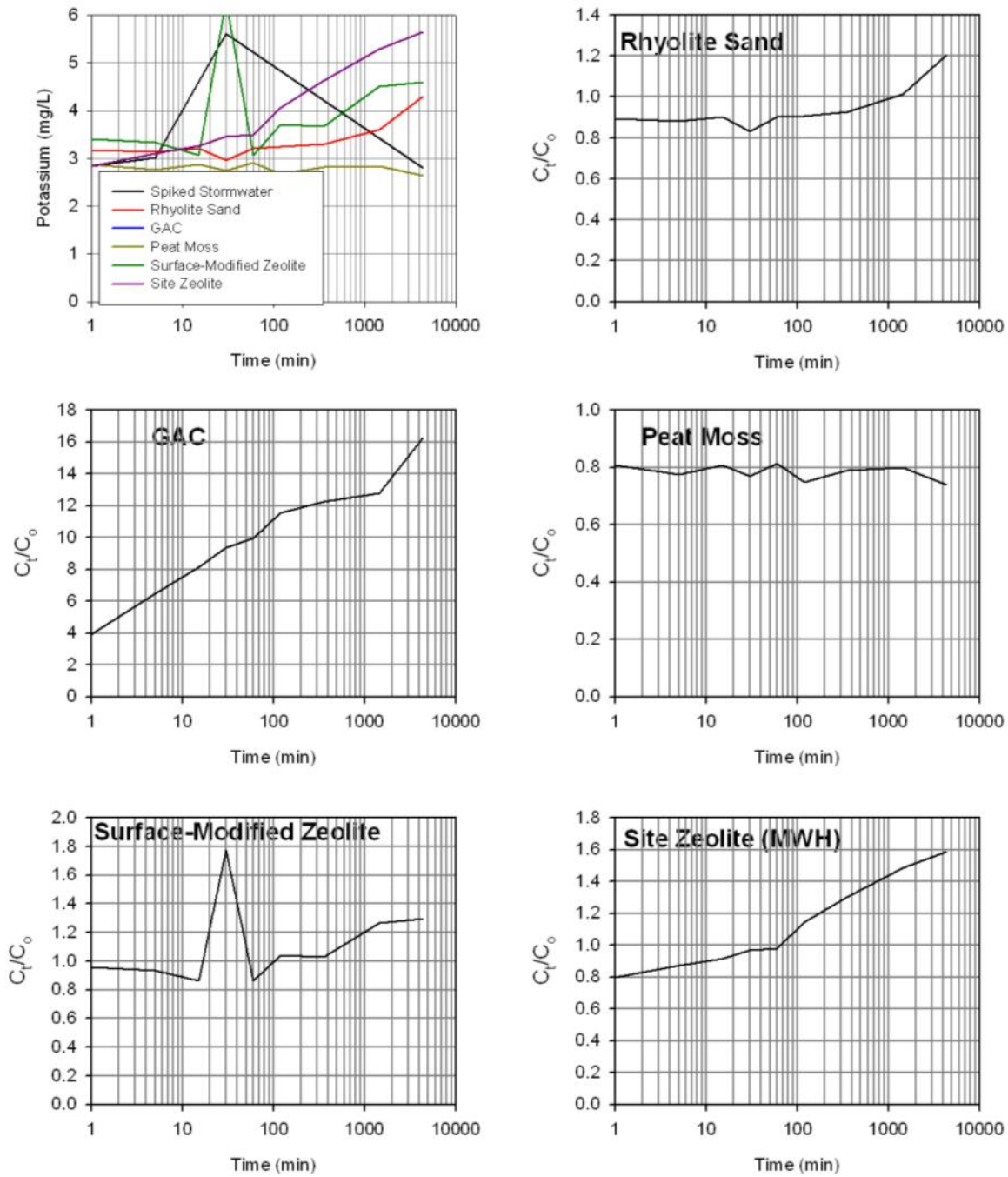


Figure C1-11. Potassium Removal as a Function of Time

Sulfate: Initial Batch Kinetics Testing

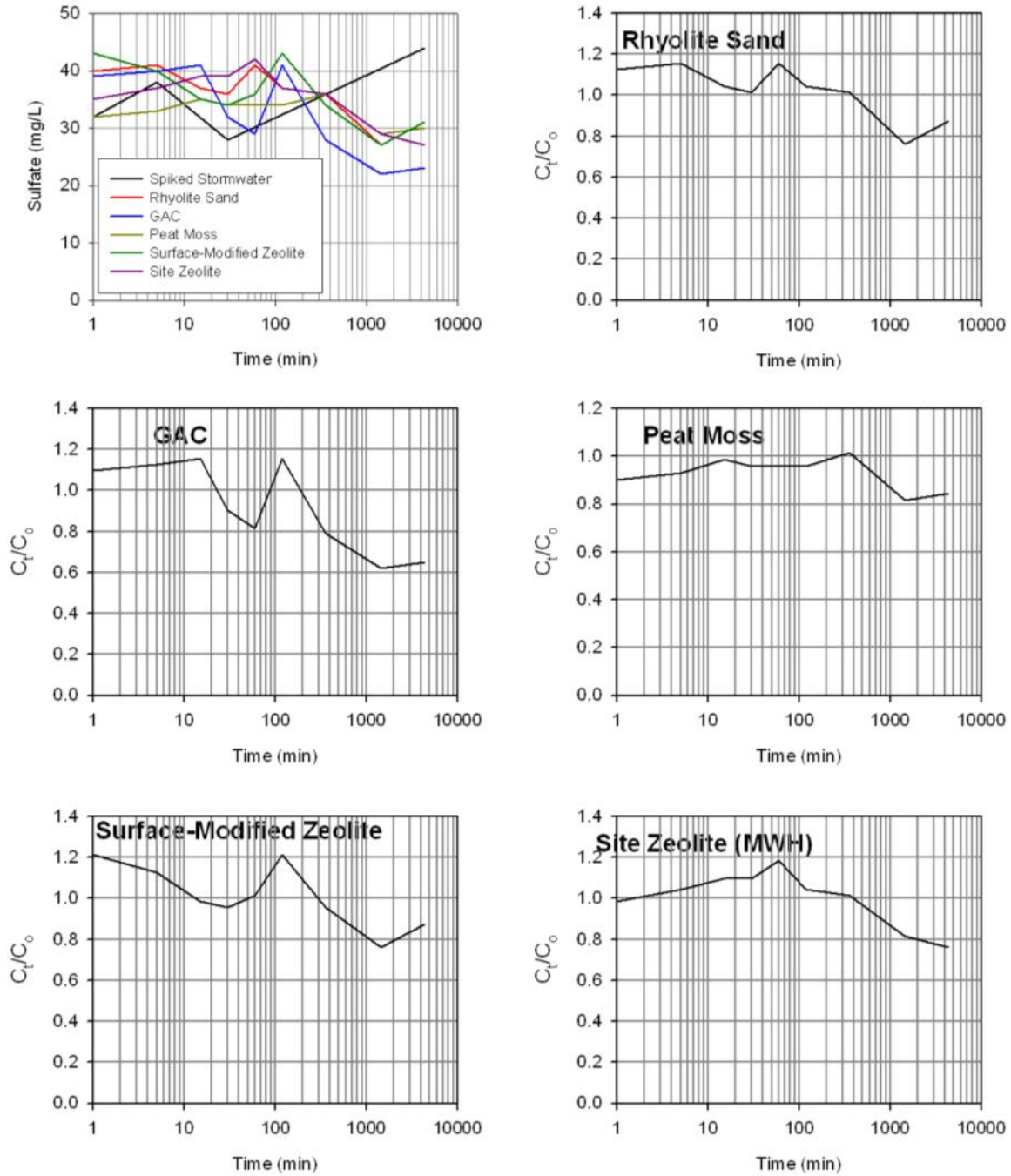


Figure C1-12. Sulfate Removal as a Function of Time

Fluoride: Initial Batch Kinetics Testing

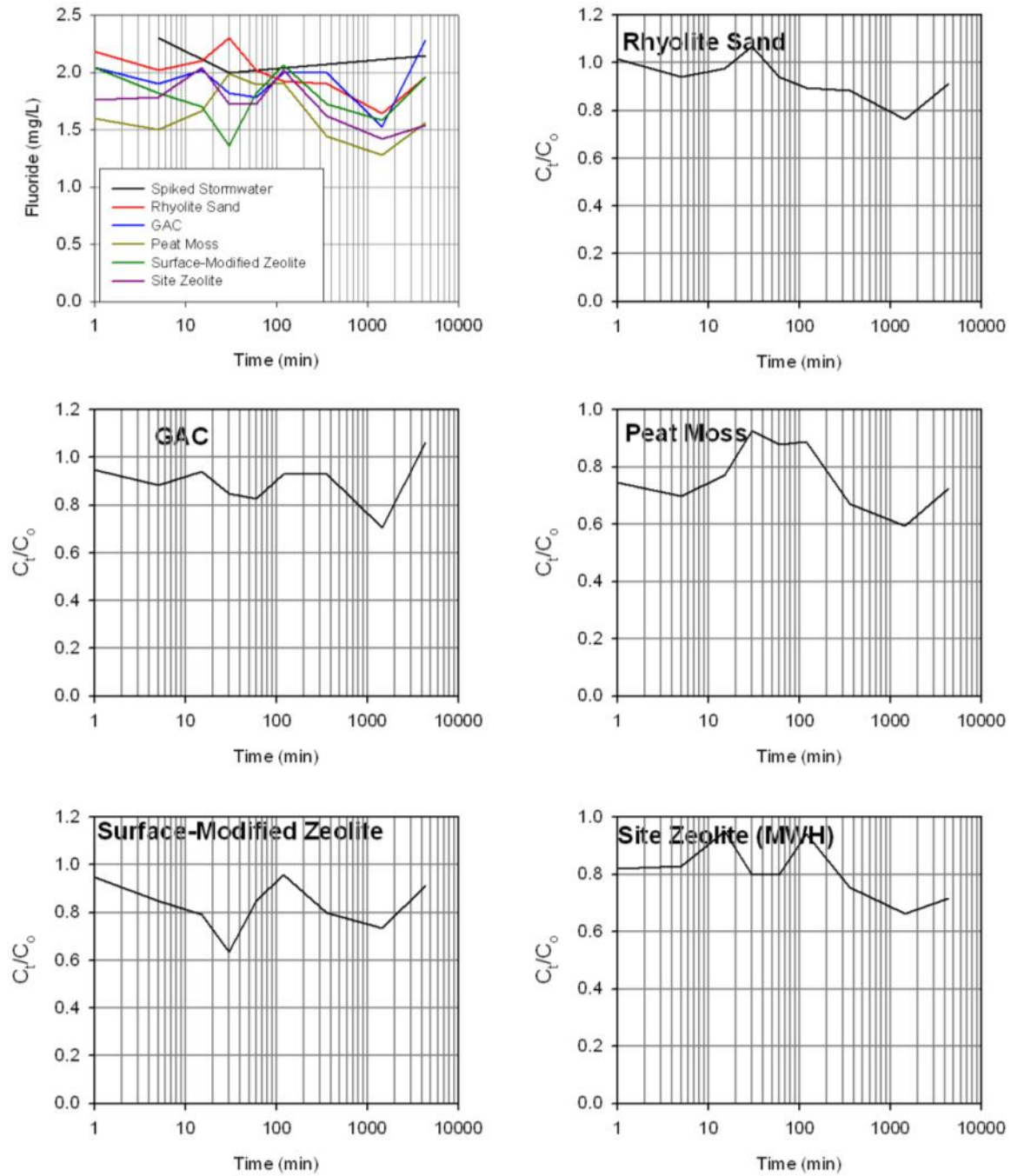


