

Appendix E

Dithionite Injection Breakthrough Curves

This appendix contains dithionite and electrical conductivity (EC) measurements for seven of the eight injection well pairs treated during emplacement of the ISRM barrier at the Frontier Hard Chrome Superfund site. Data from the 3a/b well pair, which was the location of the first remedial action injection and was designed with the largest number of operational monitoring wells, is contained in Section 6.1 of the main report. For each injection well pair along the barrier alignment, data from the treated well pair, along with data from adjacent monitoring and/or injection wells, are presented. Table 6.2 and 6.4 in the main report provide a summary of test operations for these injections. Corrections applied to the EC data during the INJ1/INJ2 injection resulted from problems associated with probe drift. Corrected data are based on multiple calibrations that were conducted during the filed test and correlation between EC and dithionite concentration. These corrected data should be considered estimated values.

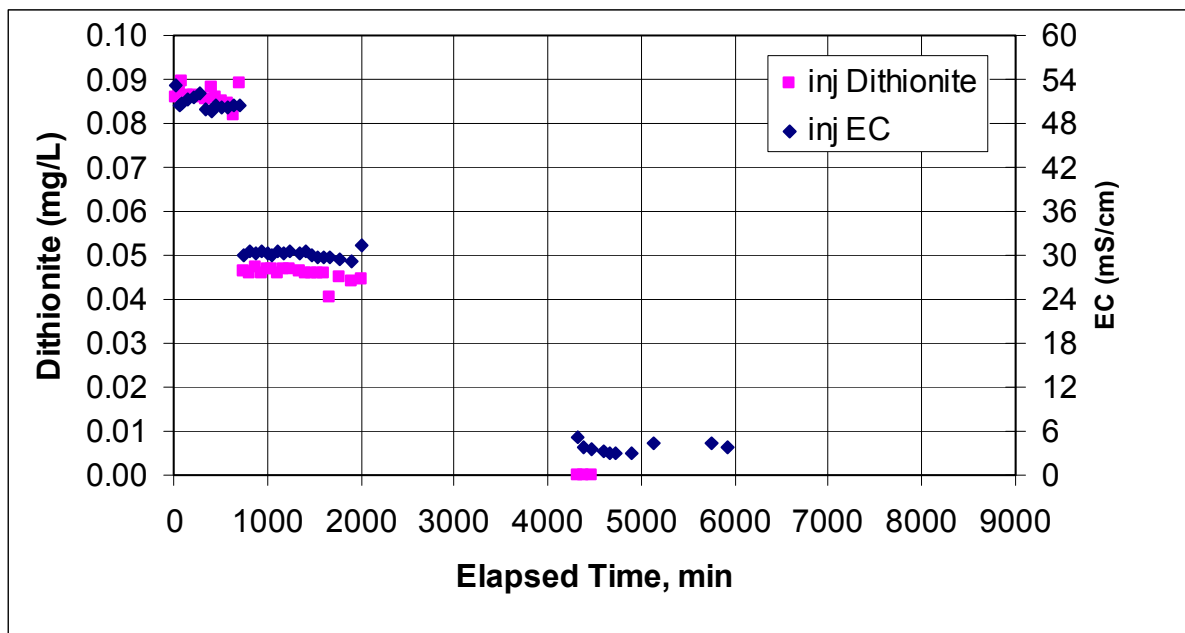


Figure E.1. Dithionite and EC Measurements of the Injection and Withdrawal Streams During the Dithionite Injection/Withdrawal Test at the RA-IW-2a/2b Well Pair

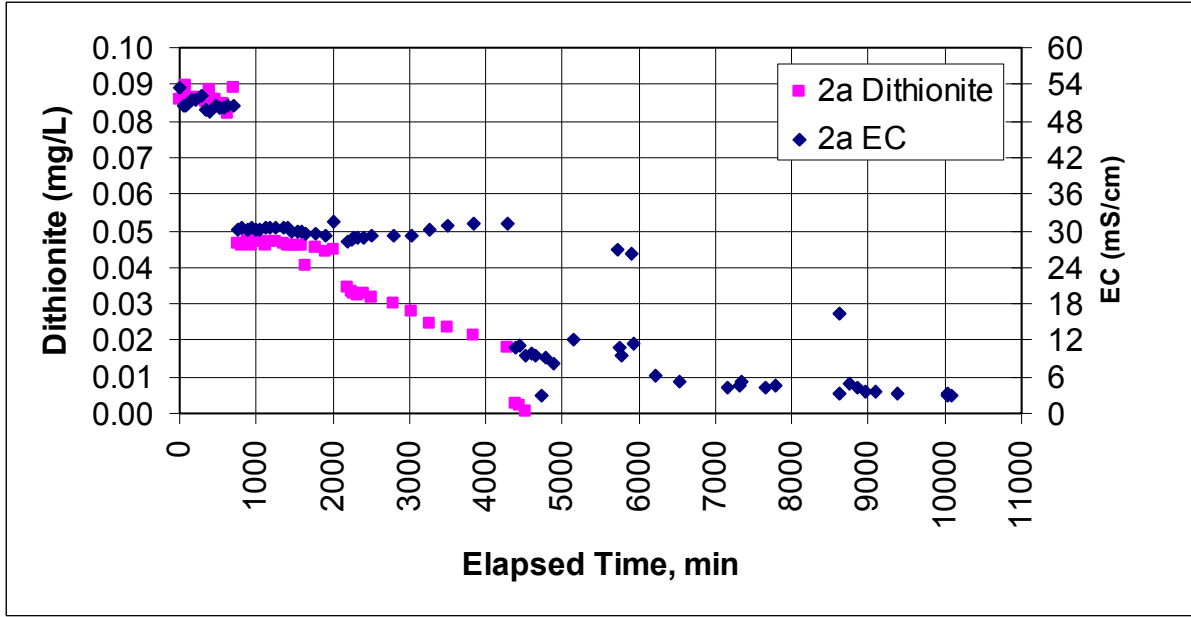


Figure E.2. Dithionite and EC Measurements at Well RA-IW-2a During the Dithionite Injection/Withdrawal Test at the RA-IW-2a/2b Well Pair

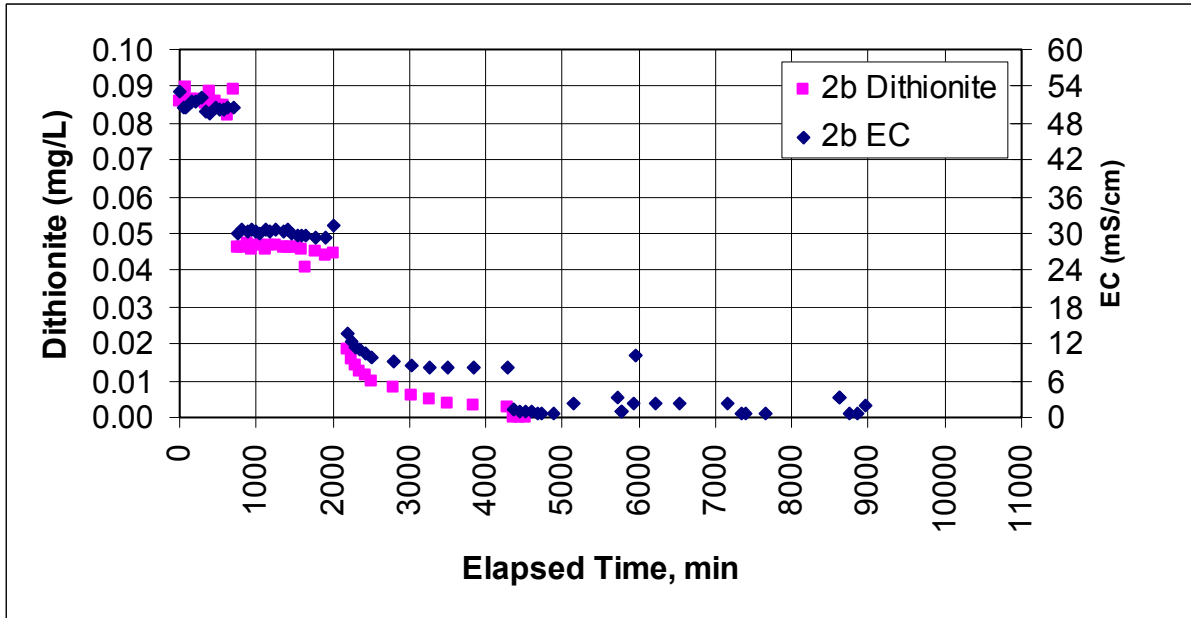


Figure E.3. Dithionite and EC Measurements at Well RA-IW-2b During the Dithionite Injection/Withdrawal Test at the RA-IW-2a/2b Well Pair

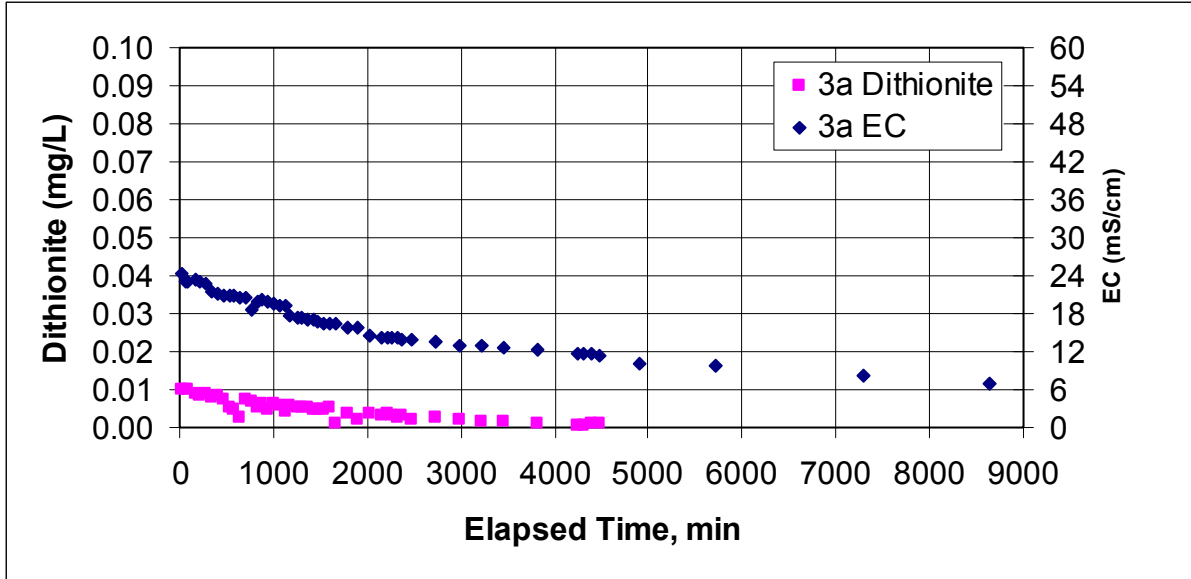


Figure E.4. Dithionite and EC Measurements at Well RA-IW-3a During the Dithionite Injection/Withdrawal Test at the RA-IW-2a/2b Well Pair

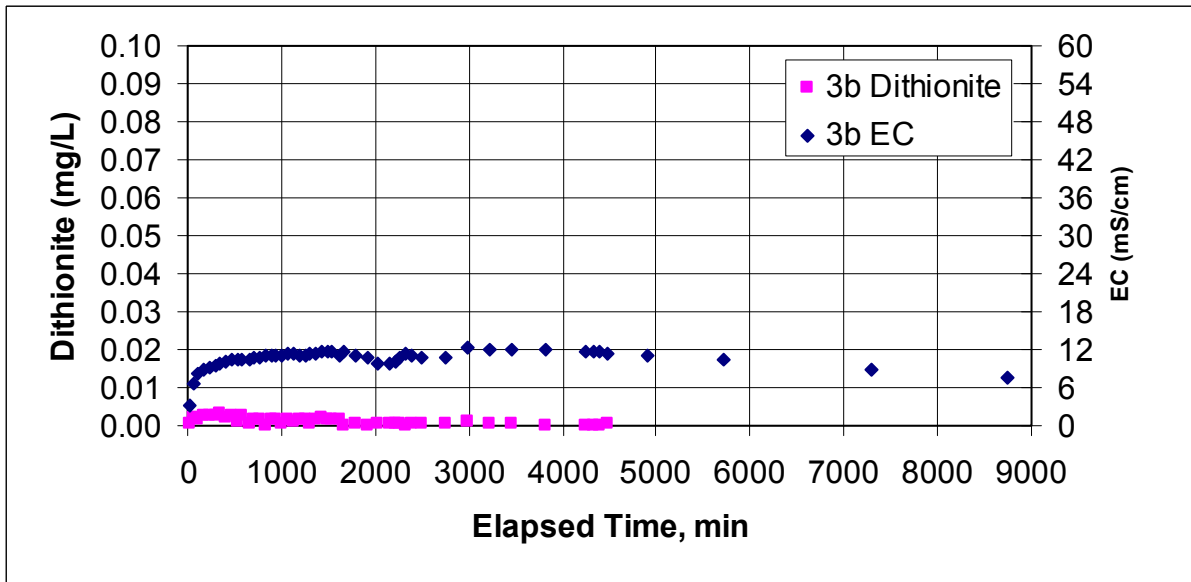


Figure E.5. Dithionite and EC Measurements at Well RA-IW-3b During the Dithionite Injection/Withdrawal Test at the RA-IW-2a/2b Well Pair

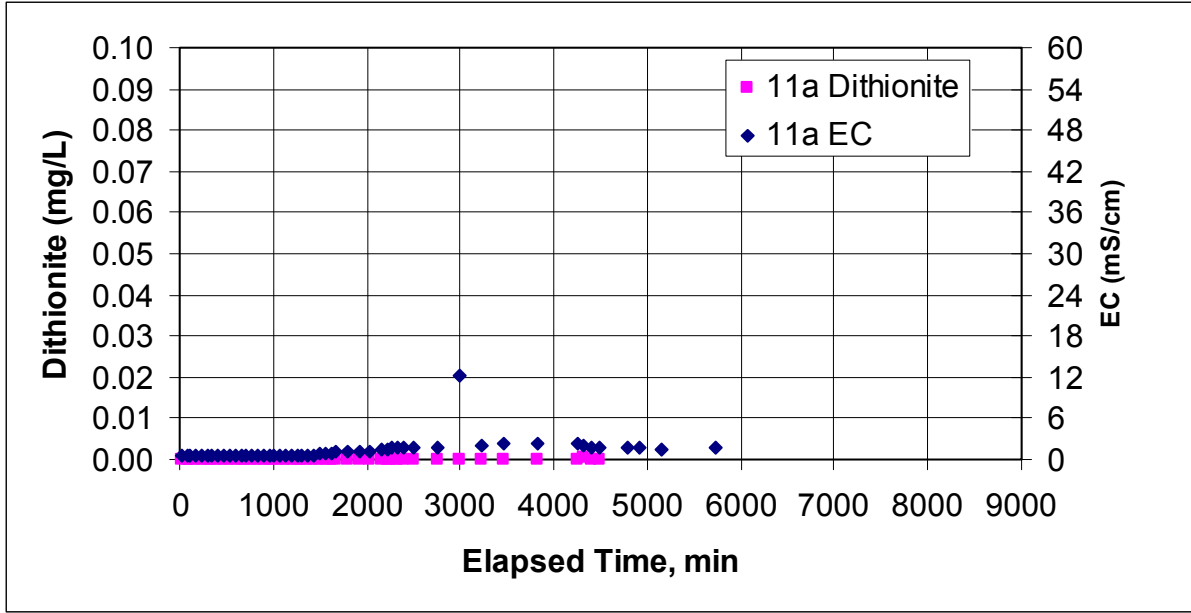


Figure E.6. Dithionite and EC Measurements at Well RA-MW-11a During the Dithionite Injection/Withdrawal Test at the RA-IW-2a/2b Well Pair

