

Appendix A

July 2003 Gel Probe Deployment

The gel probes were taken into the field on two occasions, July 2003 and October 2003. In July, a combination of clear and HFO gels were inserted into the probe in order to compare the sorption behavior in HFO gels to a porewater profile in close proximity. Gel probes were equilibrated for 7 hours. In October, only clear gels were deployed in several locations to estimate spatial variability.

There is evidence of As mobilization at depth from the field deployment. However, the concentrations of As in the porewater (clear gels) are substantially less when placed with HFO gels than in previous studies and in the October sampling. As the porewater comes into equilibrium with the clear gels, minimal perturbation is expected due to the small volume of each gel. However, the HFO gels may perturb the system significantly by concentrating As and other constituents onto the HFO through sorption, thus depleting the surrounding porewater. This is possibly reflected in the low concentrations in the clear gel profile when placed next to HFO gels. The extent of perturbation is determined by diffusion of constituents from surrounding porewaters, ability of the sediment to resupply As to the porewater, and kinetic controls on As sorption to HFO.

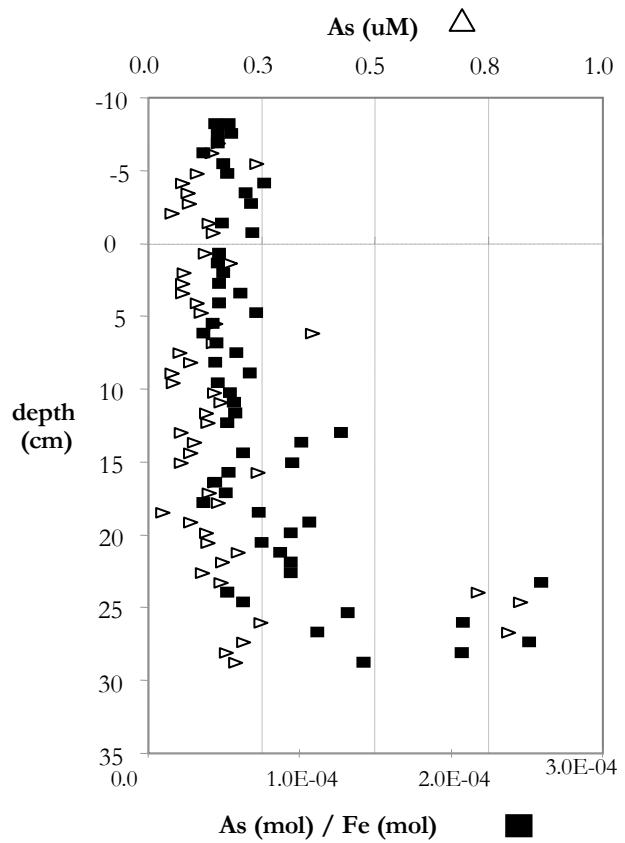


Figure A.1. Profile from July 2003 deployment of gel probe sampler. The sediment/water interface is at depth = 0. Open triangles are porewater concentrations (clear gels) and closed boxes are amount of As sorbed in HFO gels normalized to the amount of Fe per gel. The deployment time for this probe was 7.5 hours. The clear gels and the HFO gels were deployed simultaneously, and were placed within 3 cm of each other.

Appendix B

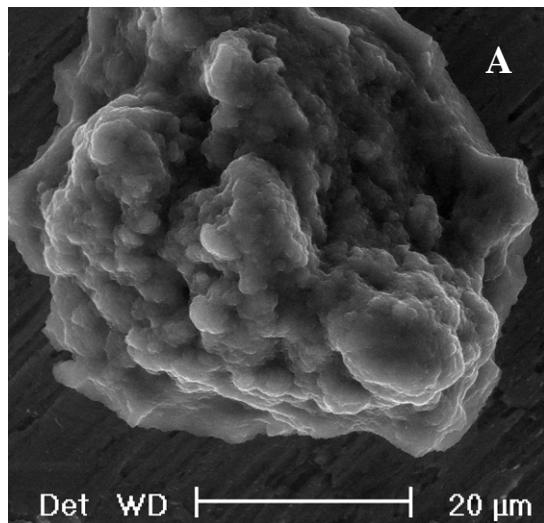
Additional ESEM images

B1. Methodology

The methods for Environmental Scanning Electron Microscopy (ESEM) and bacterial incubations are described in Chapter 6. The results presented here are observations from the HFO only, and HFO with adsorbed As(III) or As(V). The solids were either imaged without bacteria or after incubation with bacteria (*Shewanella* sp. strain ANA-3 wild-type (WT) or $\Delta arrA$ mutant).