Figure C1-13. Fluoride Removal as a Function of Time

Nutrients

Ammonia: Initial Batch Kinetics Testing

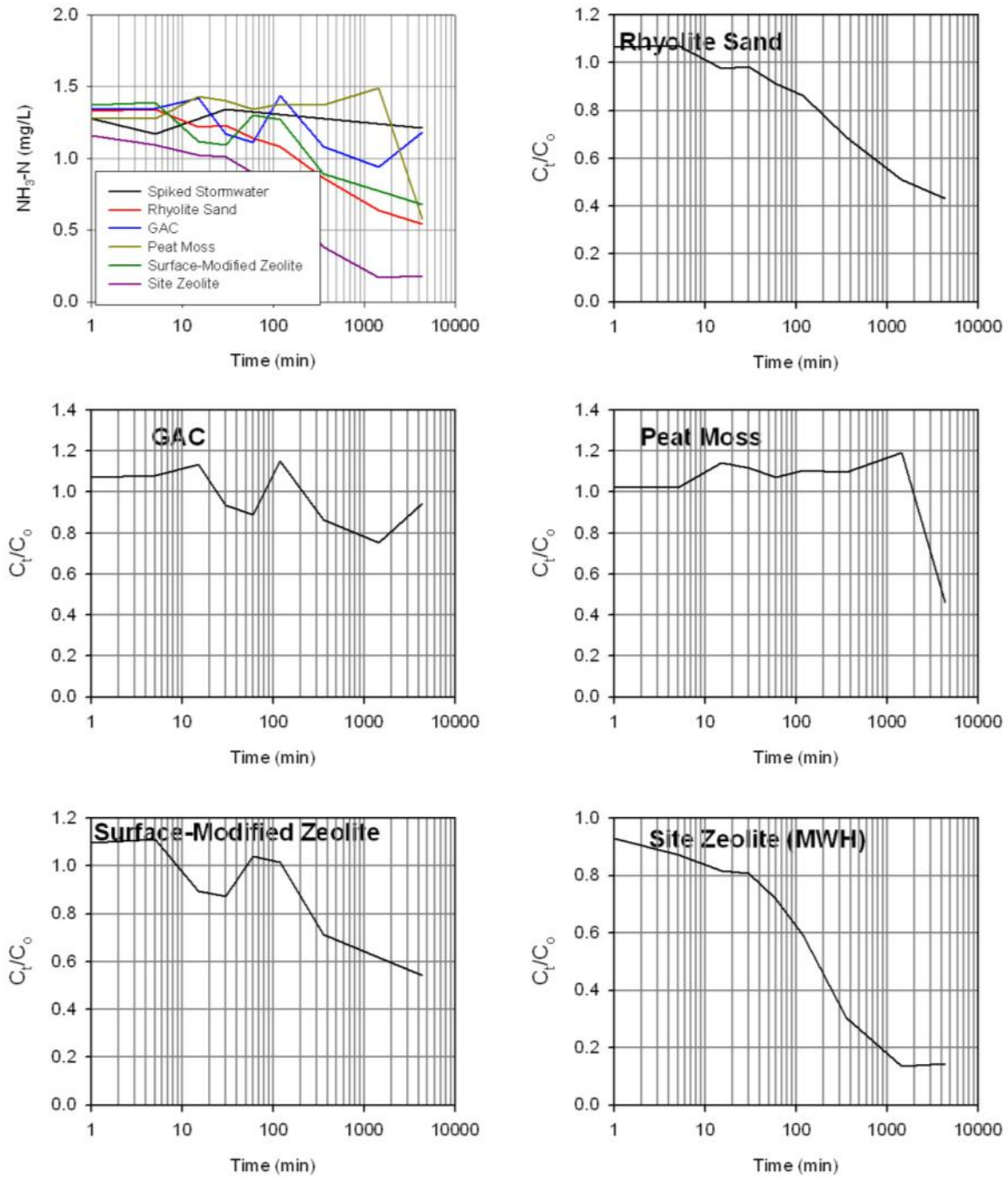


Figure C1-14. Ammonia Removal as a Function of Time

Nitrate: Initial Batch Kinetics Testing

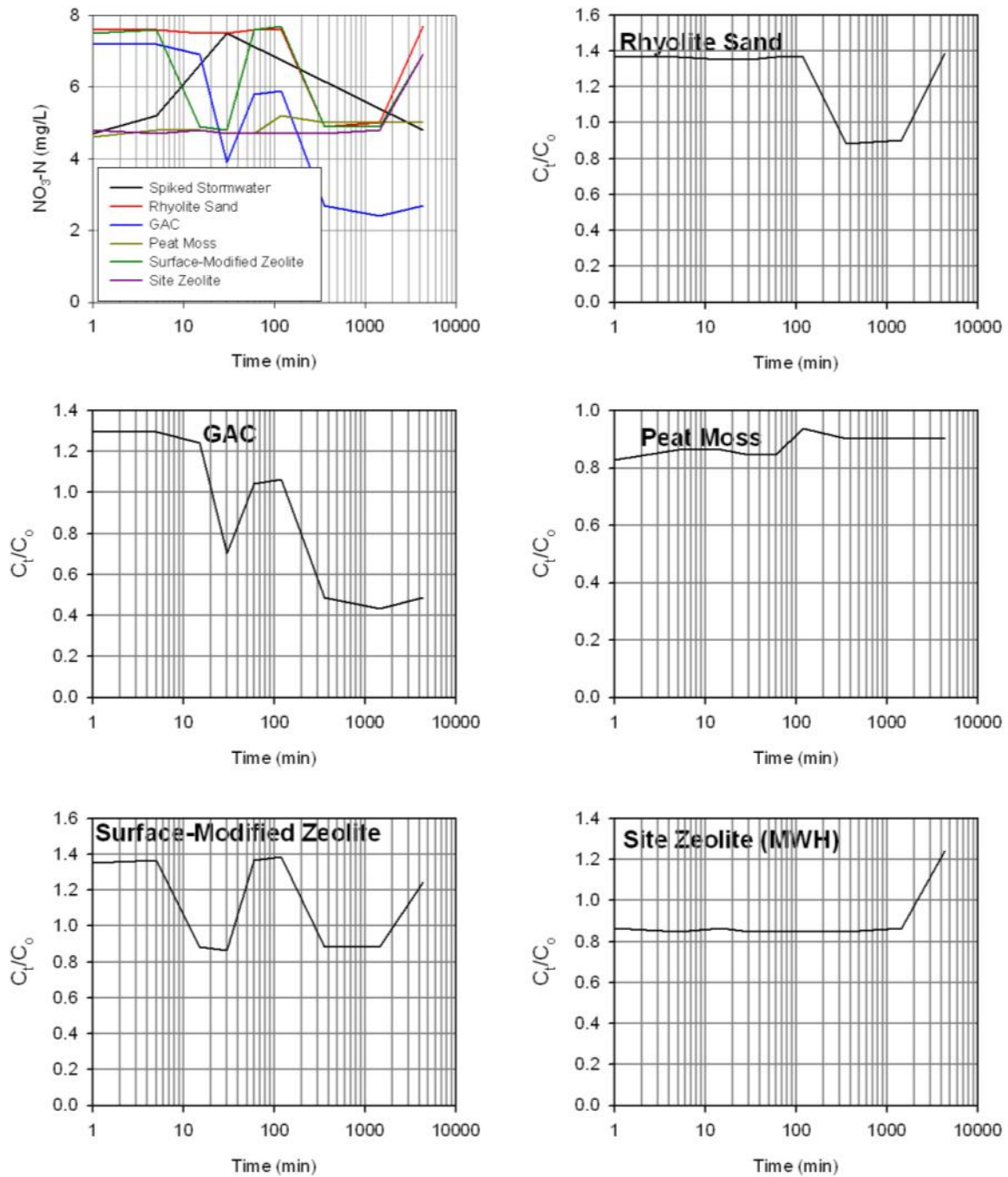