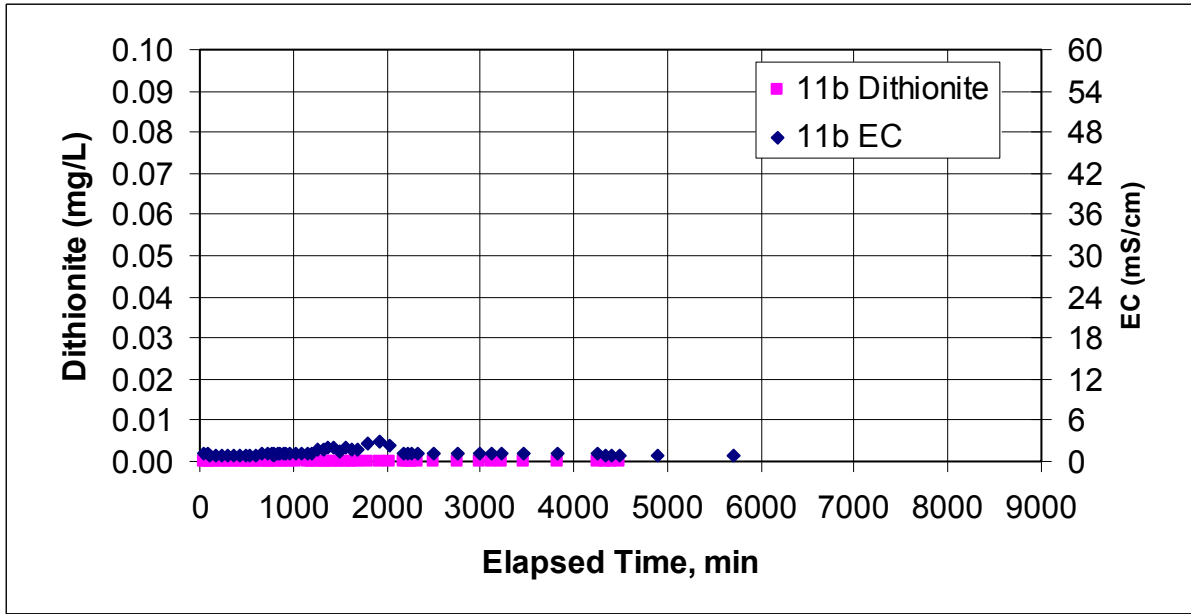


Figure E.7. Dithionite and EC Measurements at Well RA-MW-11b During the Dithionite Injection/Withdrawal Test at the RA-IW-2a/2b Well Pair

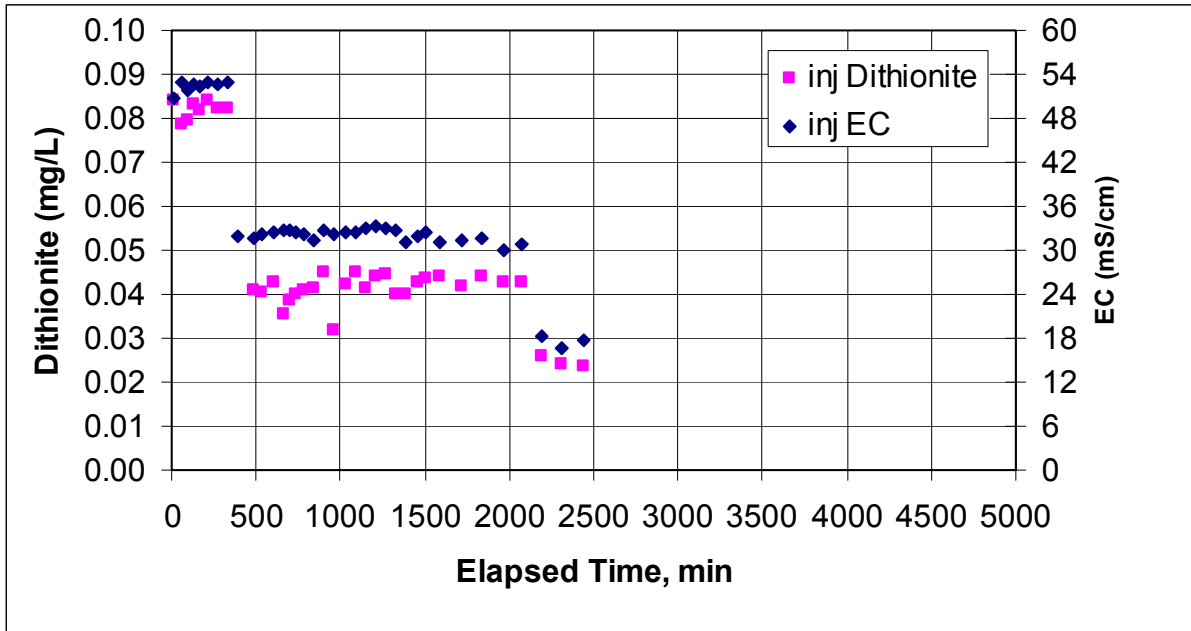


Figure E.8. Dithionite and EC Measurements of the Injection Stream During the Dithionite Injection Test at the RA-IW-4a/4b Well Pair

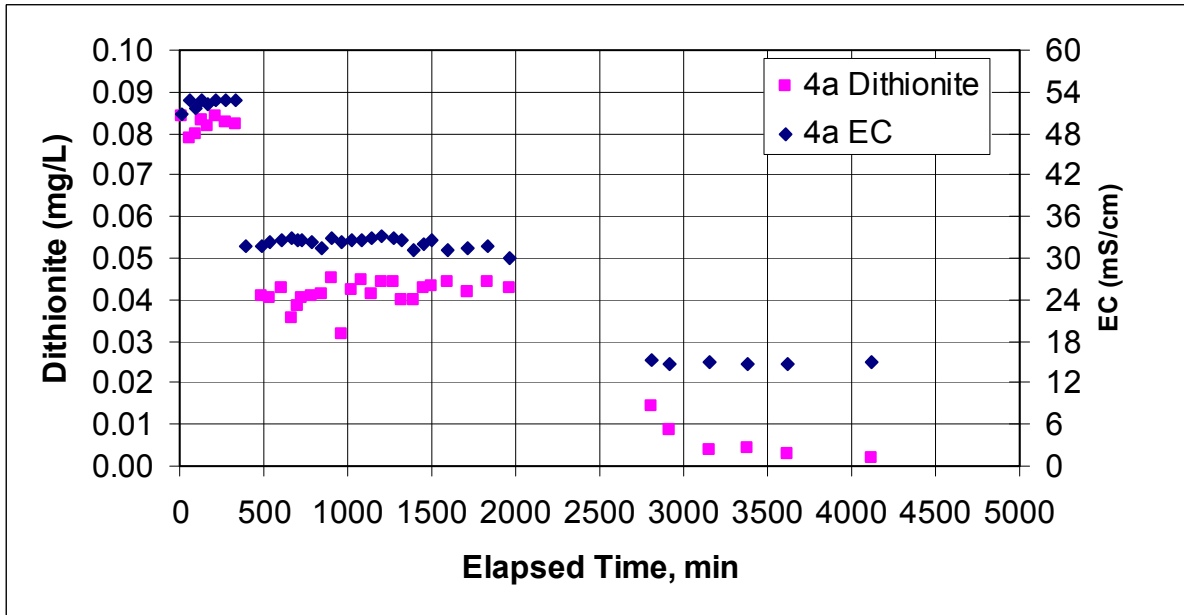


Figure E.9. Dithionite and EC Measurements at Well RA-IW-4a and Injection Stream During the Dithionite Injection Test at the RA-IW-4a/4b Well Pair

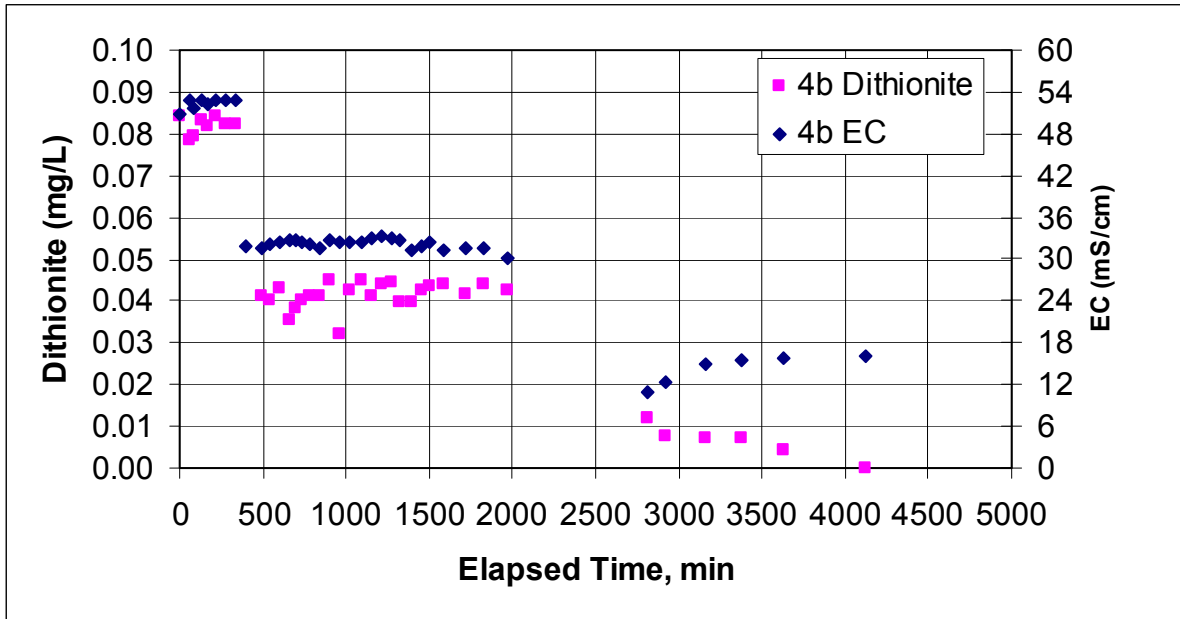


Figure E.10. Dithionite and EC Measurements at Well RA-IW-4b and Injection Stream During the Dithionite Injection Test at the RA-IW-4a/4b Well Pair

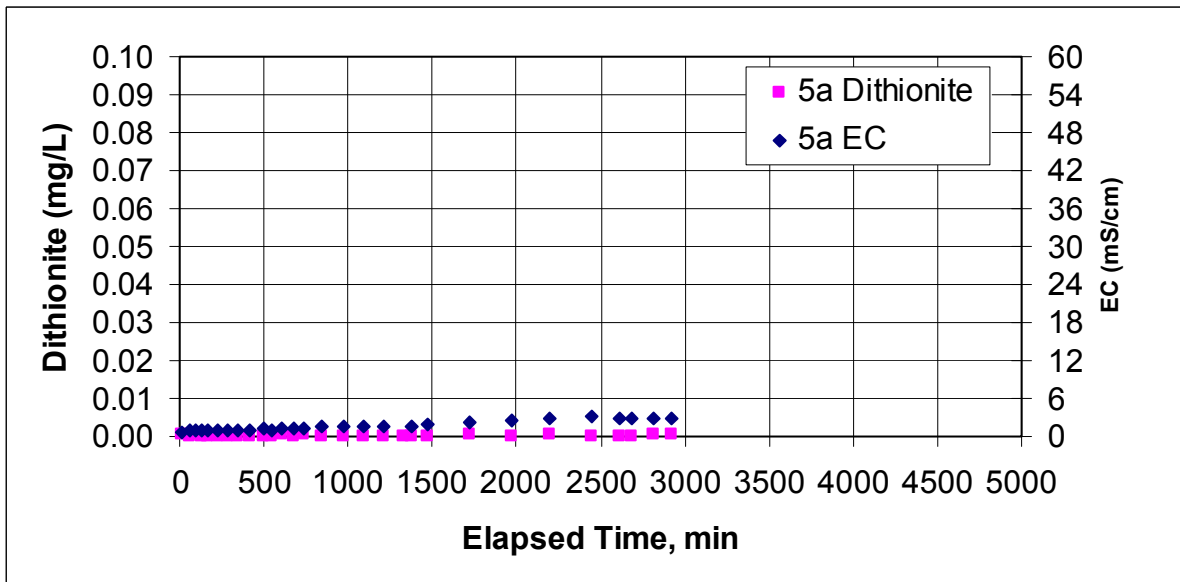


Figure E.11. Dithionite and EC Measurements at Well RA-IW-5a During the Dithionite Injection Test at the RA-IW-4a/4b Well Pair

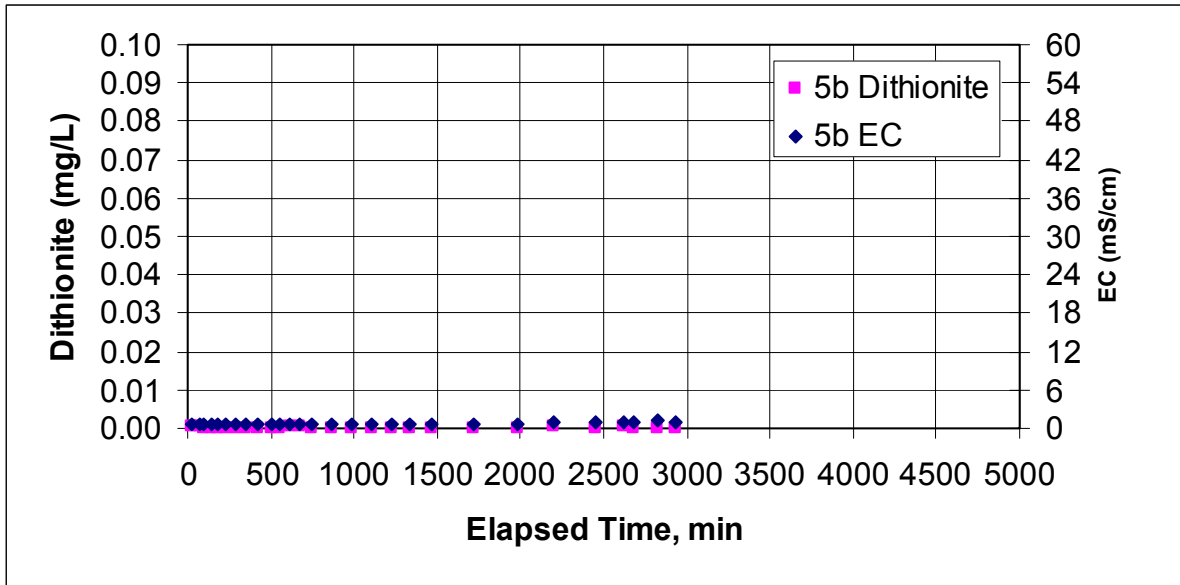


Figure E.12. Dithionite and EC Measurements at Well RA-IW-5b During the Dithionite Injection Test at the RA-IW-4a/4b Well Pair

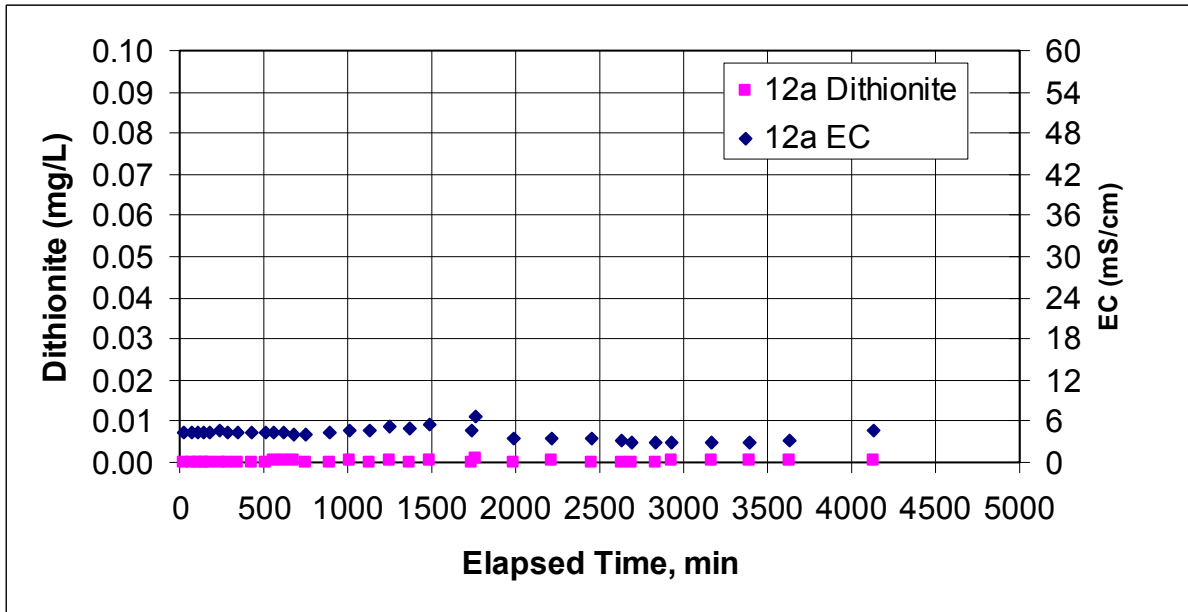


Figure E.13. Dithionite and EC Measurements at Well RA-MW-12a During the Dithionite Injection Test at the RA-IW-4a/4b Well Pair

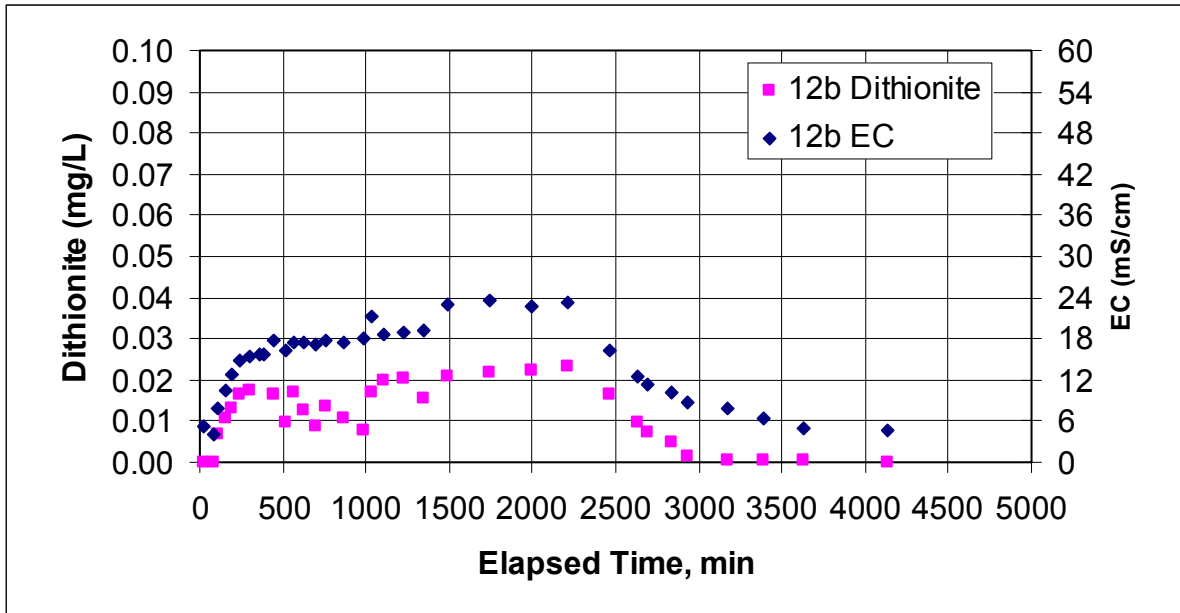


Figure E.14. Dithionite and EC Measurements at Well RA-MW-12b During the Dithionite Injection Test at the RA-IW-4a/4b Well Pair

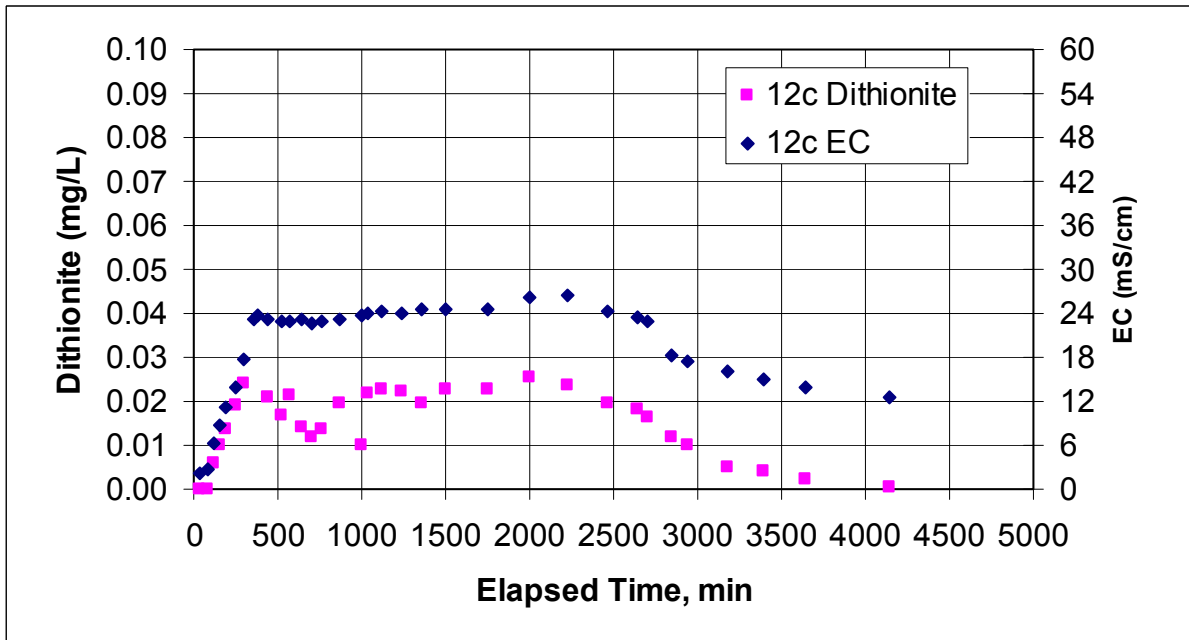


Figure E.15. Dithionite and EC Measurements at Well RA-MW-12c During the Dithionite Injection Test at the RA-IW-4a/4b Well Pair

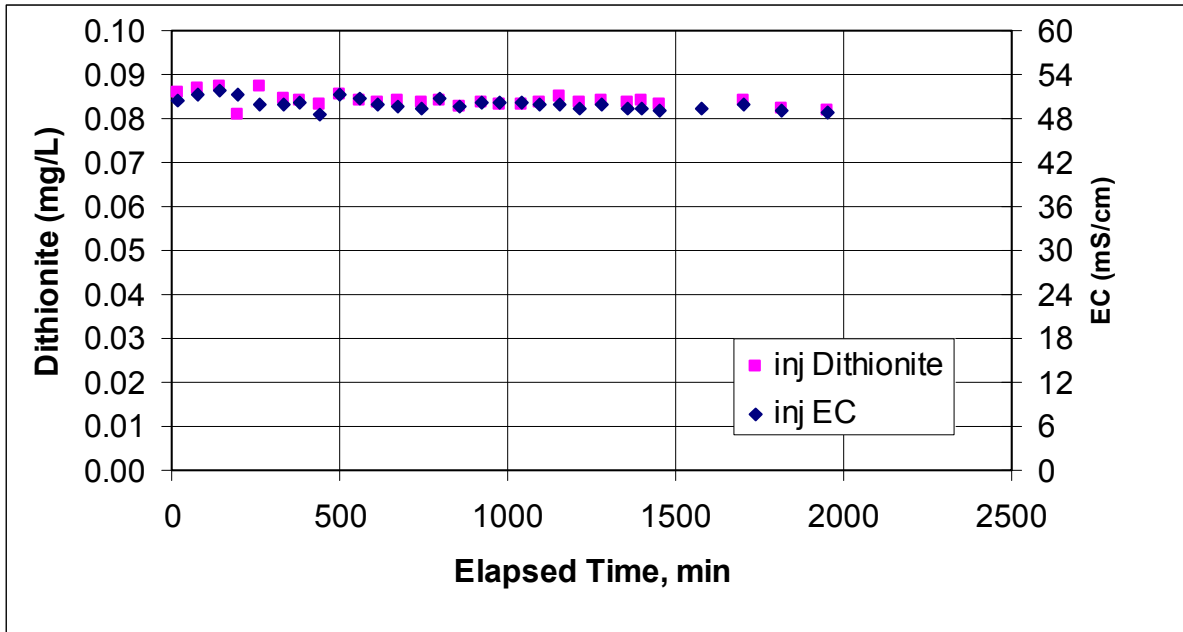


Figure E.16. Dithionite and EC Measurements of the Injection Stream During the Dithionite Injection Test at the RA-IW-5a/5b Well Pair

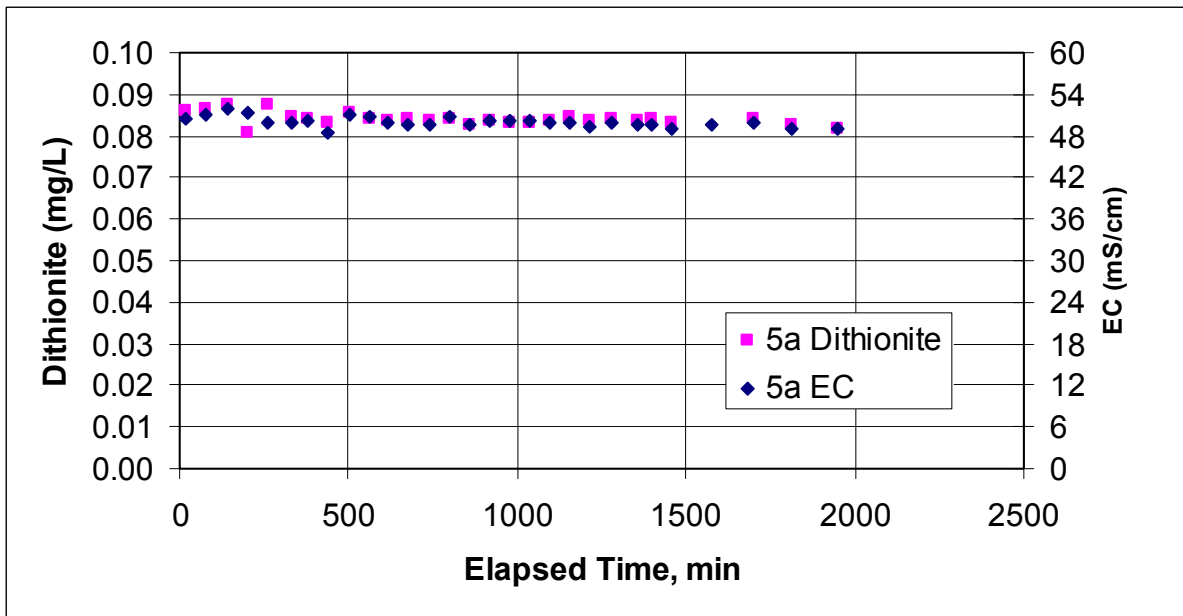


Figure E.17. Dithionite and EC Measurements at Well RA-IW-5a and Injection Stream During the Dithionite Injection Test at the RA-IW-5a/5b Well Pair

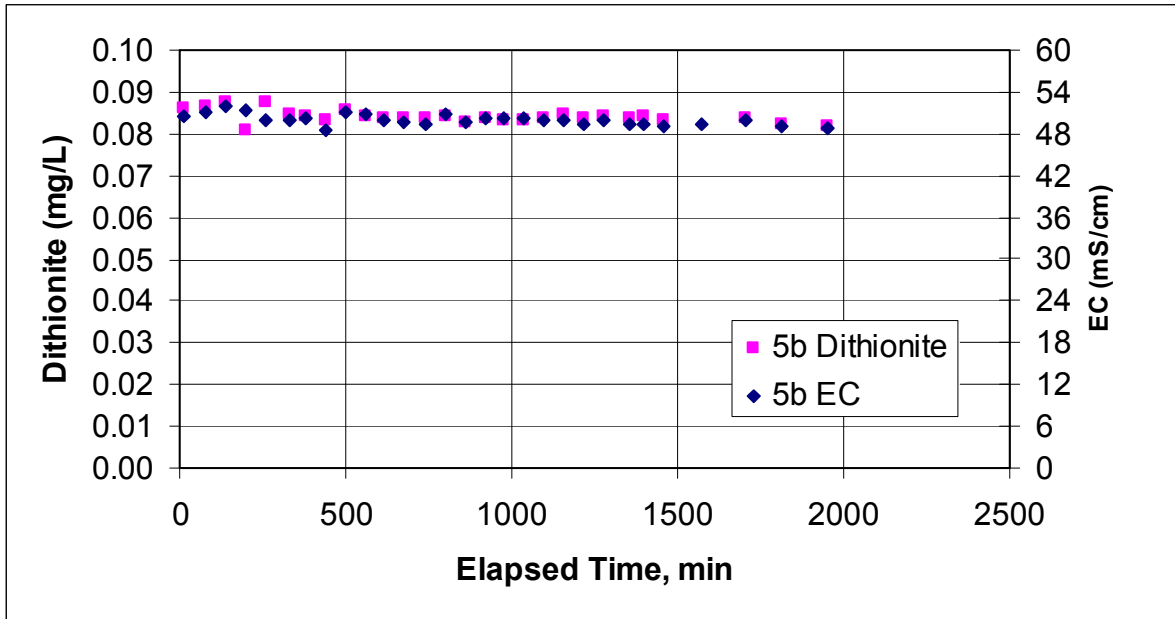


Figure E.18. Dithionite and EC Measurements at Well RA-IW-5b and Injection Stream During the Dithionite Injection Test at the RA-IW-5a/5b Well Pair

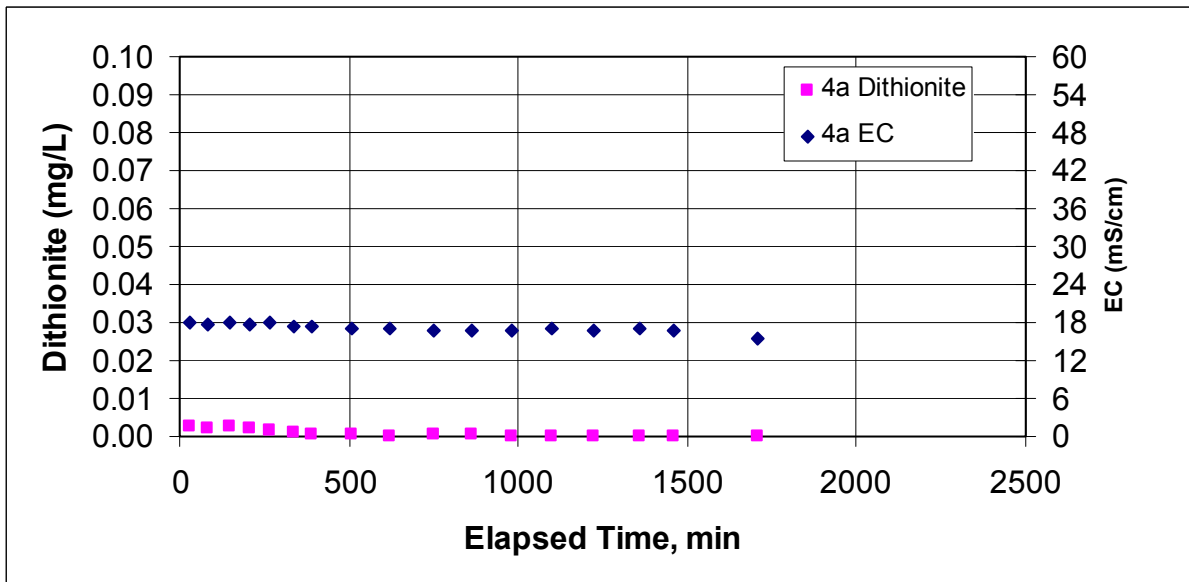


Figure E.19. Dithionite and EC Measurements at Well RA-IW-4a During the Dithionite Injection Test at the RA-IW-5a/5b Well Pair