Figure C1-15. Nitrate Removal as a Function of Time

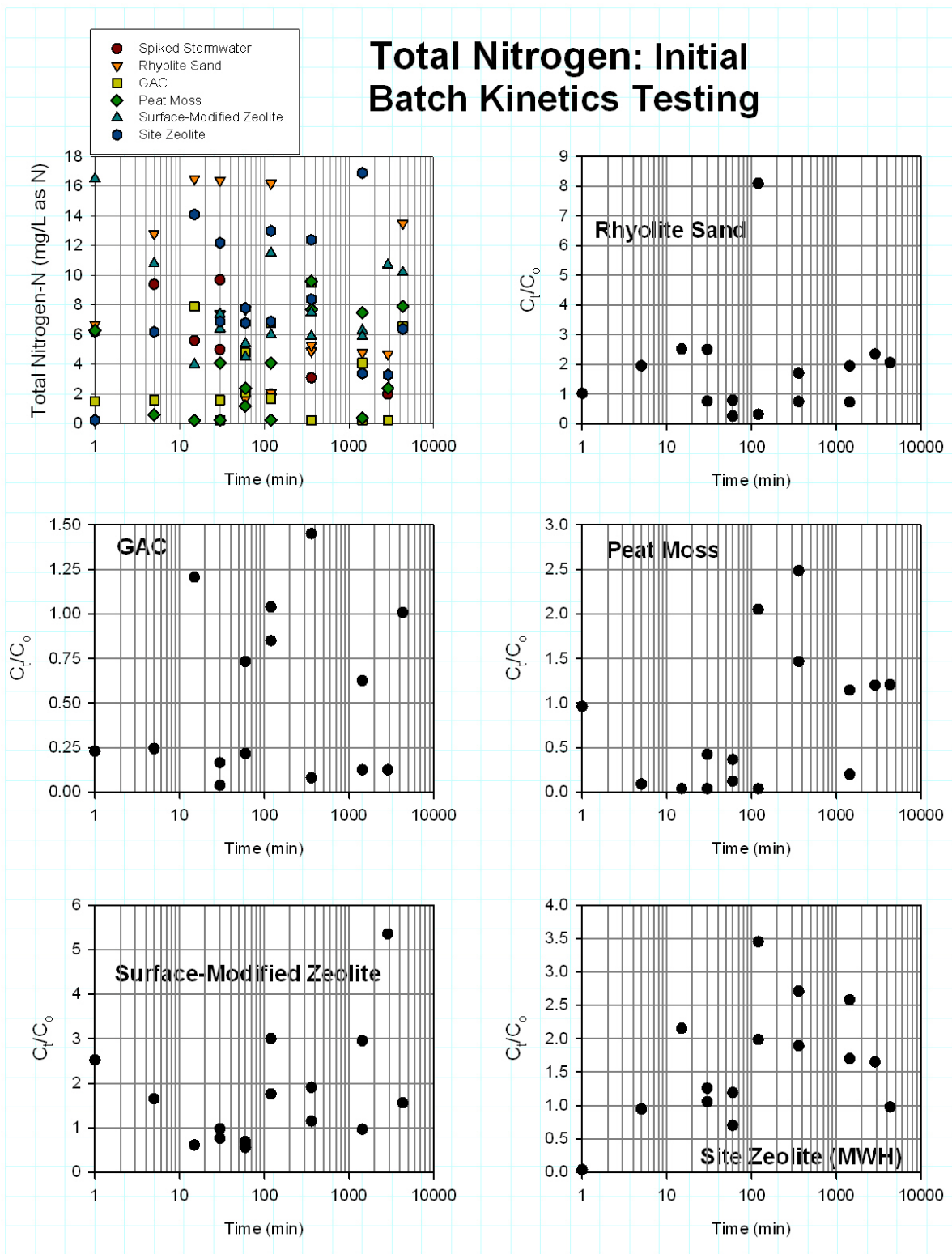


Figure C1-16. Total Nitrogen Removal as a Function of Time

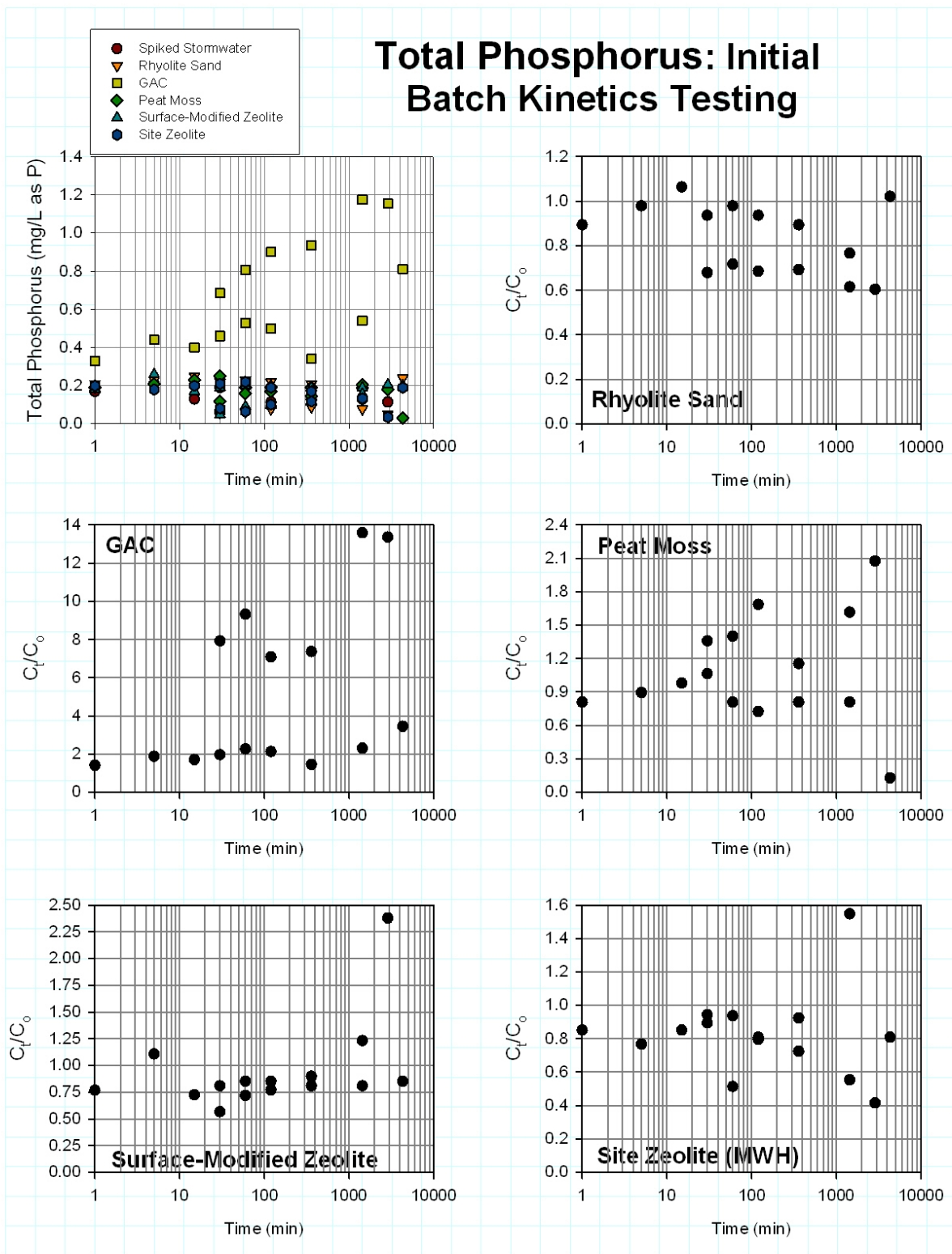


Figure C1-17. Total Phosphorus Removal as a Function of Time

Phosphate: Initial Batch Kinetics Testing

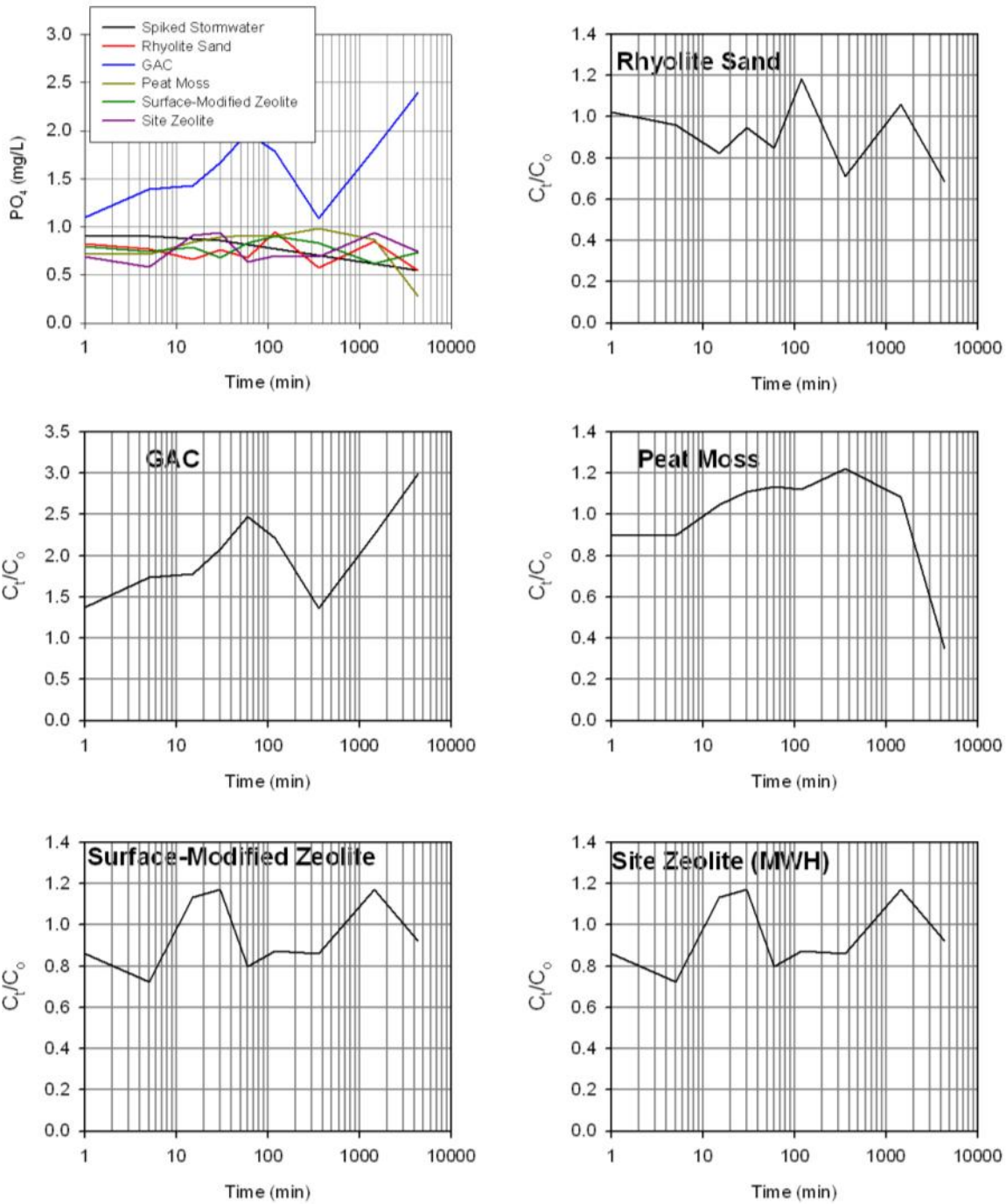


Figure C1-18. Phosphate Removal as a Function of Time

Heavy Metals and Other Trace Constituents

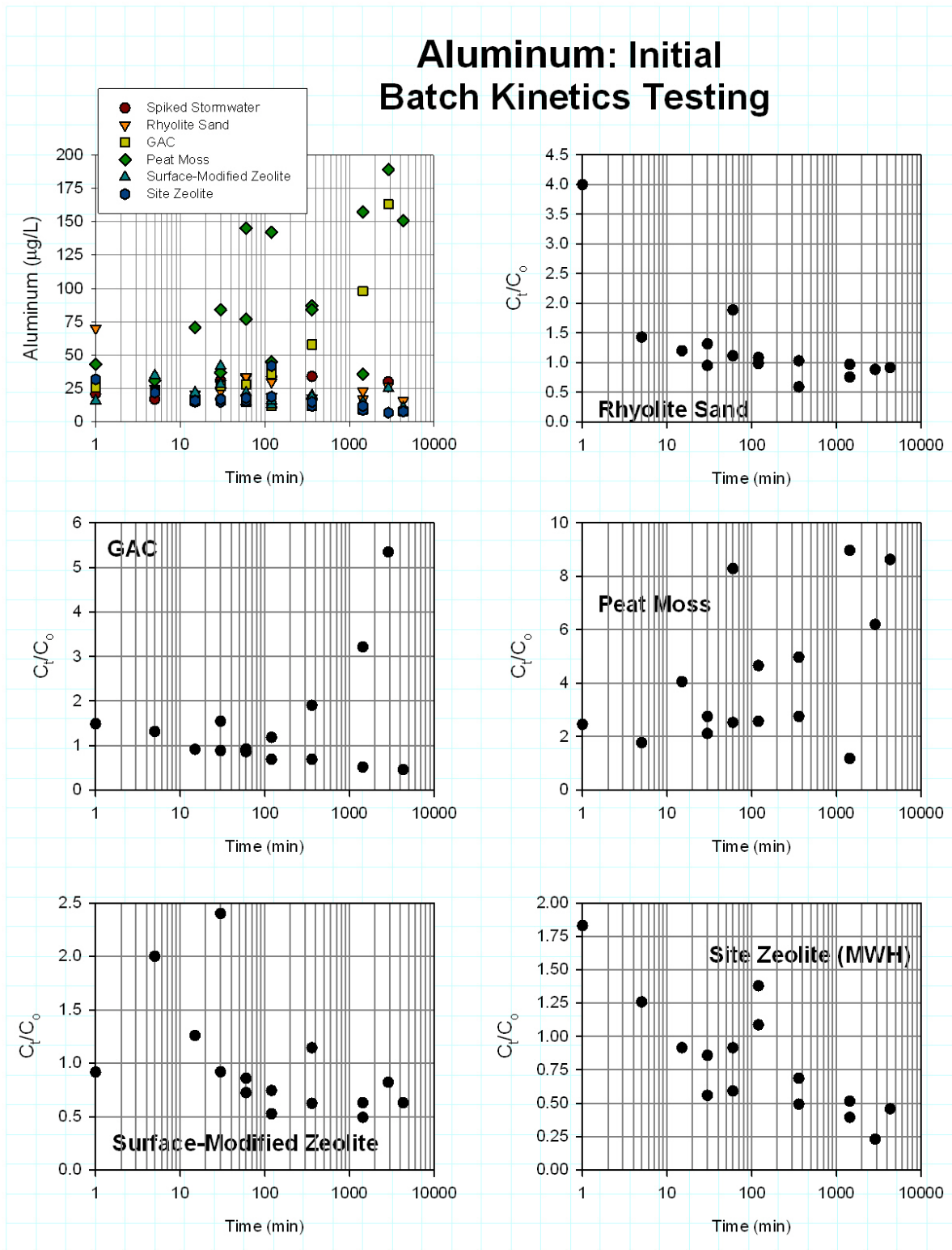


Figure C1-19. Aluminum Removal as a Function of Time

Antimony: Initial Batch Kinetics Testing

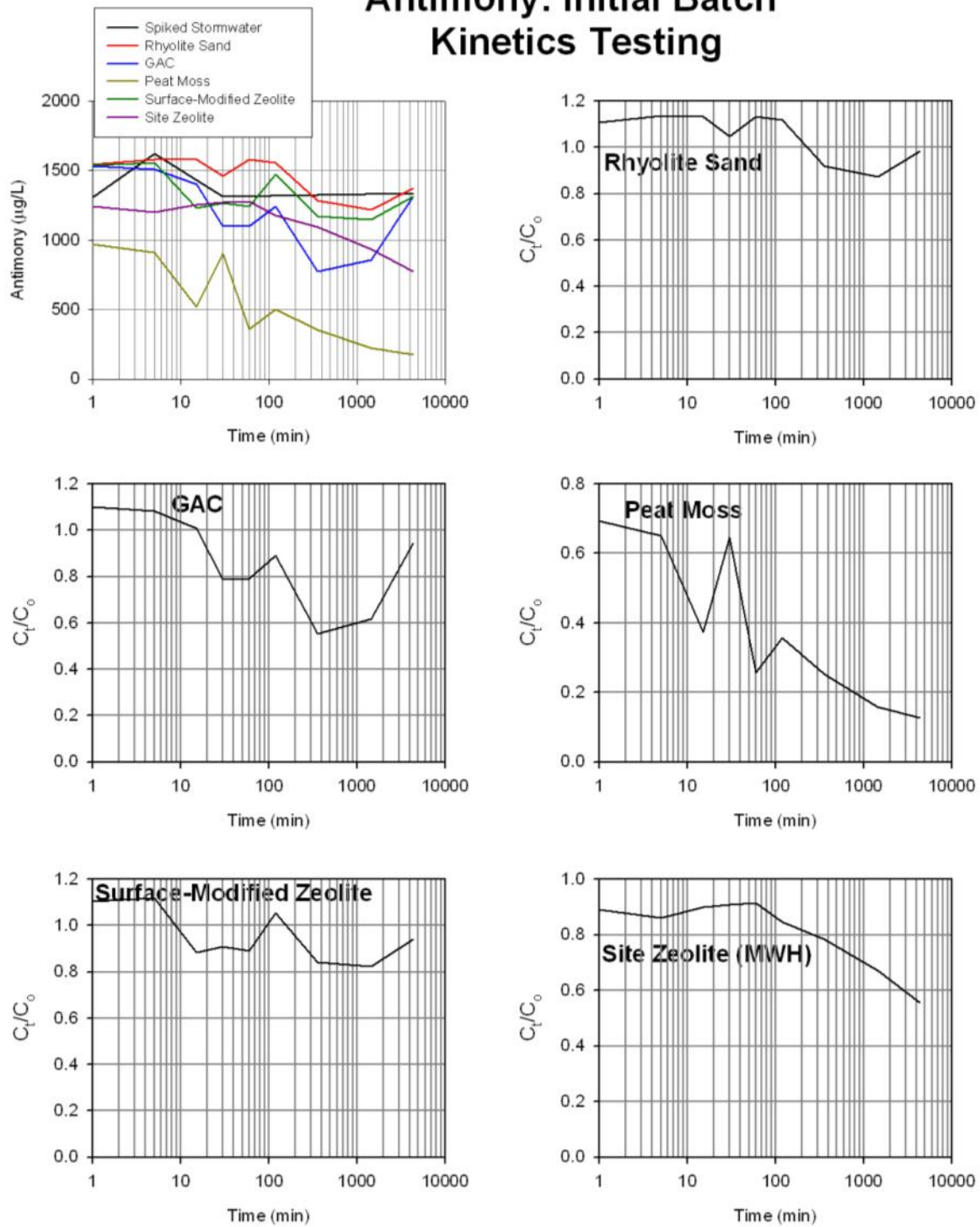