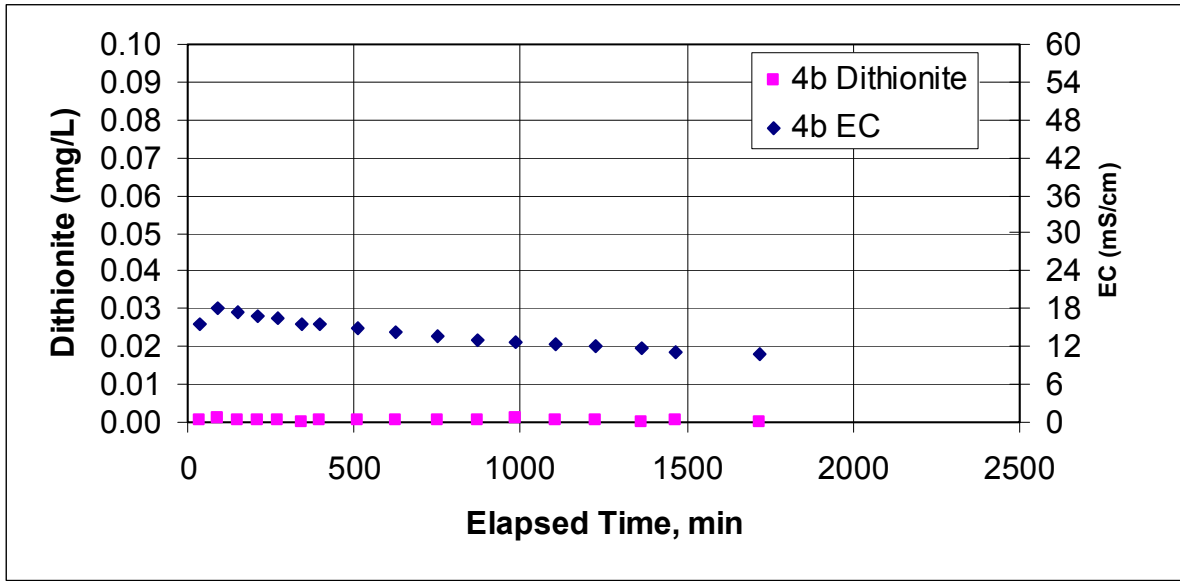


Figure E.20. Dithionite and EC Measurements at Well RA-IW-4b During the Dithionite Injection Test at the RA-IW-5a/5b Well Pair

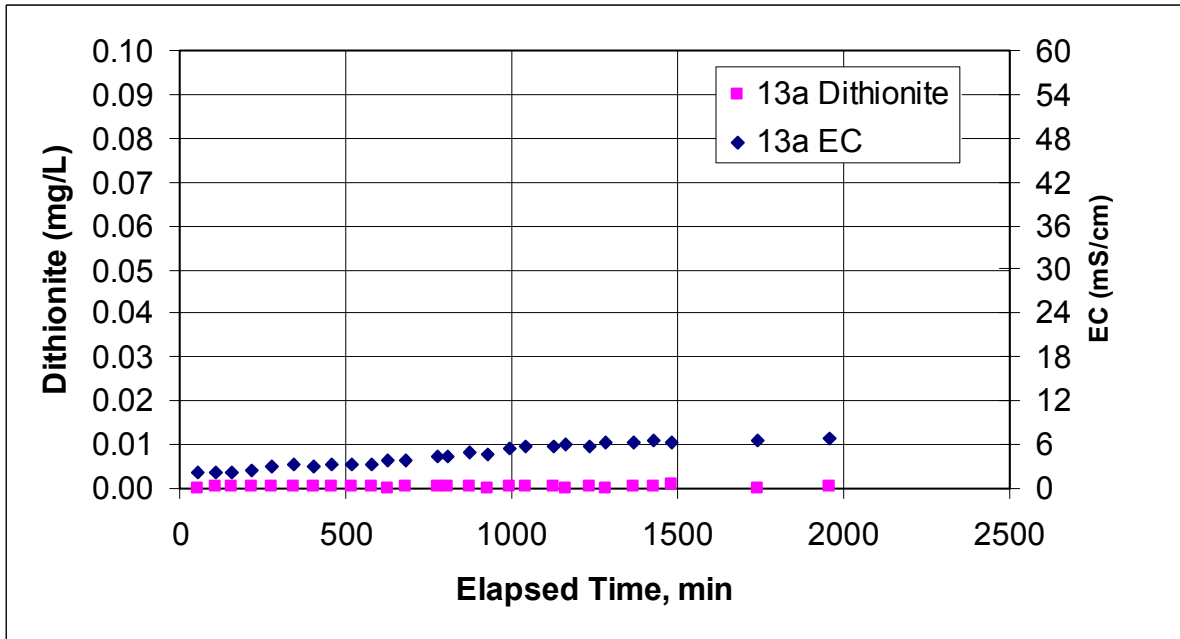


Figure E.21. Dithionite and EC Measurements at Well RA-MW-13a During the Dithionite Injection Test at the RA-IW-5a/5b Well Pair

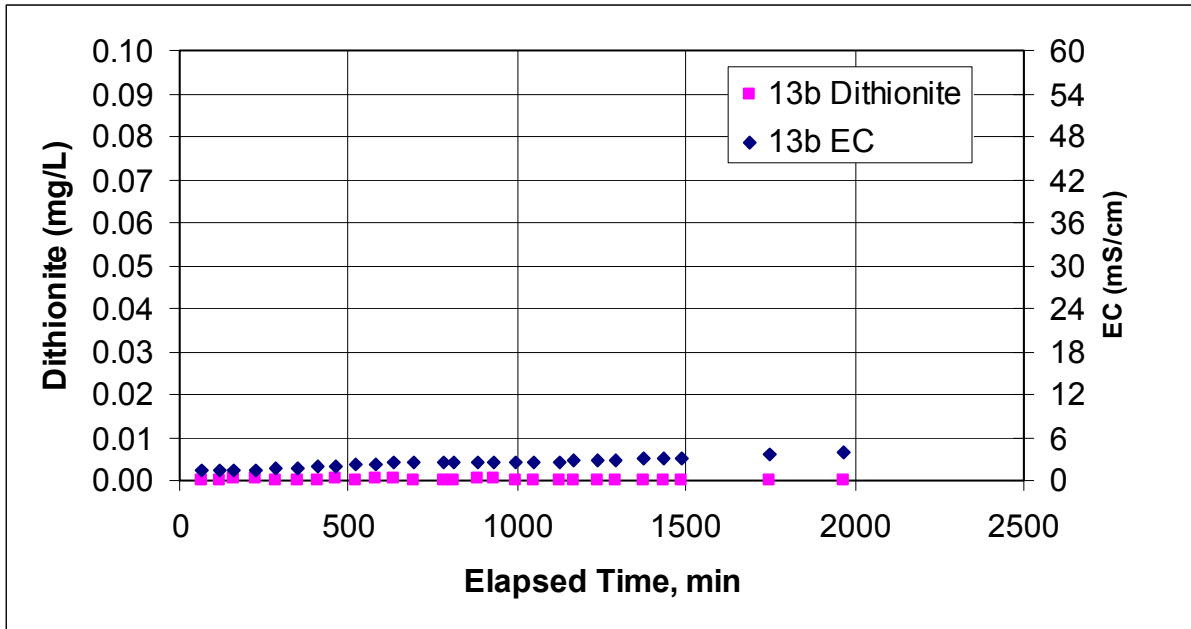


Figure E.22. Dithionite and EC Measurements at Well RA-MW-13b During the Dithionite Injection Test at the RA-IW-5a/5b Well Pair

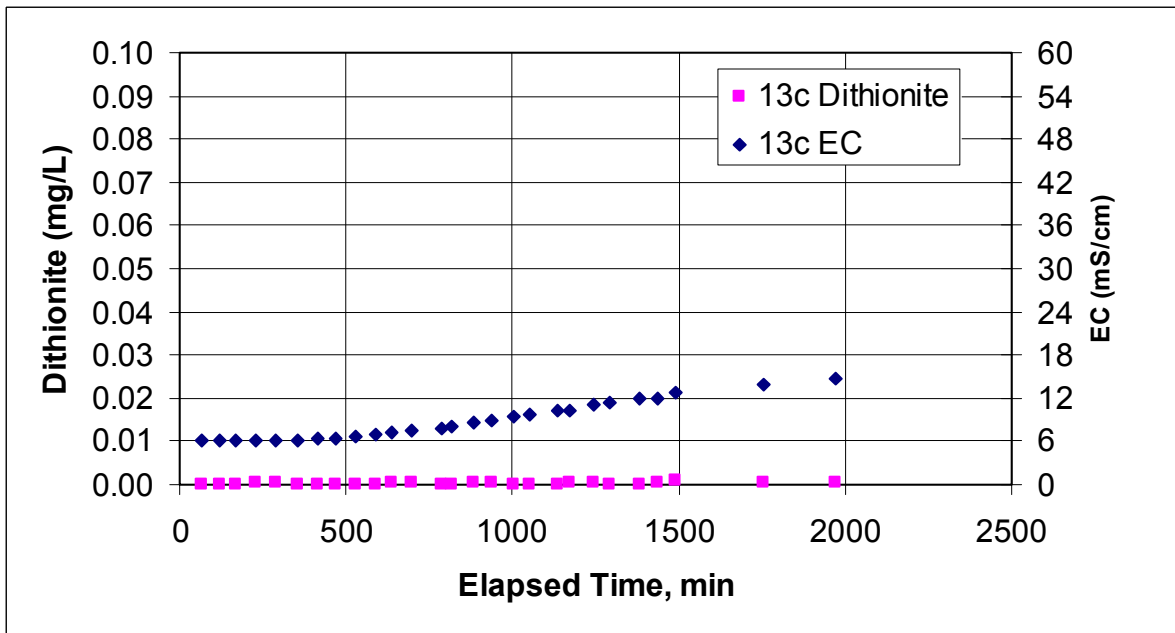


Figure E.23. Dithionite and EC Measurements at Well RA-MW-13c During the Dithionite Injection Test at the RA-IW-5a/5b Well Pair

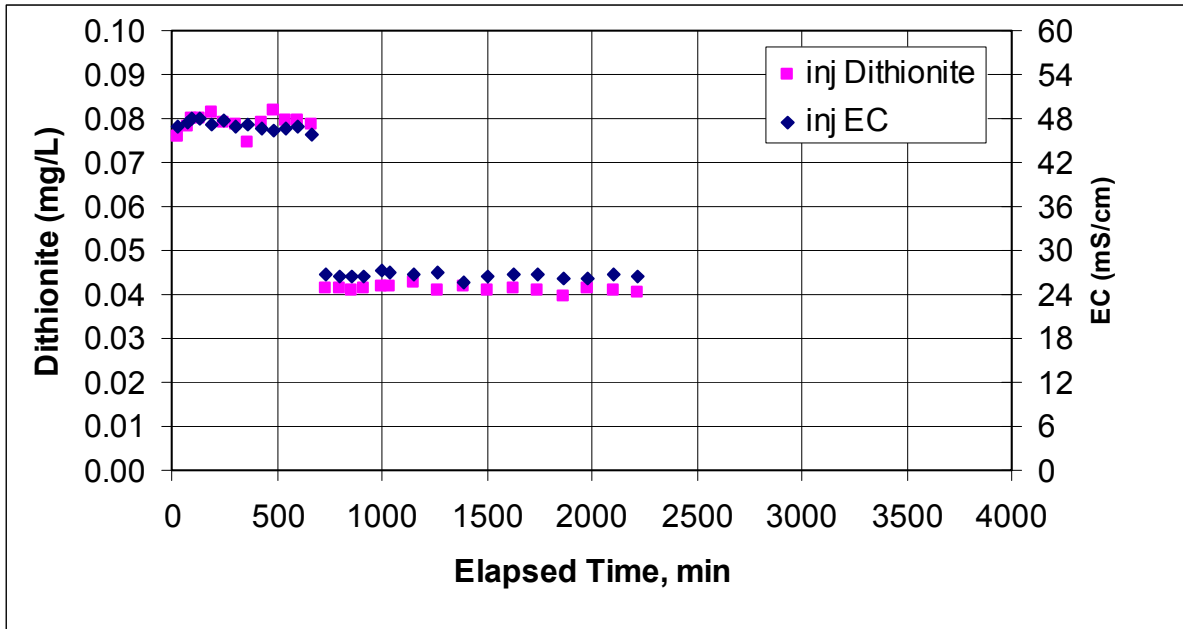


Figure E.24. Dithionite and EC Measurements of the Injection Stream During the Dithionite Injection Test at the RA-IW-6a/6b Well Pair

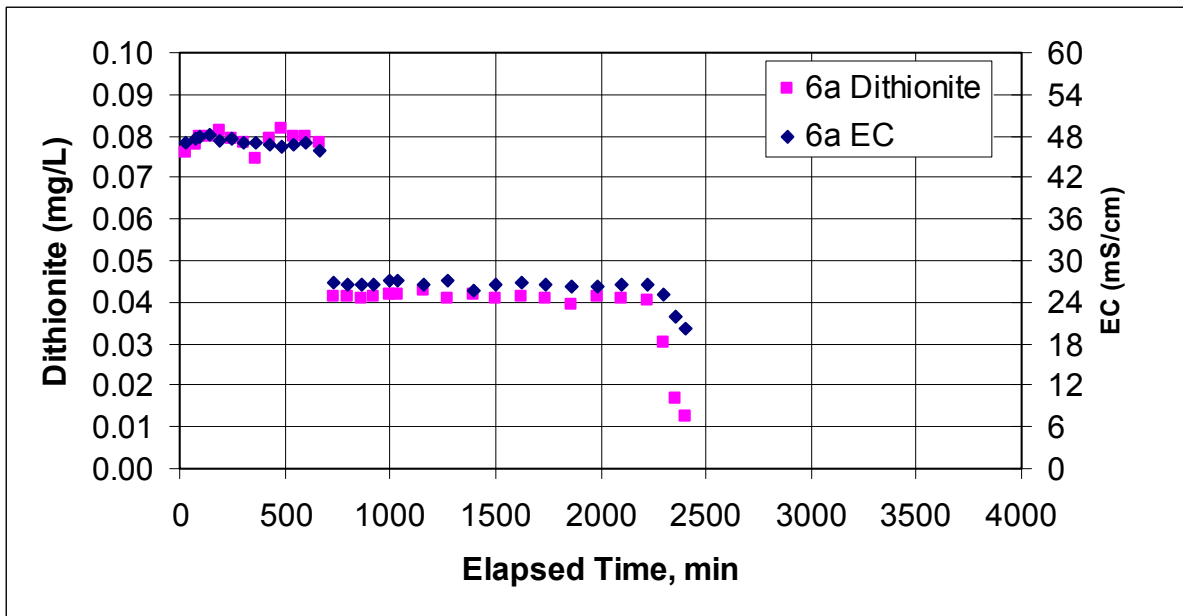


Figure E.25. Dithionite and EC Measurements at Well RA-IW-6a and Injection Stream During the Dithionite Injection Test at the RA-IW-6a/6b Well Pair

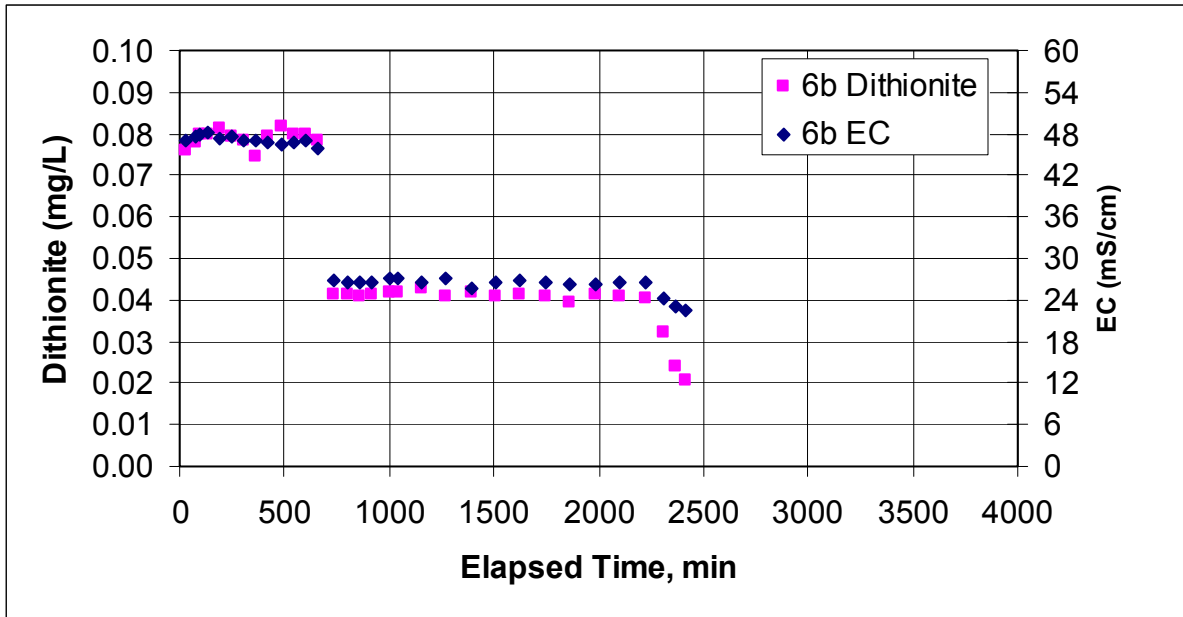


Figure E.26. Dithionite and EC Measurements at Well RA-IW-6b and Injection Stream During the Dithionite Injection Test at the RA-IW-6a/6b Well Pair

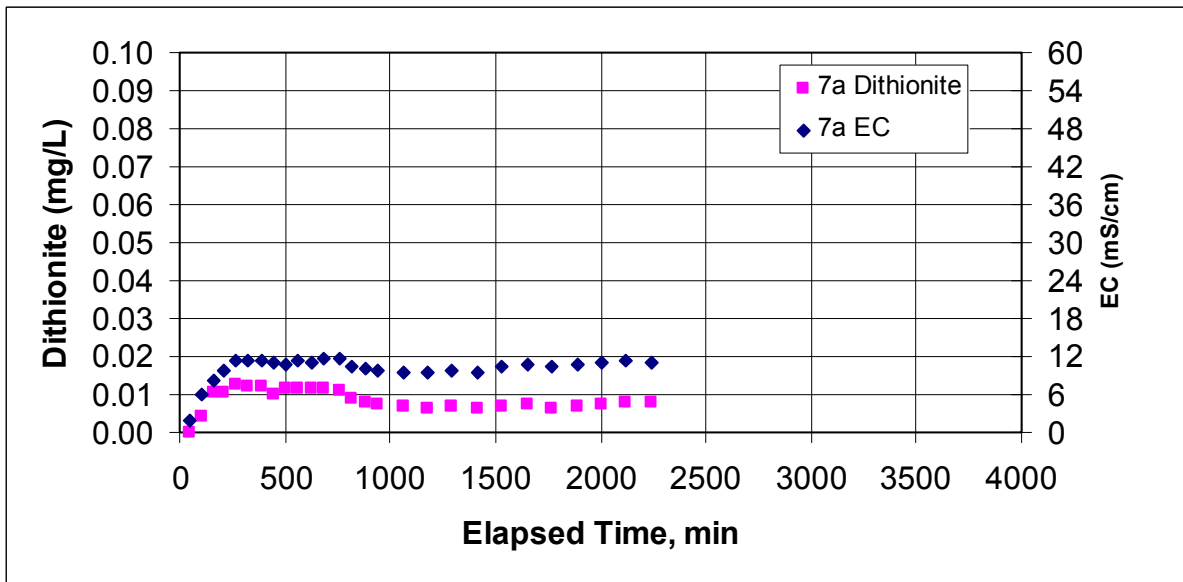


Figure E.27. Dithionite and EC Measurements at Well RA-IW-7a During the Dithionite Injection Test at the RA-IW-6a/6b Well Pair

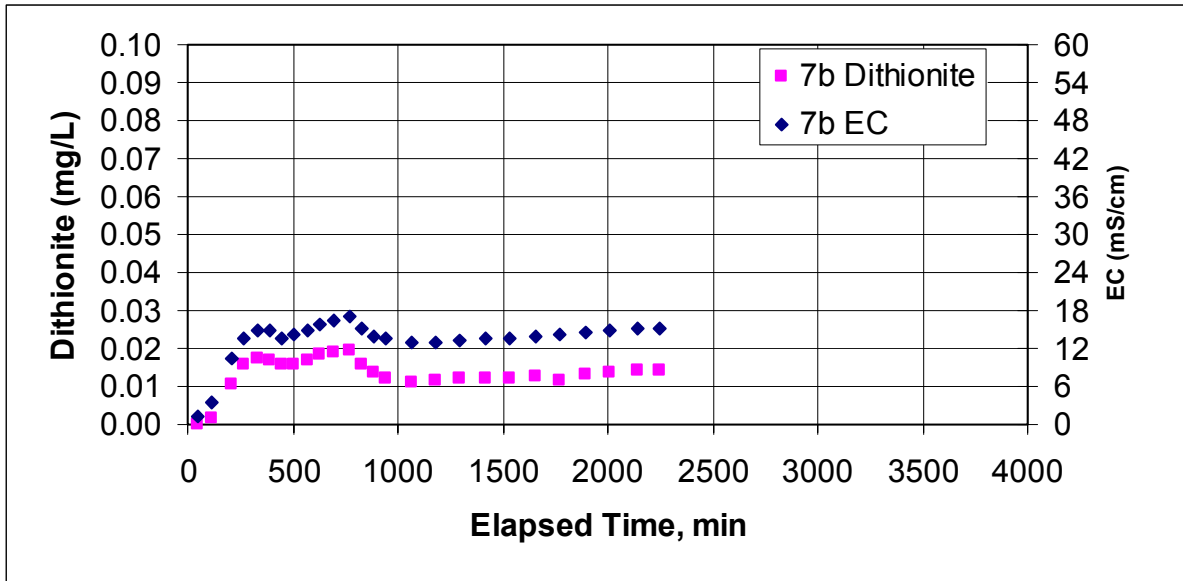


Figure E.28. Dithionite and EC Measurements at Well RA-IW-7b During the Dithionite Injection Test at the RA-IW-6a/6b Well Pair

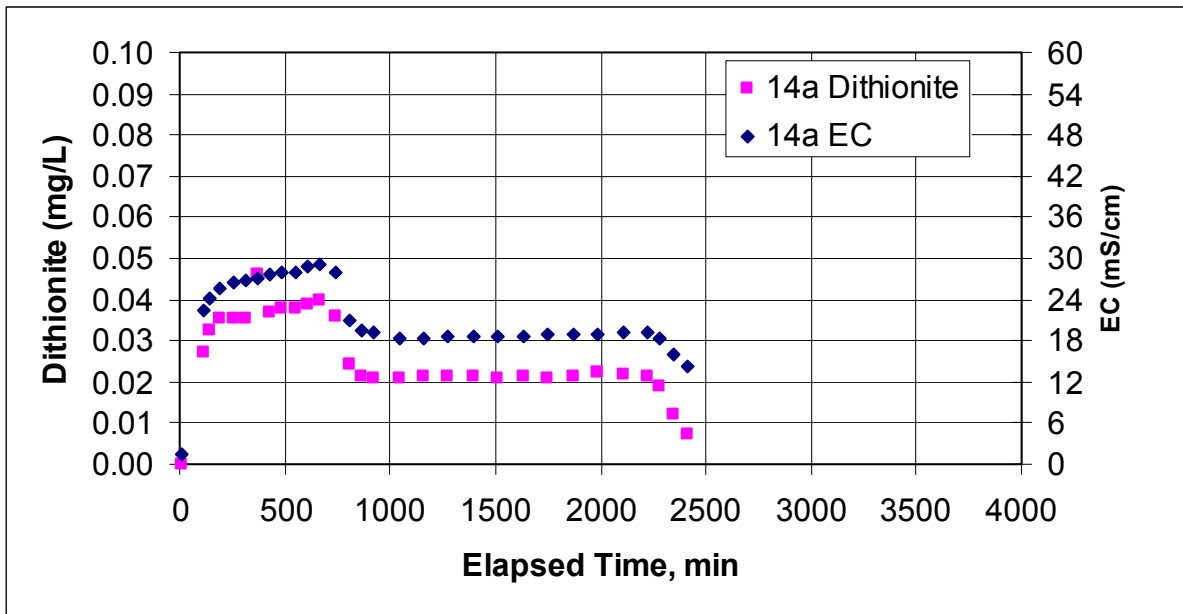


Figure E.29. Dithionite and EC Measurements at Well RA-MW-14a During the Dithionite Injection Test at the RA-IW-6a/6b Well Pair

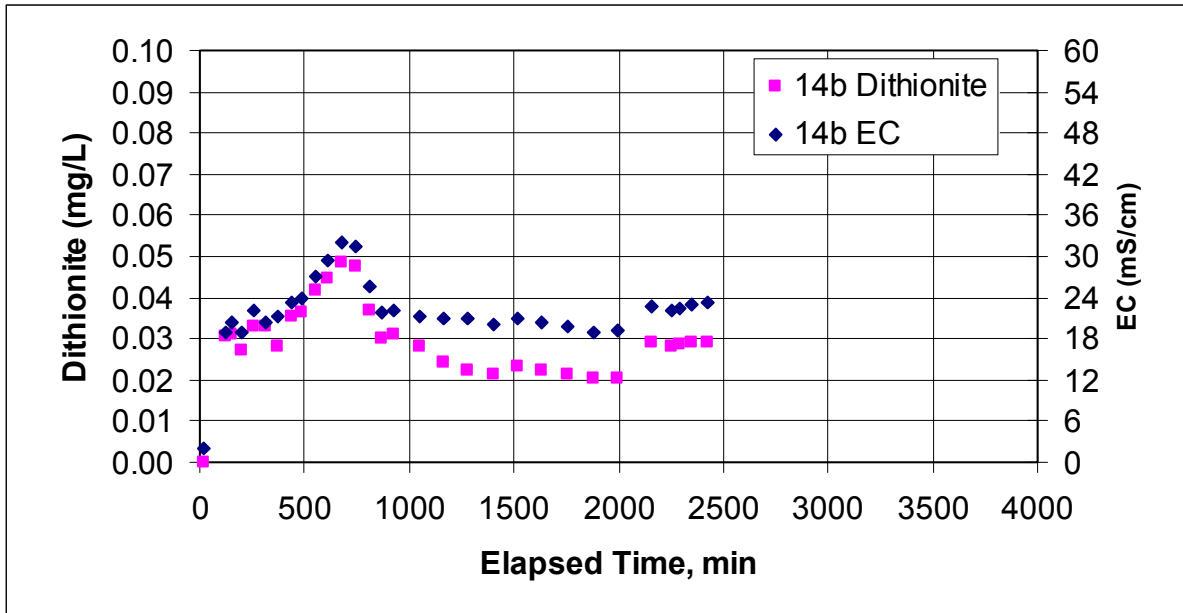


Figure E.30. Dithionite and EC Measurements at Well RA-MW-14b During the Dithionite Injection Test at the RA-IW-6a/6b Well Pair

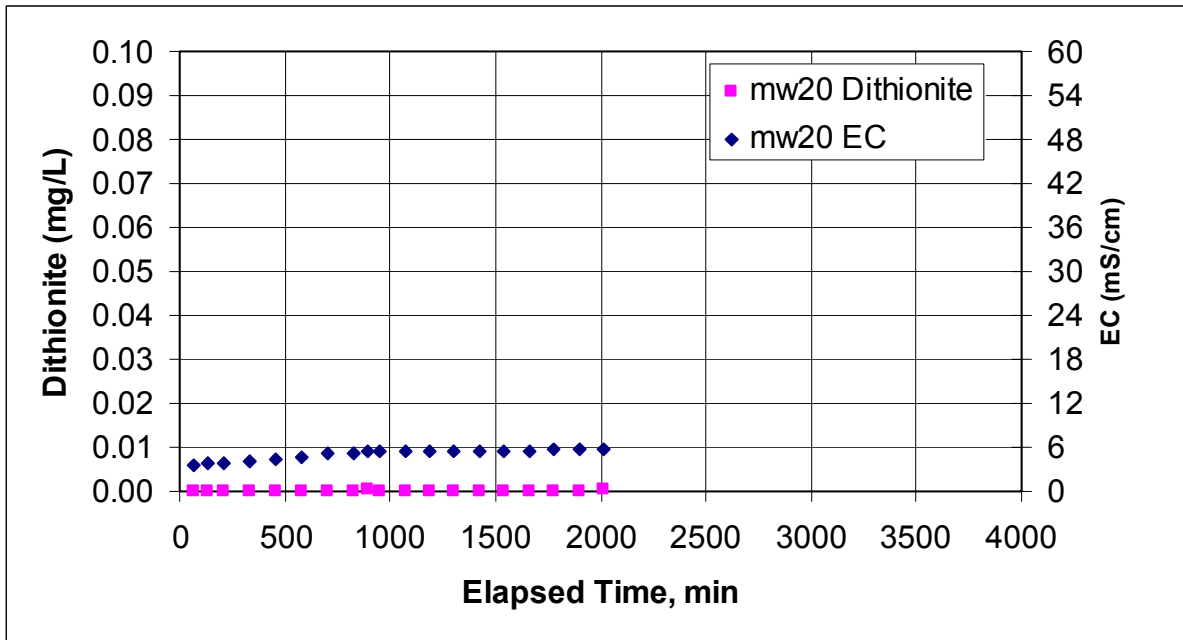


Figure E.31. Dithionite and EC Measurements at Well MW-20 During the Dithionite Injection Test at the RA-IW-6a/6b Well Pair

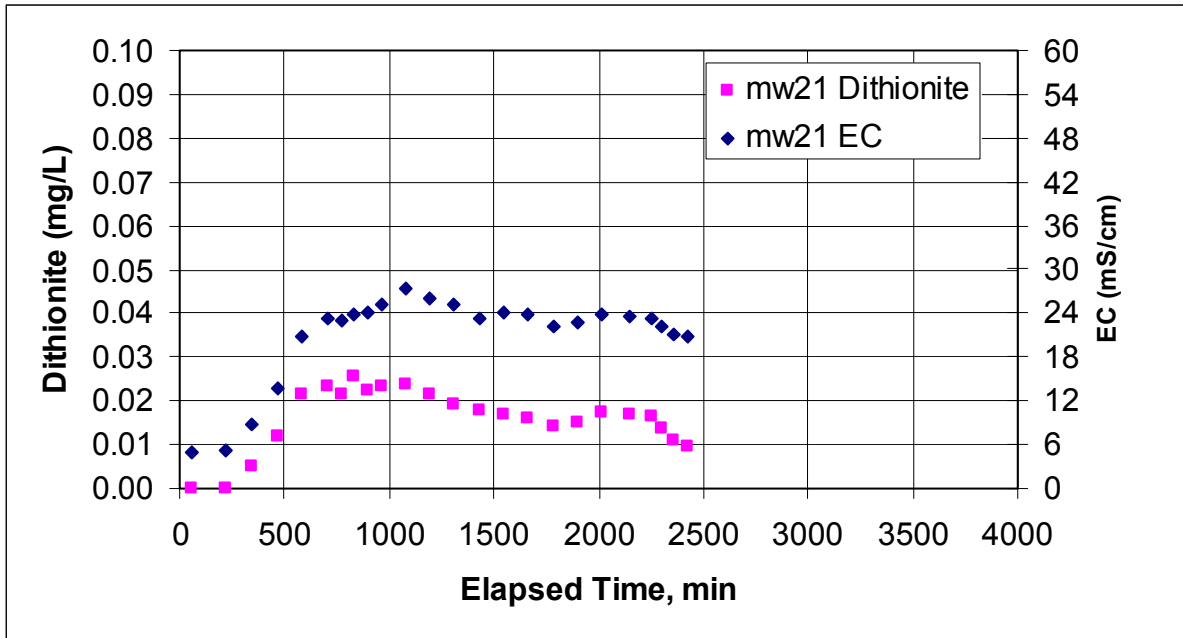


Figure E.32. Dithionite and EC Measurements at Well MW-21 During the Dithionite Injection Test at the RA-IW-6a/6b Well Pair