Figure C1-20. Antimony Removal as a Function of Time

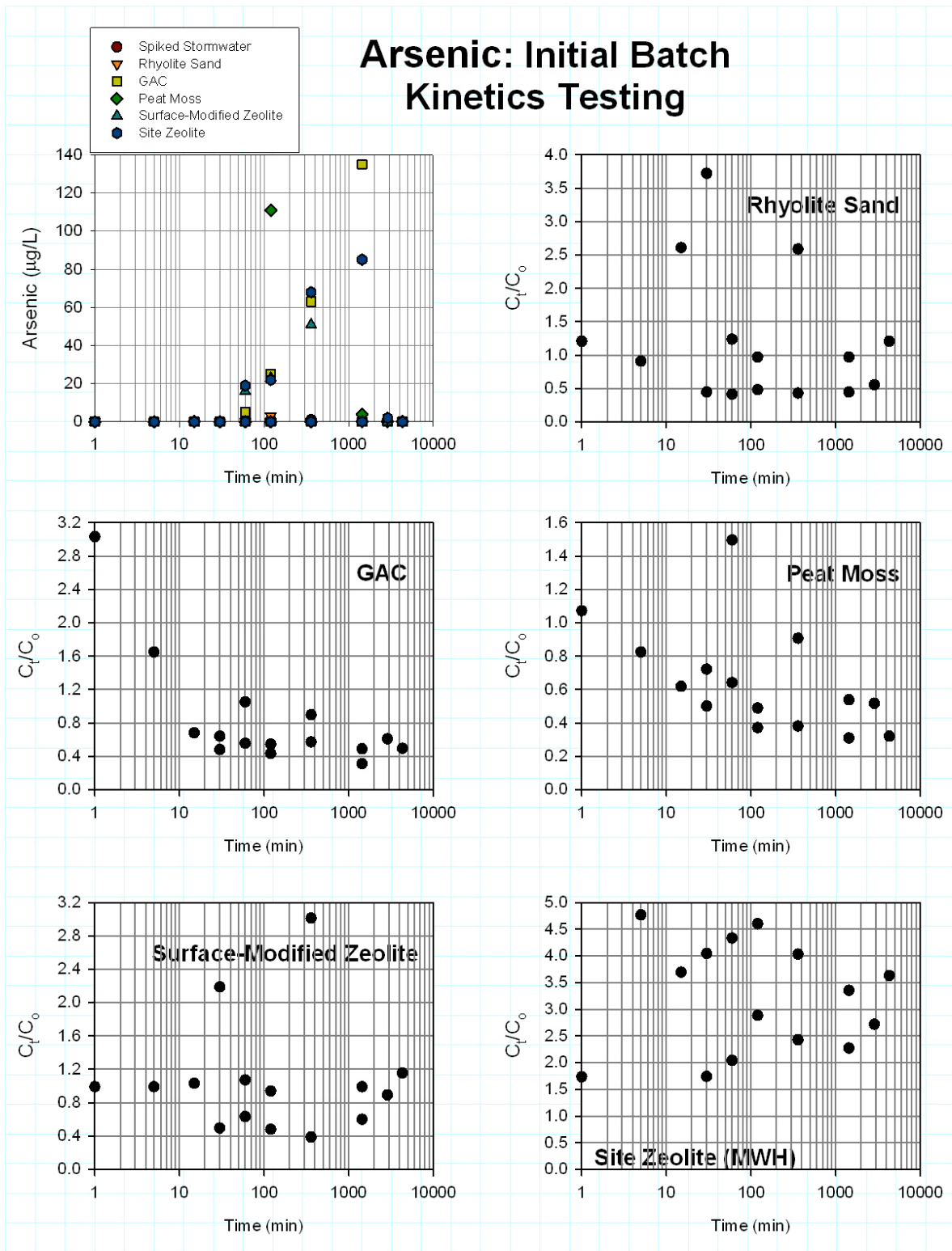


Figure C1-21. Arsenic Removal as a Function of Time

Boron: Initial Batch Kinetics Testing

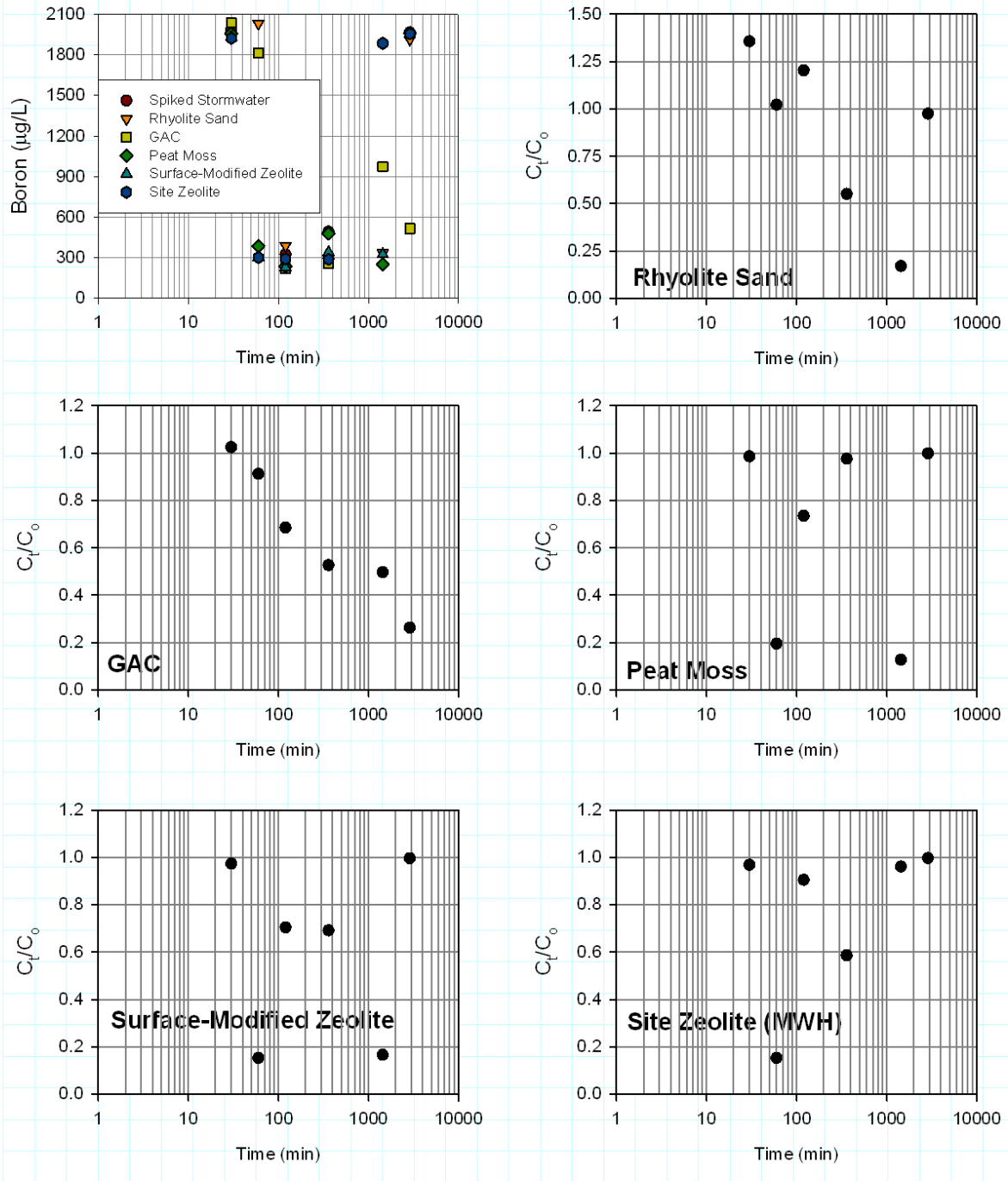


Figure C1-22. Boron Removal as a Function of Time