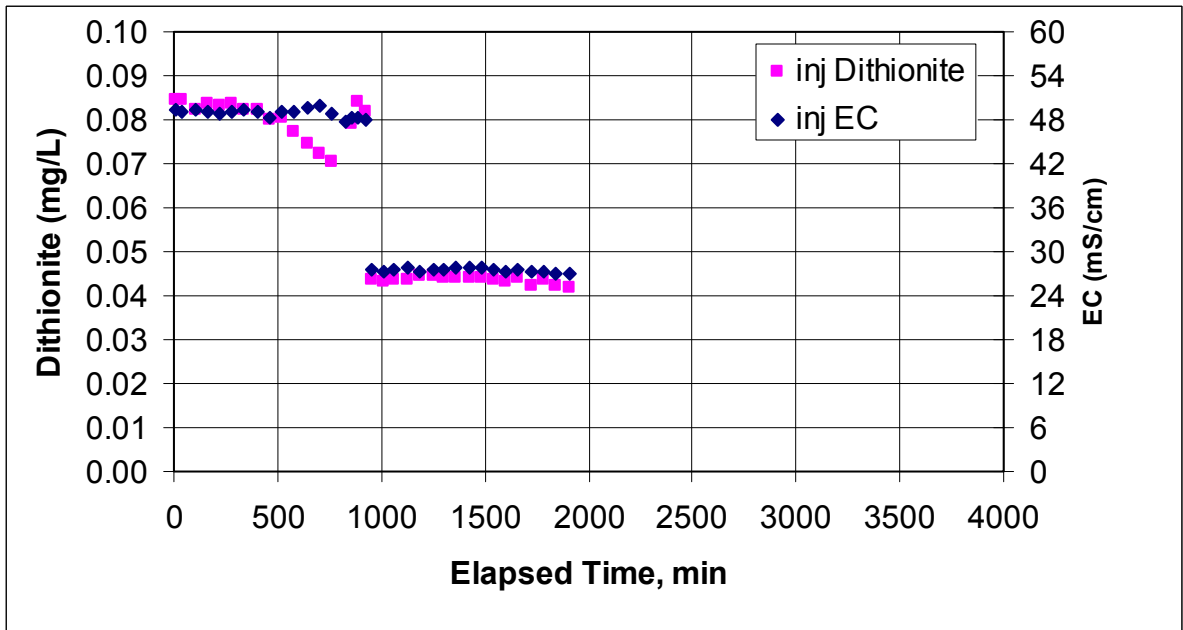


Figure E.33. Dithionite and EC Measurements of the Injection Stream During the Dithionite Injection Test at the RA-IW-7a/7b Well Pair

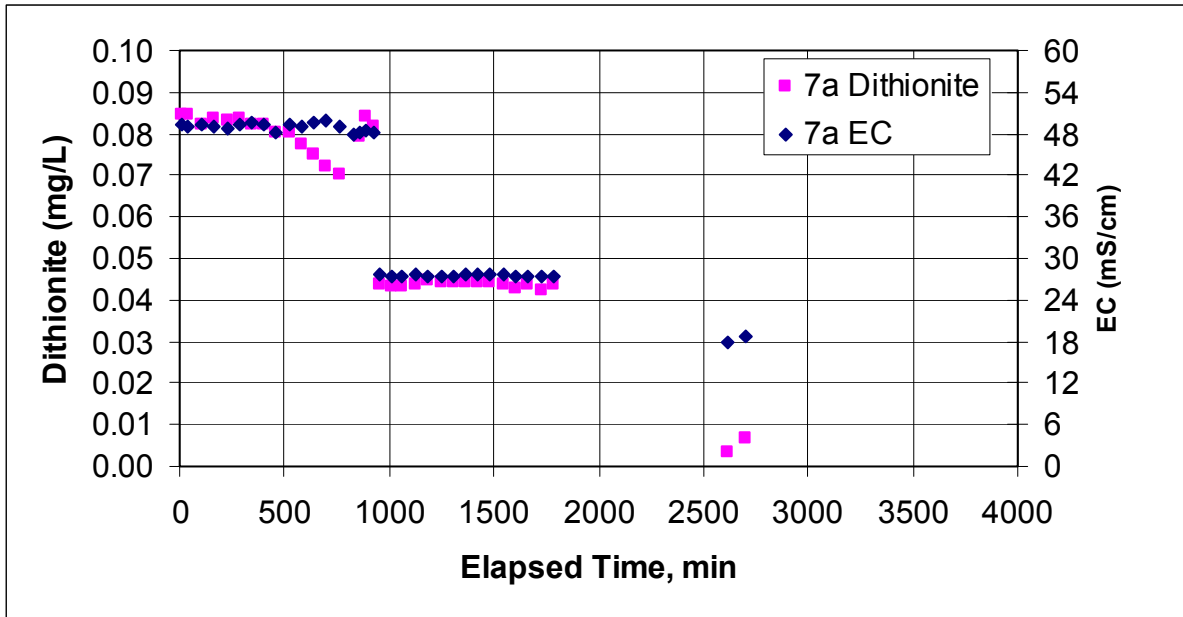


Figure E.34. Dithionite and EC Measurements at Well RA-IW-7a and Injection Stream During the Dithionite Injection Test at the RA-IW-7a/7b Well Pair

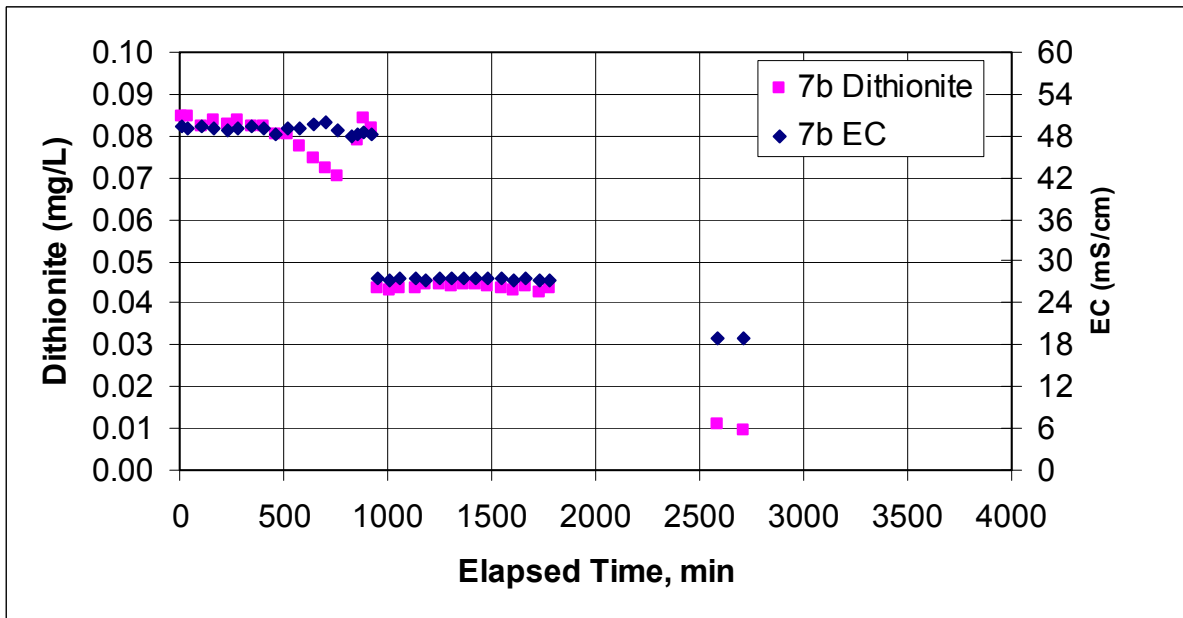


Figure E.35. Dithionite and EC Measurements at Well RA-IW-7b and Injection Stream During the Dithionite Injection Test at the RA-IW-7a/7b Well Pair

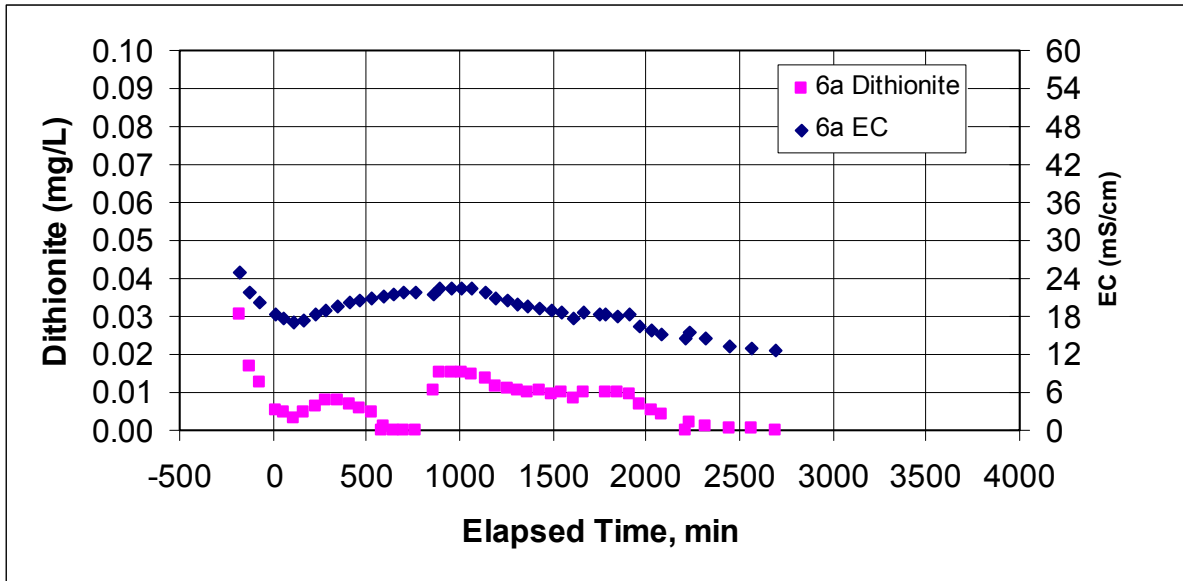


Figure E.36. Dithionite and EC Measurements at Well RA-IW-6a During the Dithionite Injection Test at the RA-IW-7a/7b Well Pair

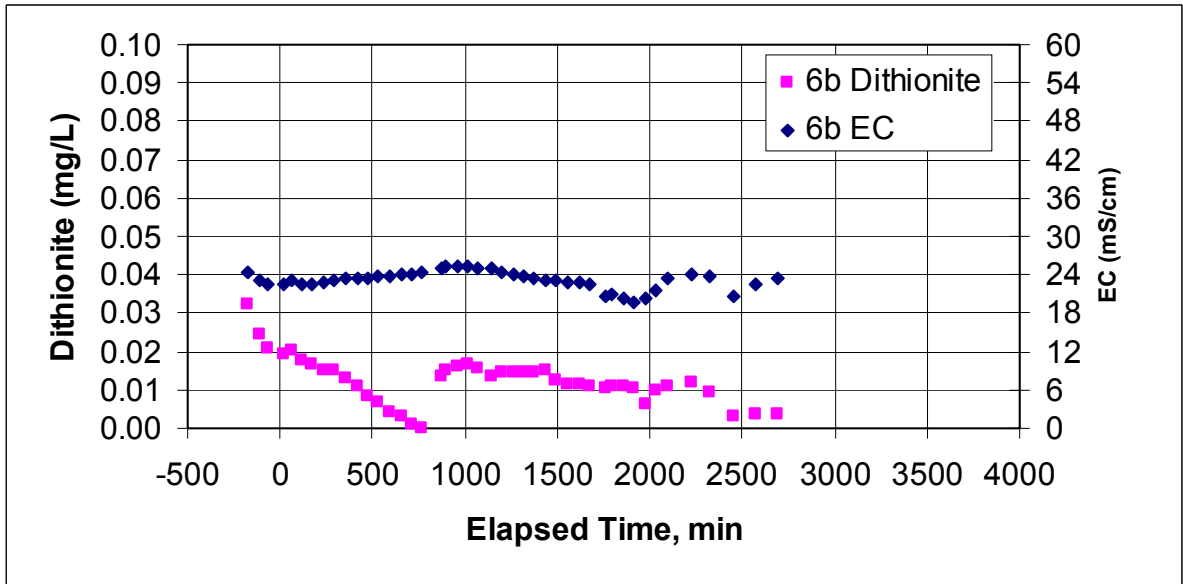


Figure E.37. Dithionite and EC Measurements at Well RA-IW-6b During the Dithionite Injection Test at the RA-IW-7a/7b Well Pair

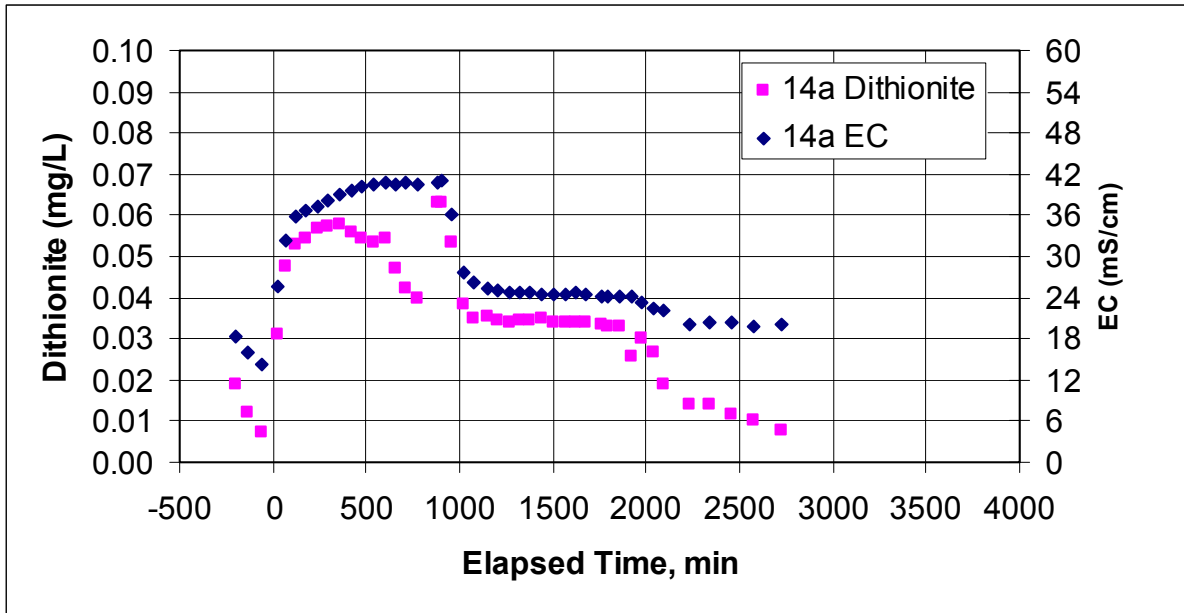


Figure E.38. Dithionite and EC Measurements at Well RA-MW-14a During Dithionite Injection Test at the RA-IW-7a/7b Well Pair