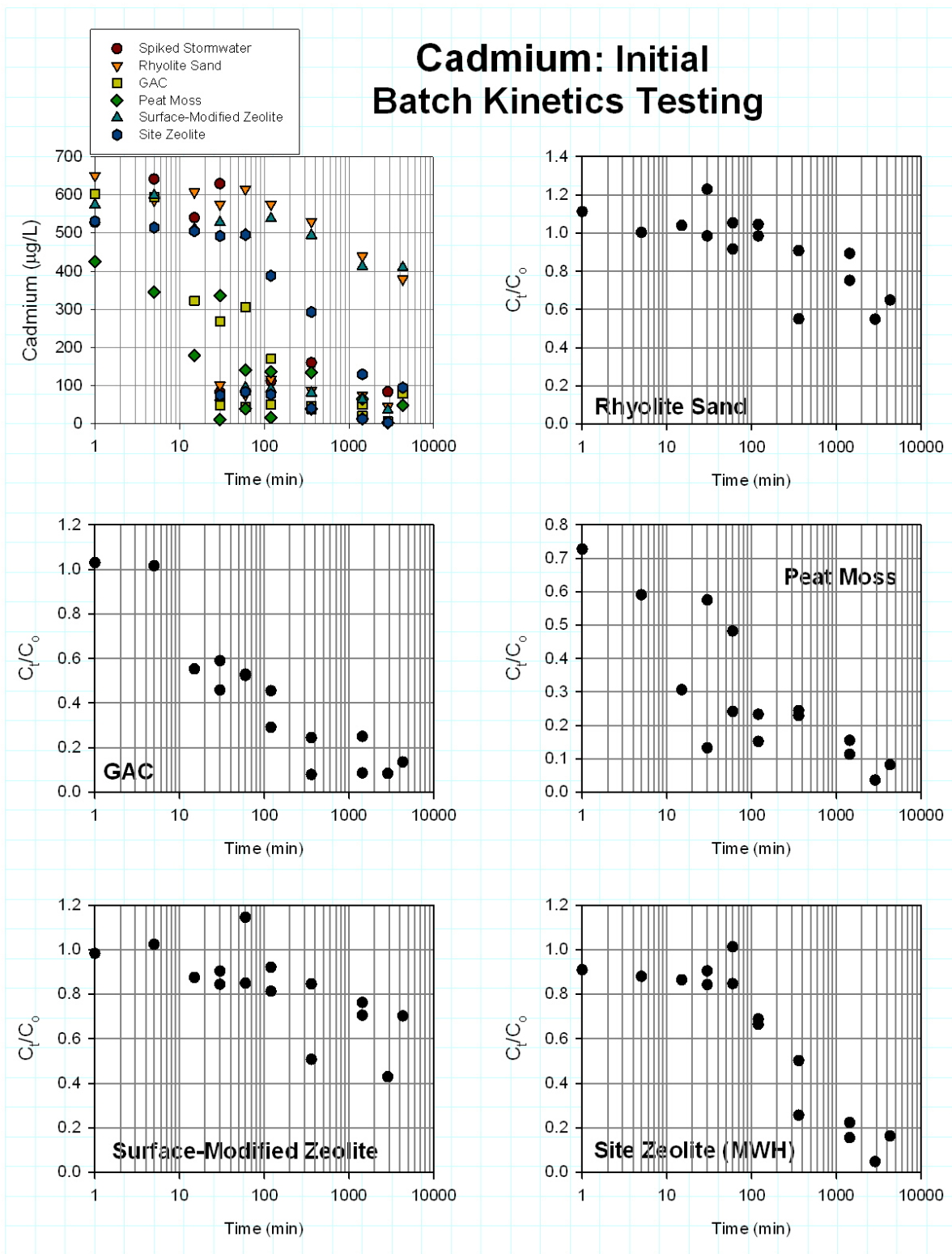


Figure C1-23. Cadmium Removal as a Function of Time

Chromium: Initial Batch Kinetics Testing

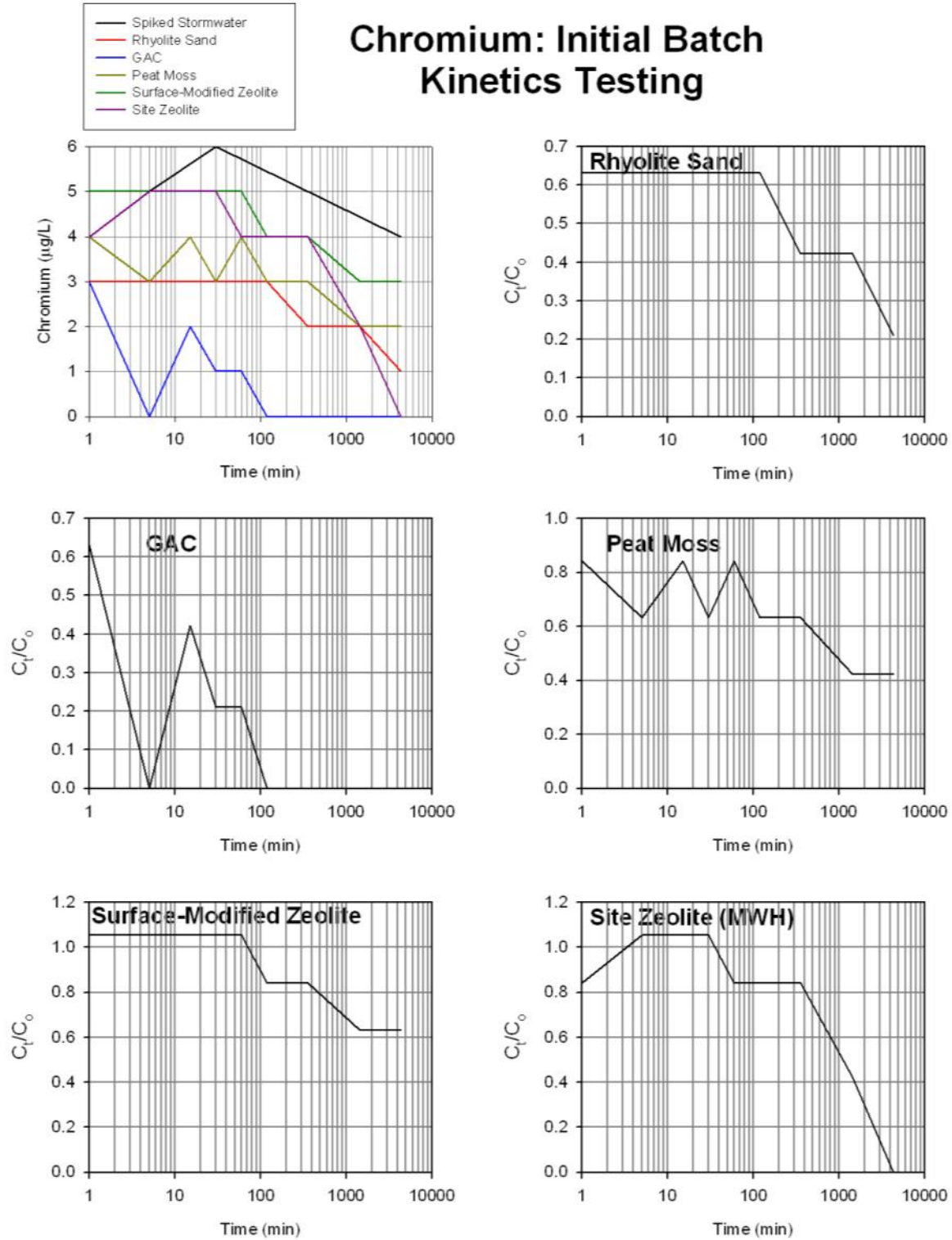


Figure C1-24. Chromium Removal as a Function of Time

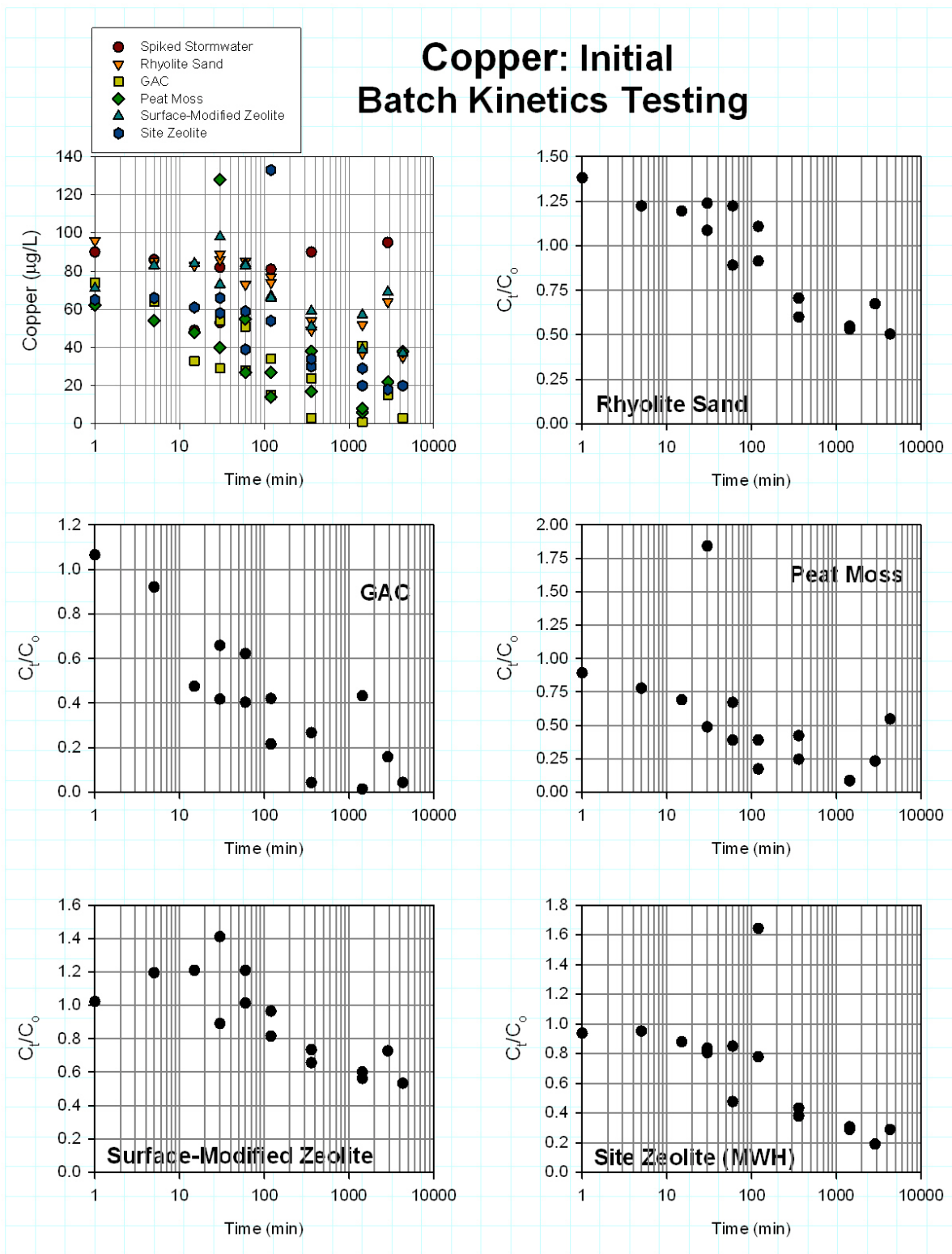


Figure C1-25. Copper Removal as a Function of Time