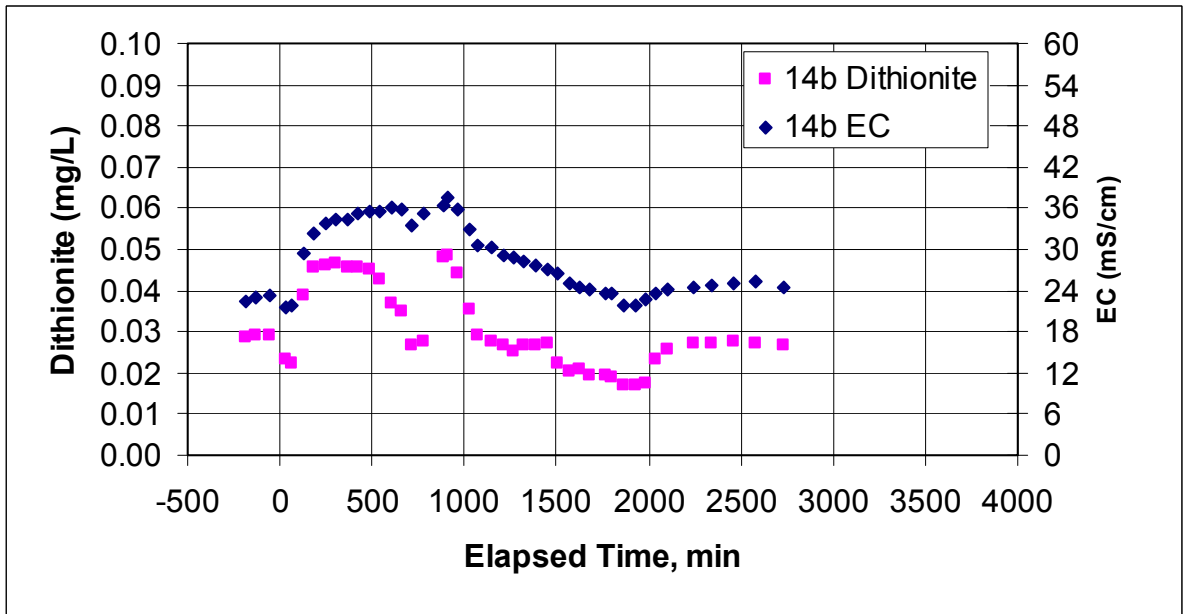


Figure E.39. Dithionite and EC Measurements at Well RA-MW-14b During the Dithionite Injection Test at the RA-IW-7a/7b Well Pair

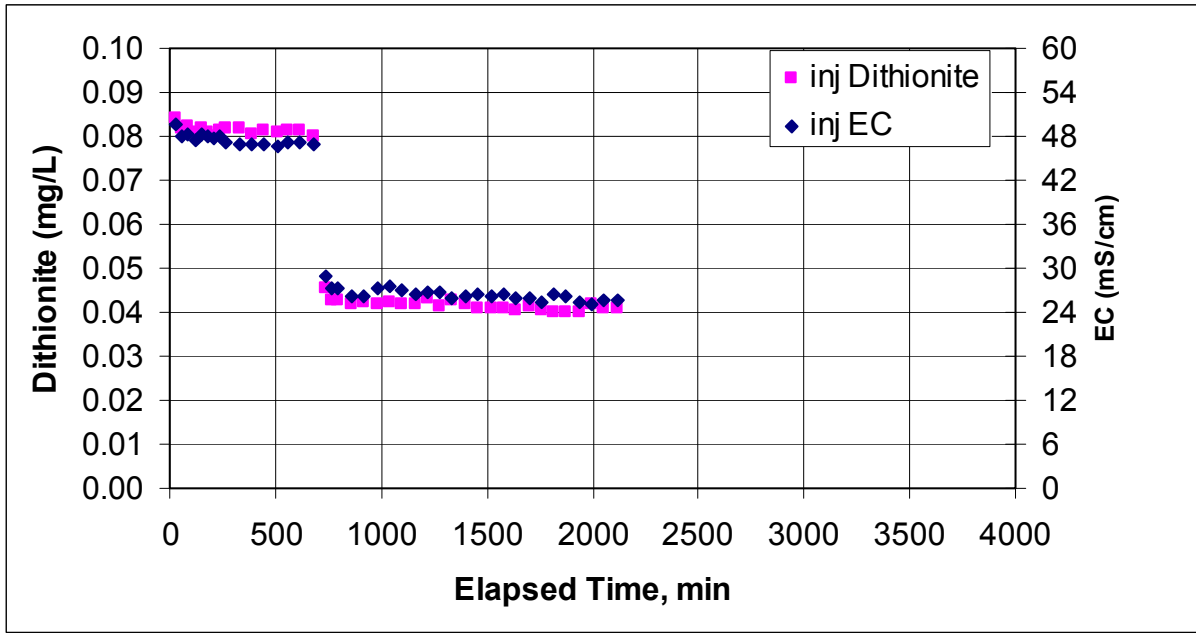


Figure E.40. Dithionite and EC Measurements of the Injection Stream During the Dithionite Injection Test at the RA-IW-8a/8b Well Pair

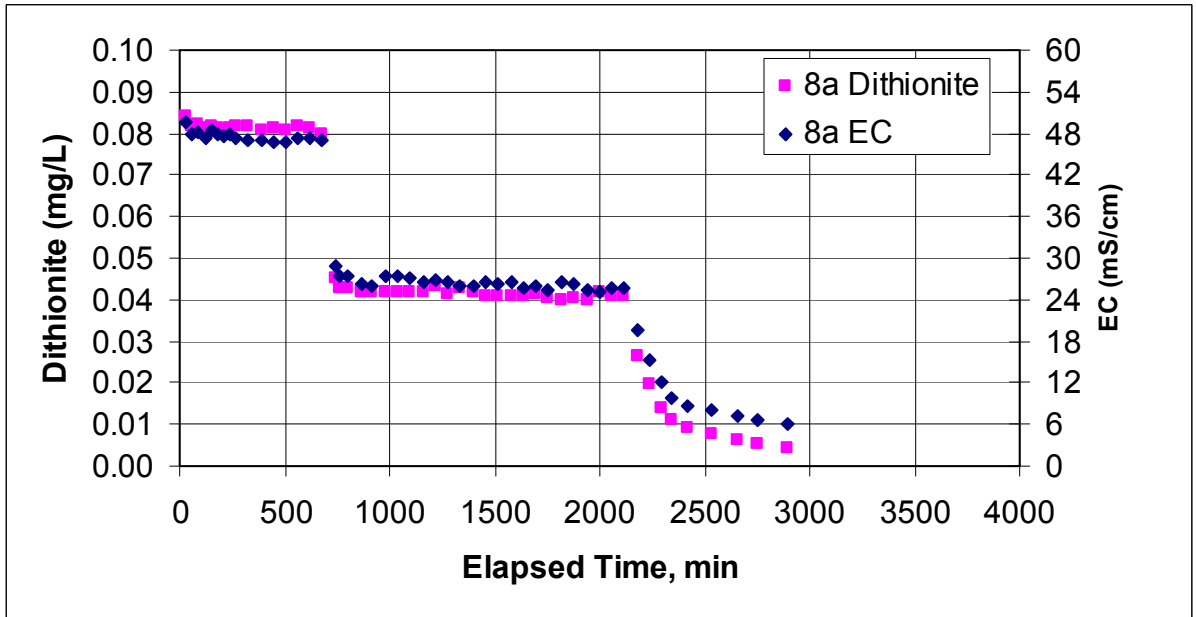


Figure E.41. Dithionite and EC Measurements at Well RA-IW-8a and Injection Stream During the Dithionite Injection Test at the RA-IW-8a/8b Well Pair

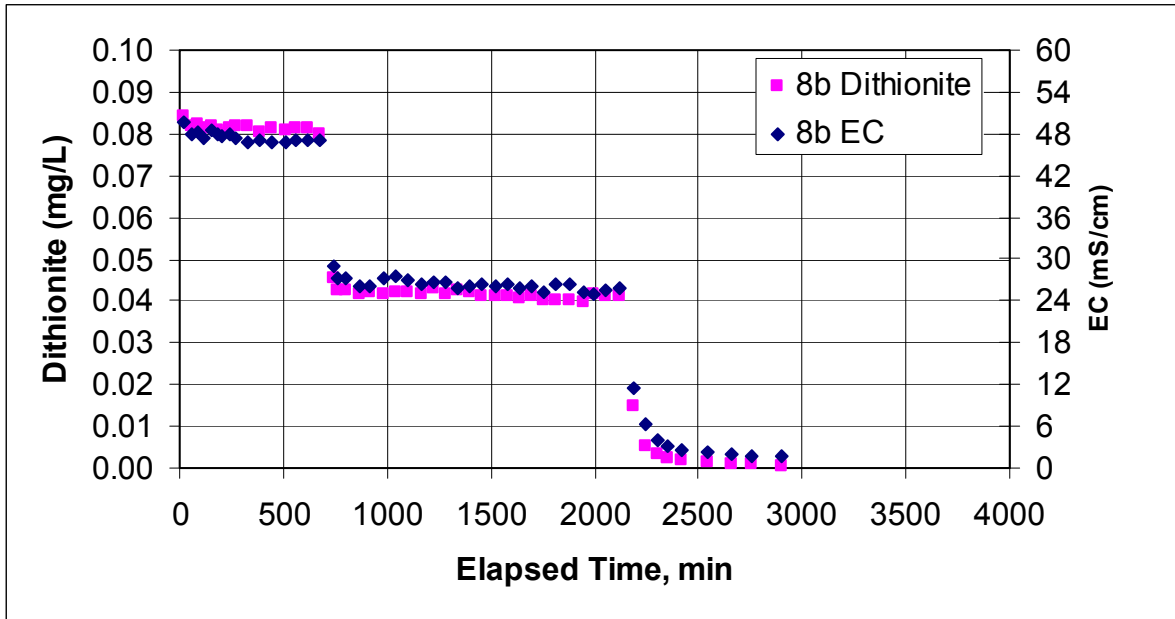


Figure E.42. Dithionite and EC Measurements at Well RA-IW-8b and Injection Stream During the Dithionite Injection Test at the RA-IW-8a/8b Well Pair

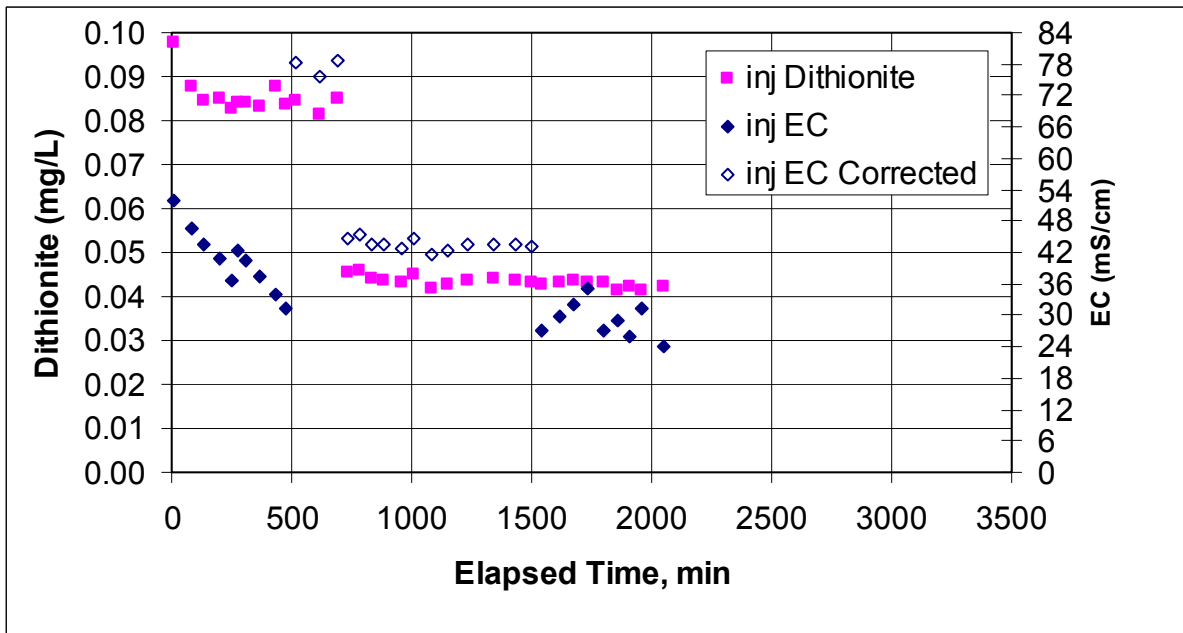


Figure E.43. Dithionite and EC Measurements of the Injection Stream During the Dithionite Injection Test at Well Pair INJ1/INJ2

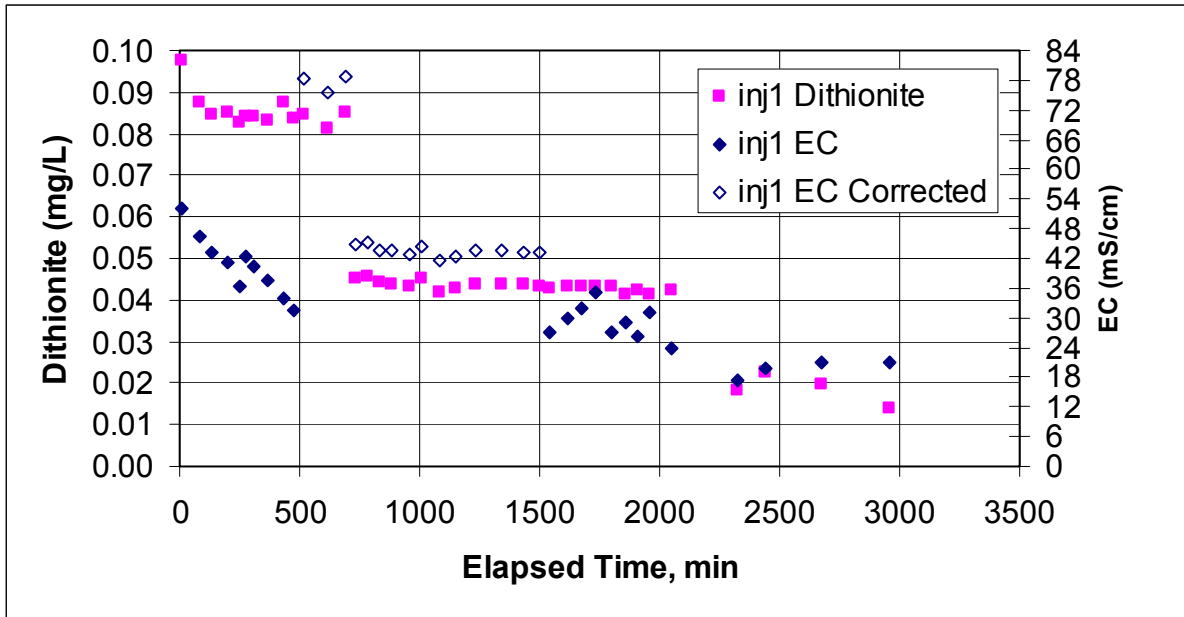


Figure E.44. Dithionite and EC Measurements at Well INJ1 and Injection Stream During the Dithionite Injection Test at Well Pair INJ1/INJ2

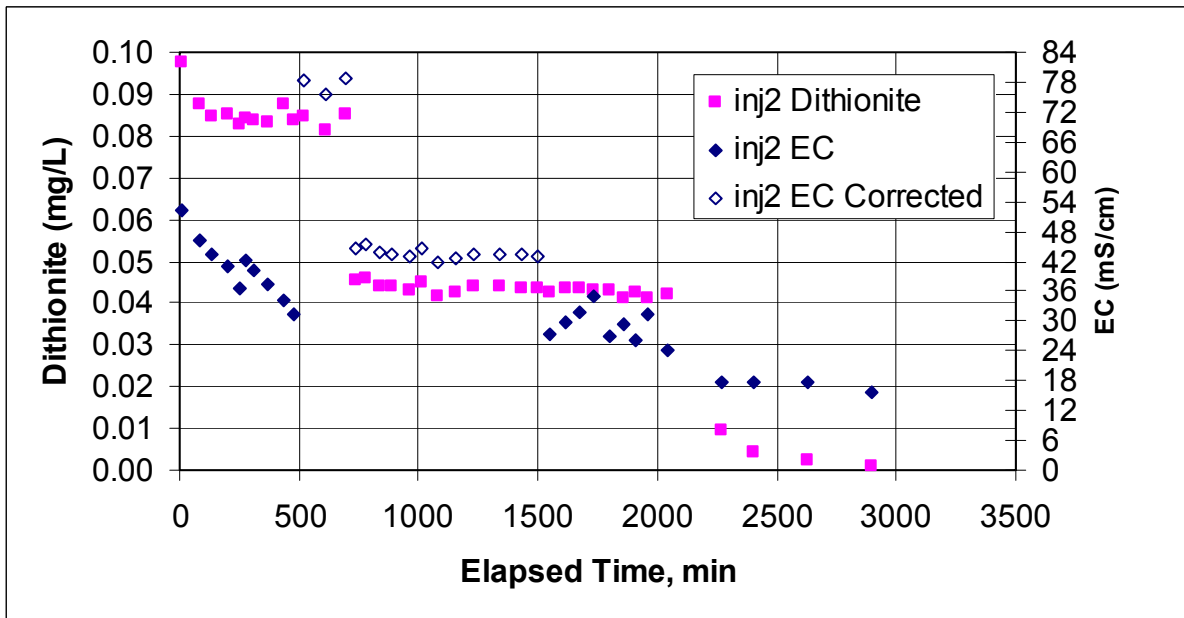


Figure E.45. Dithionite and EC Measurements at Well INJ2 and Injection Stream During Dithionite Injection Test at Well Pair INJ1/INJ2