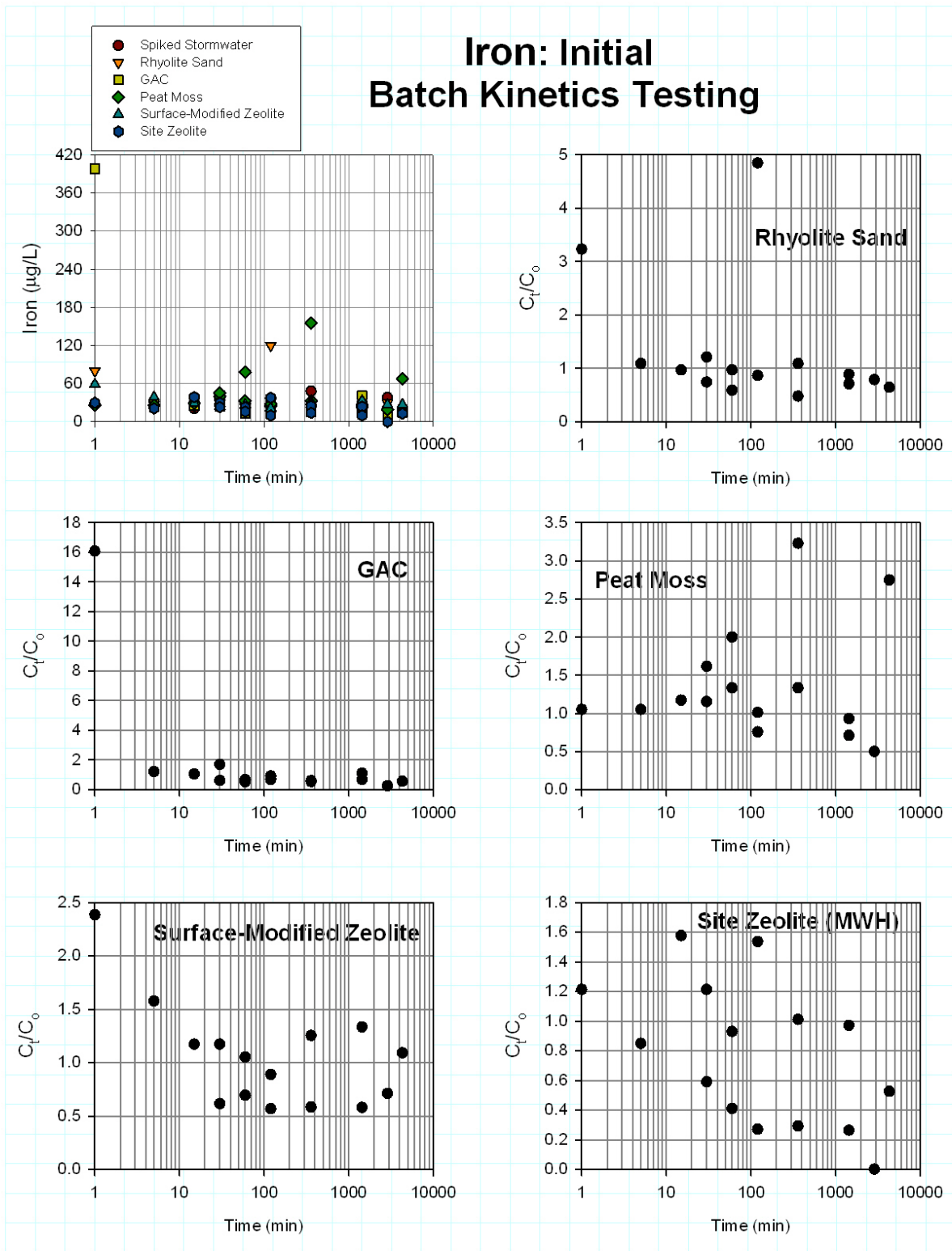


Figure C1-26. Iron Removal as a Function of Time

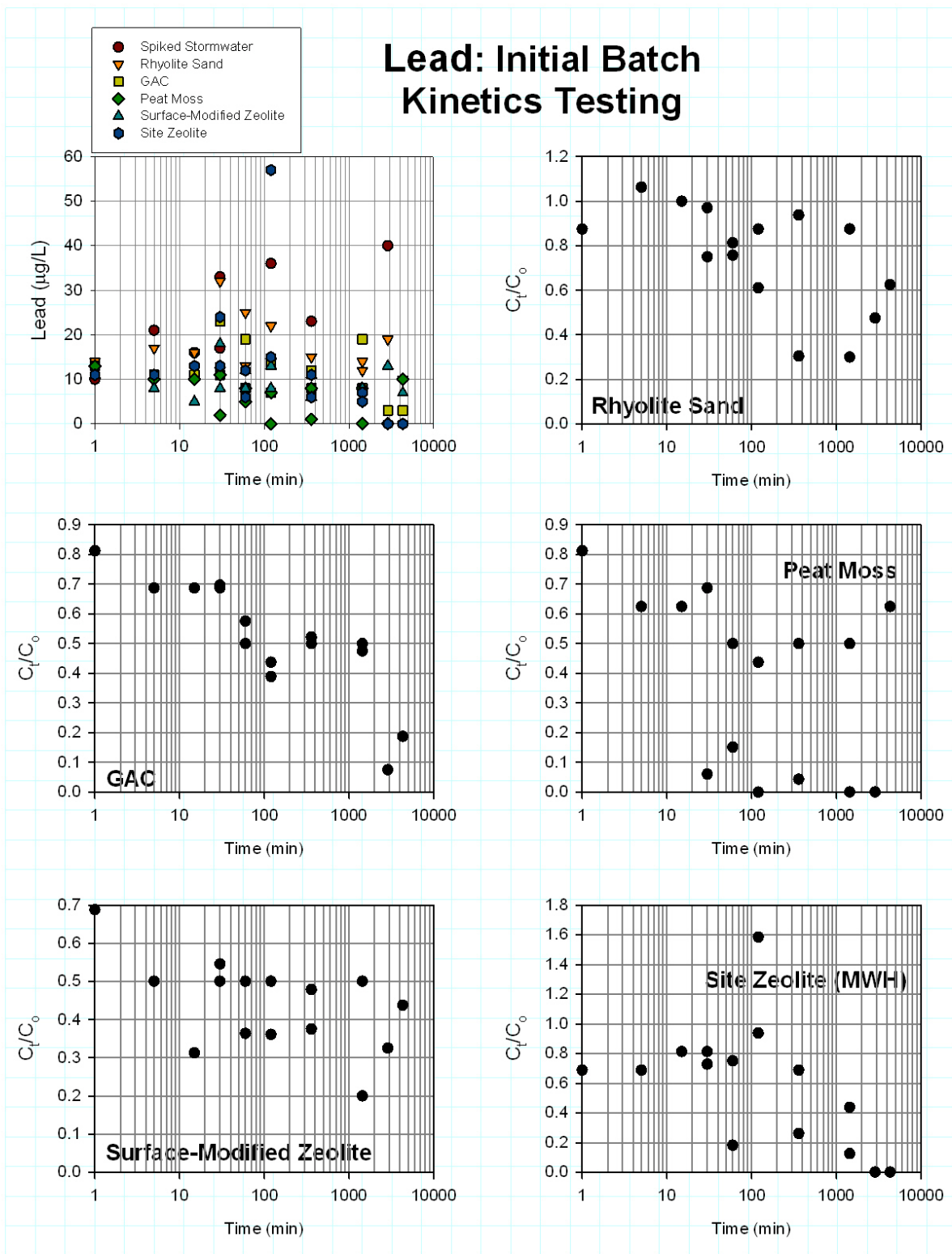


Figure C1-27. Lead Removal as a Function of Time

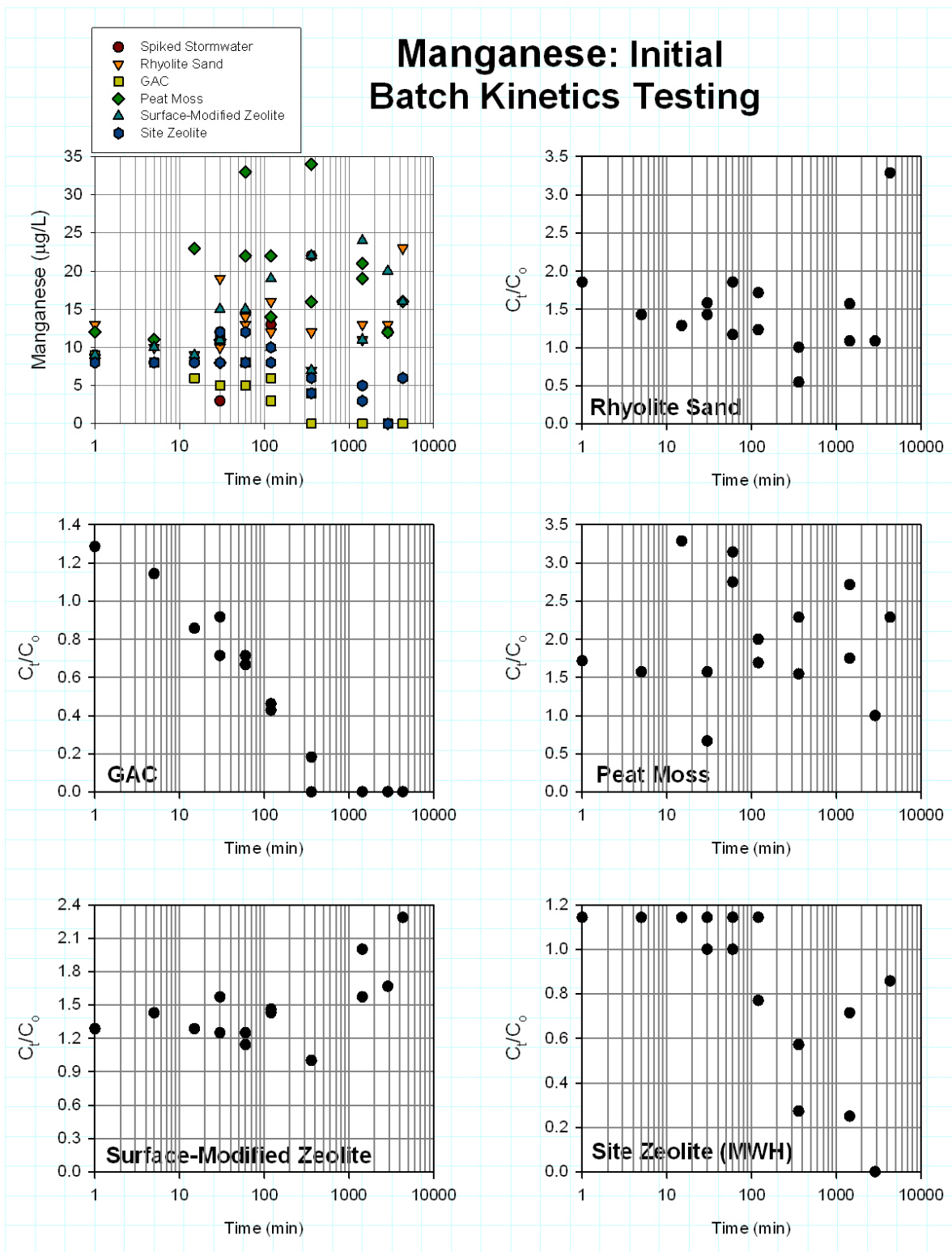


Figure C1-28. Manganese Removal as a Function of Time

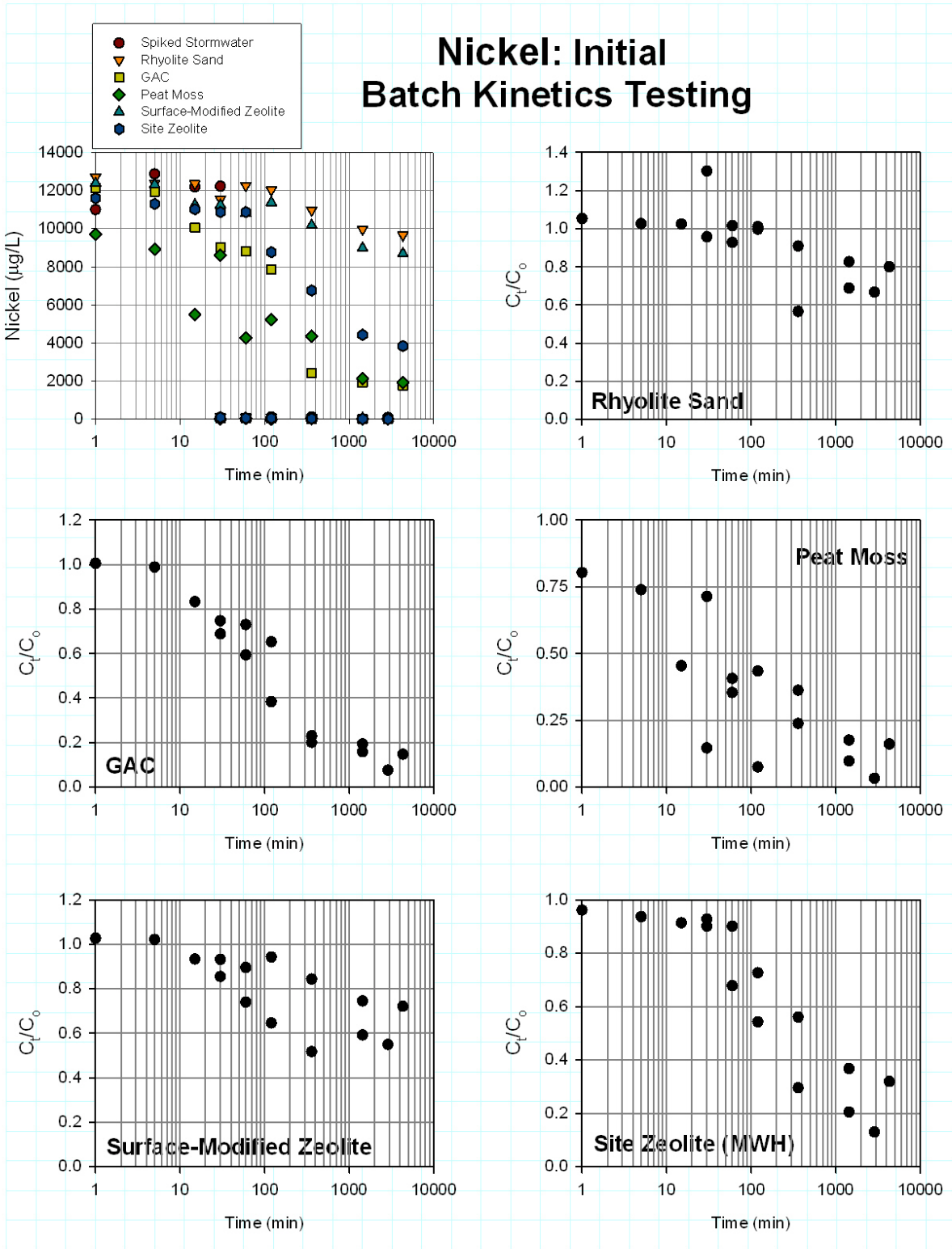


Figure C1-29. Nickel Removal as a Function of Time

Thallium: Initial Batch Kinetics Testing

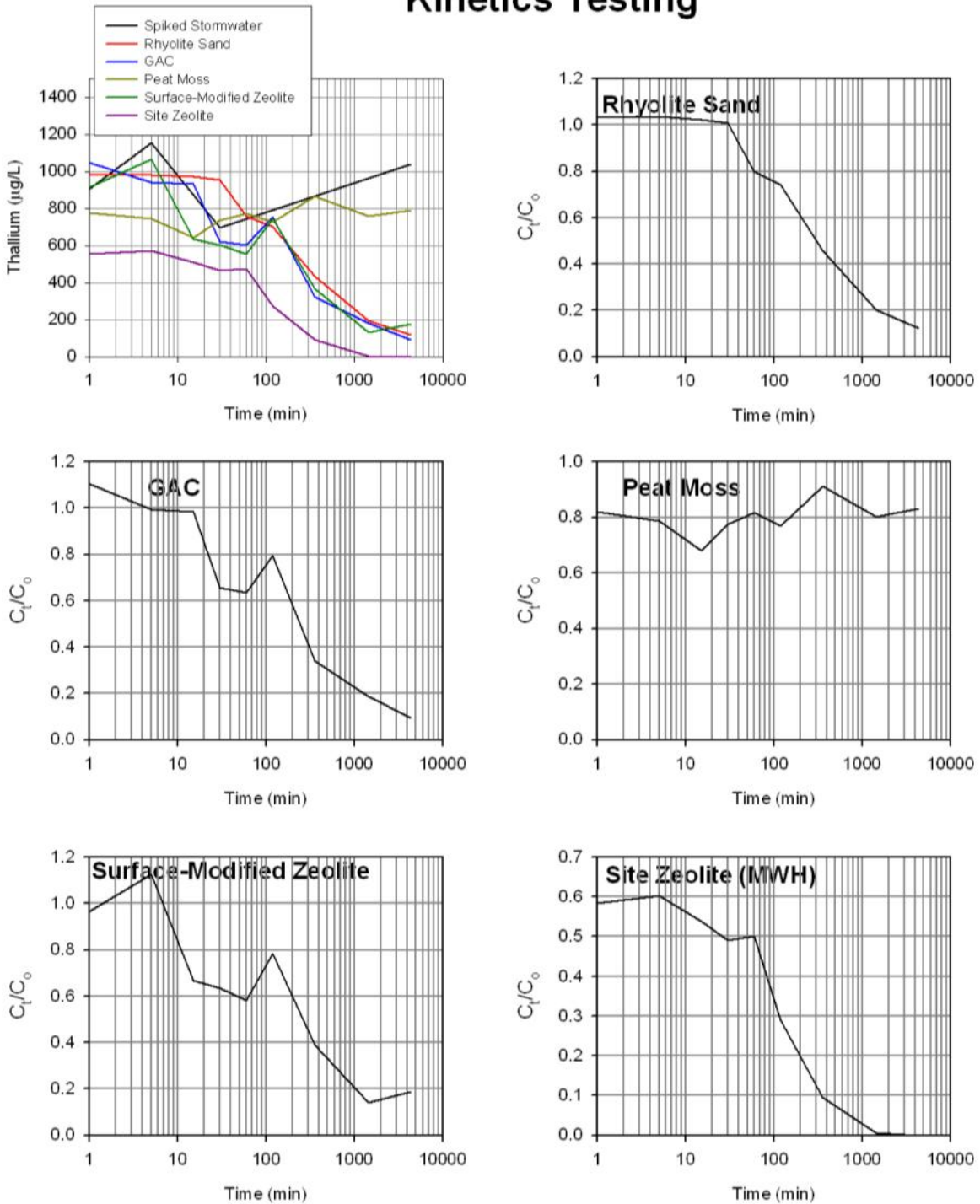


Figure C1-30. Thallium Removal as a Function of Time

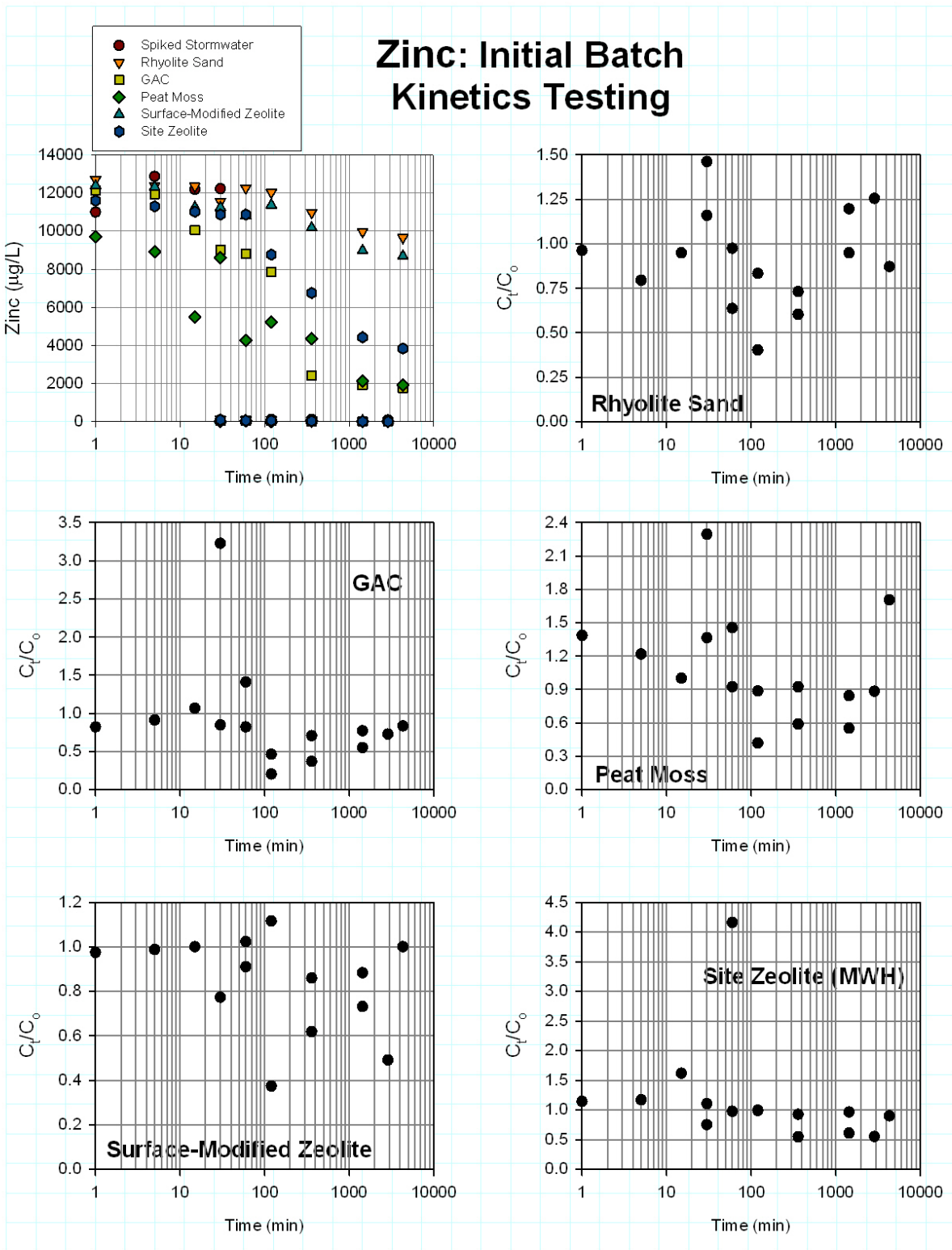


Figure C1-31. Zinc Removal as a Function of Time