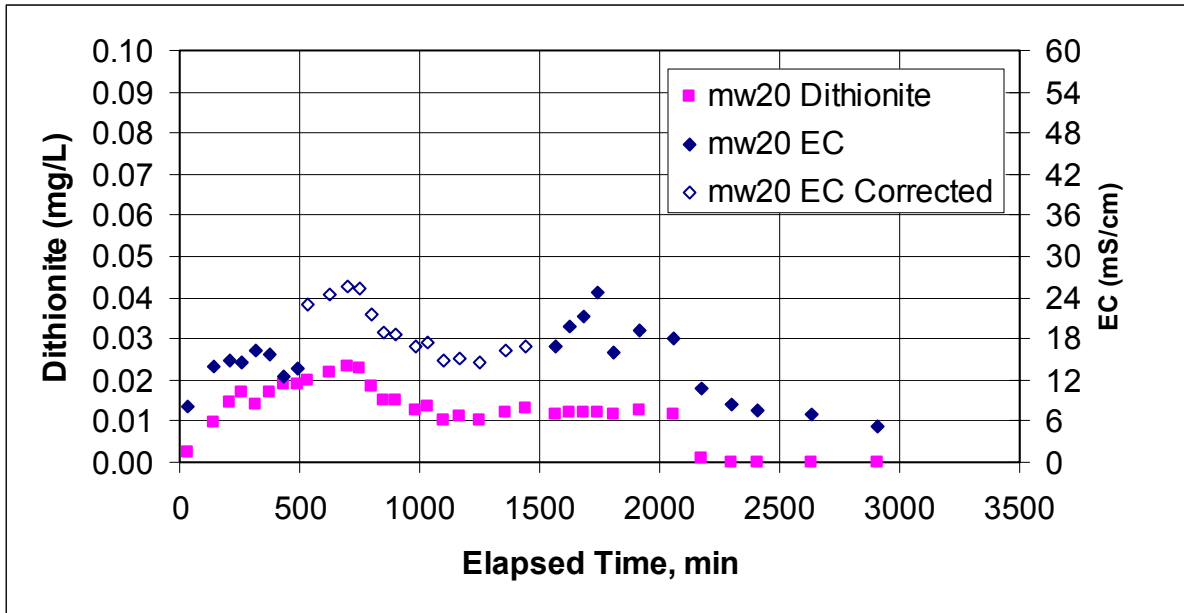


Figure E.46. Dithionite and EC Measurements at Well MW-20 During the Dithionite Injection Test at Well Pair INJ1/INJ2

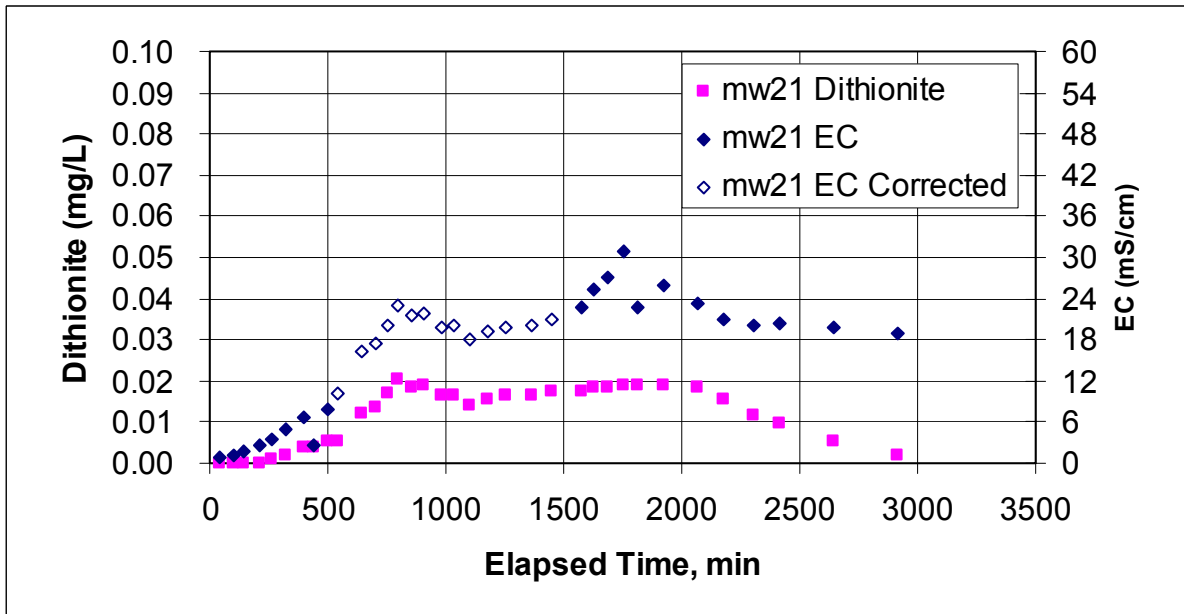


Figure E.47. Dithionite and EC Measurements at Well MW-21 During the Dithionite Injection Test at Well Pair INJ1/INJ2

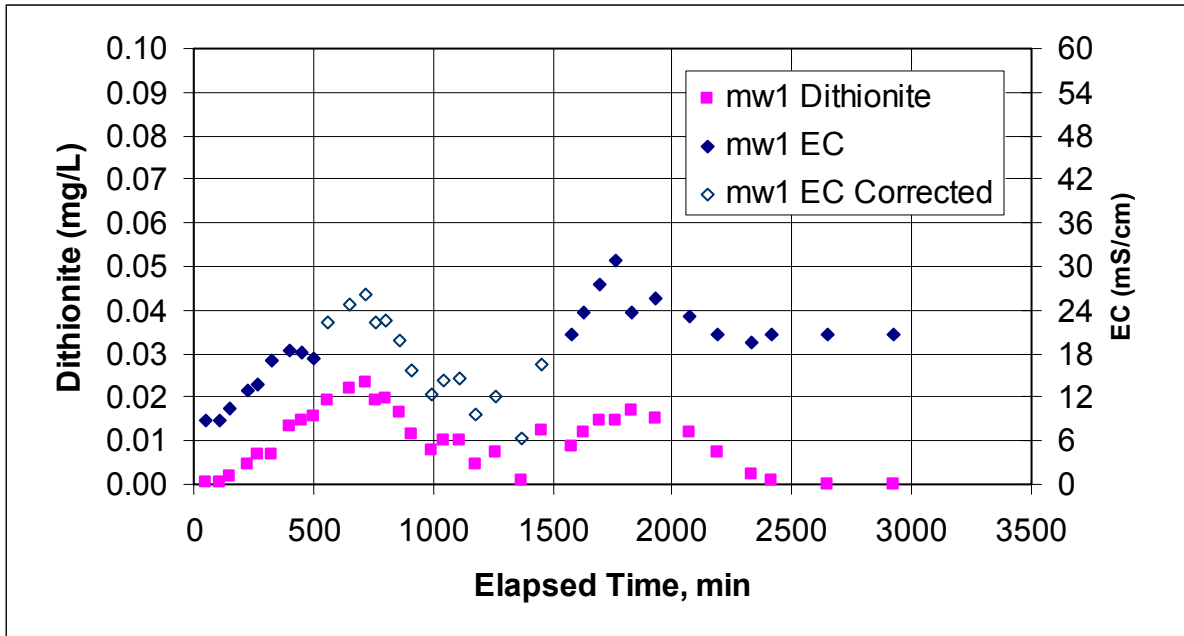


Figure E.48. Dithionite and EC Measurements at Well MW-1 During the Dithionite Injection Test at Well Pair INJ1/INJ2

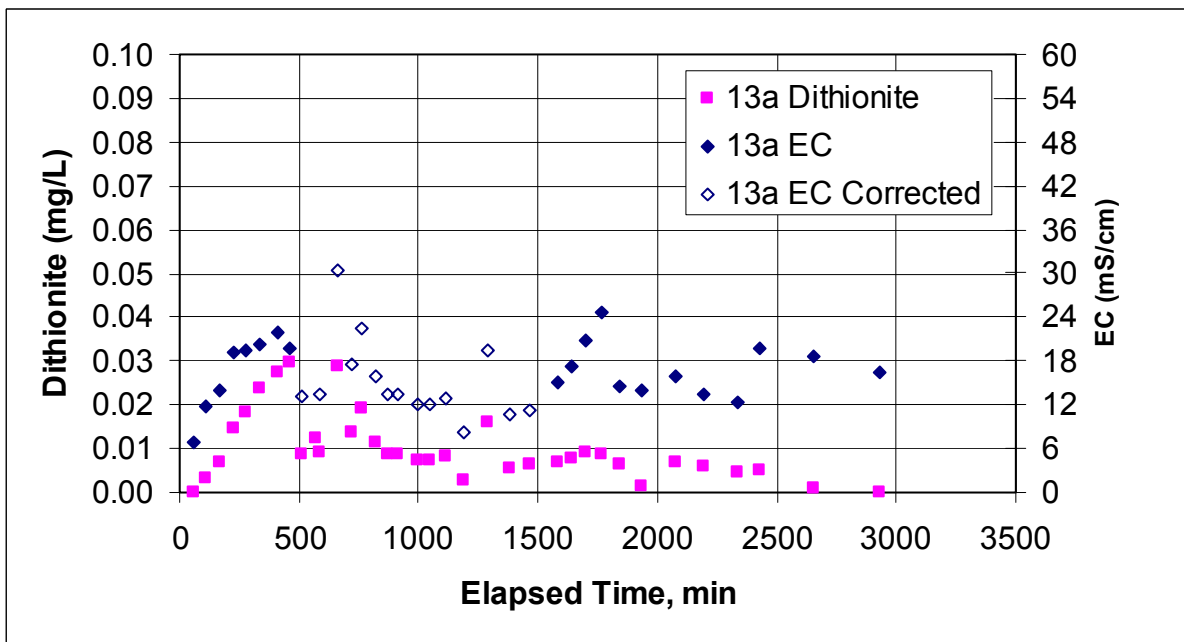


Figure E.49. Dithionite and EC Measurements at Well RA-MW-13a During Dithionite Injection Test at Well Pair INJ1/INJ2

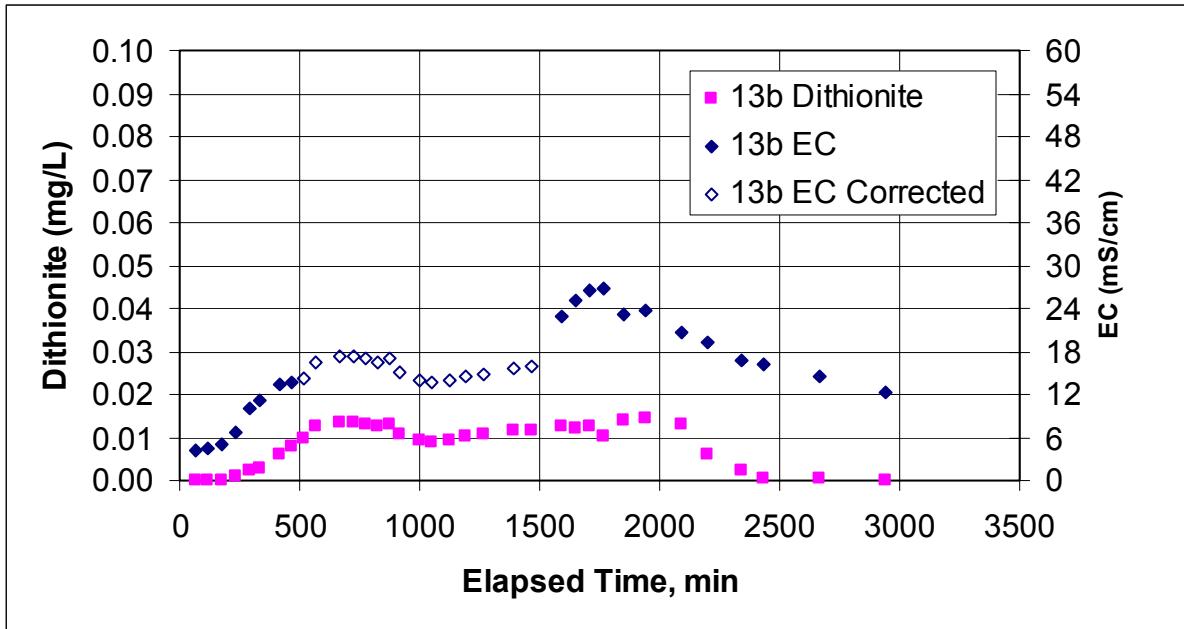


Figure E.50. Dithionite and EC Measurements at Well RA-MW-13b During Dithionite Injection Test at Well Pair INJ1/INJ2

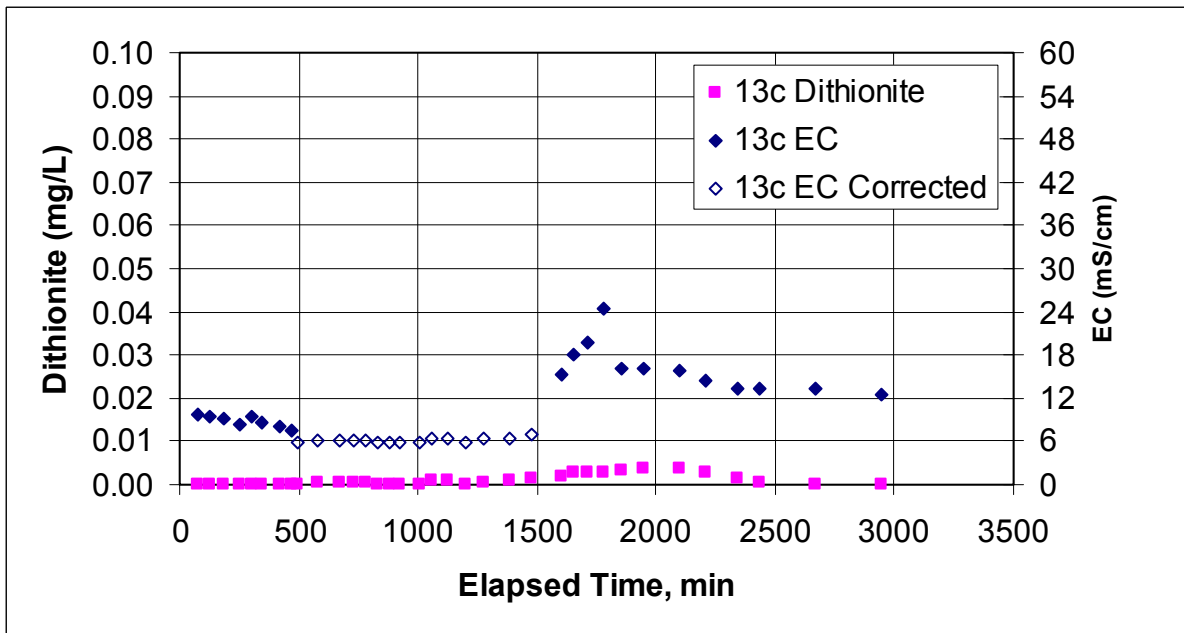


Figure E.51. Dithionite and EC Measurements at Well RA-MW-13c During Dithionite Injection Test at Well Pair INJ1/INJ2