B2. HFO morphology

The surface structure of HFO without adsorbed As or bacteria is shown in Figure B.1. The images are of one large aggregate of HFO, with increasing magnification. In Figure B.1d, structures of ~100 nm are visible.



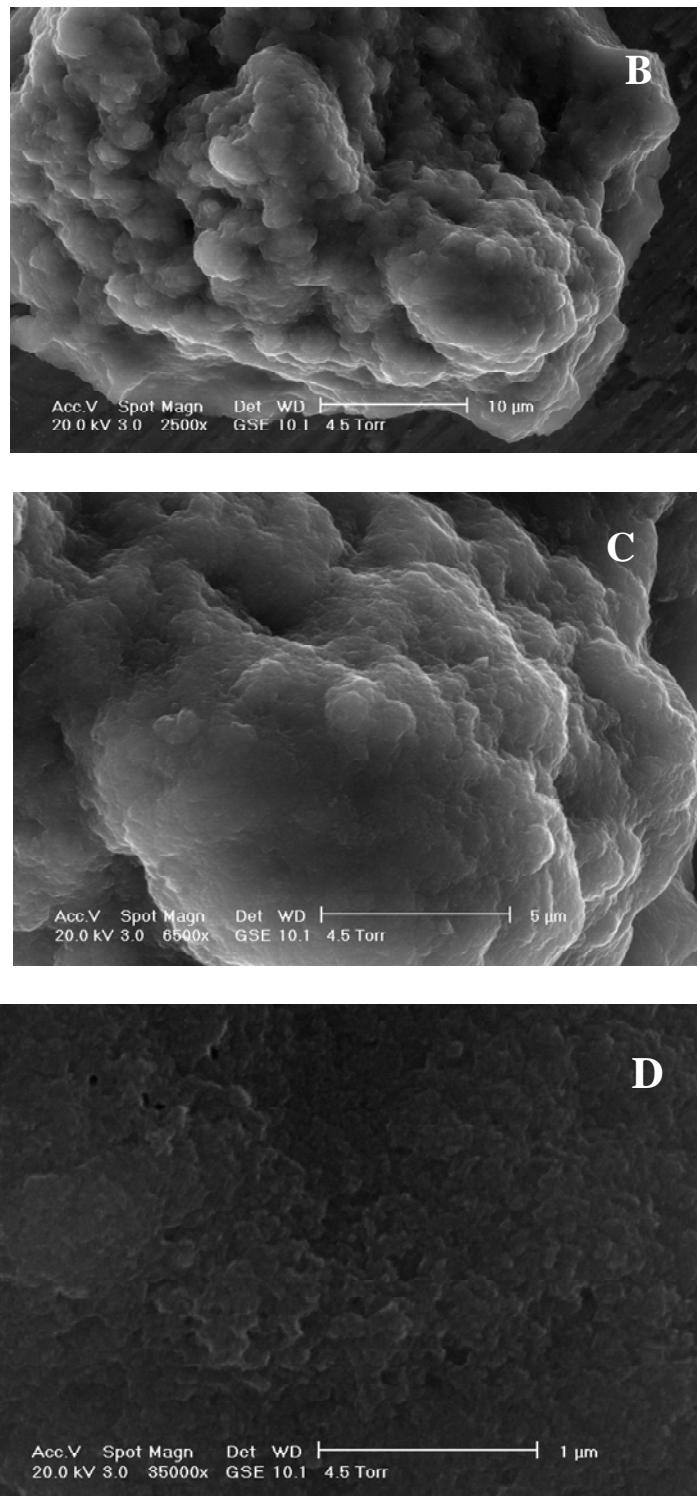


Figure B.1 a-d. Surface structure of HFO only (no adsorbed As). The solid was not incubated with any bacteria before the images were taken.

B.3 Fine structures after incubation with ANA-3 WT or mutant strain

After incubation with either the WT or mutant strain of ANA-3, several types of structures were visible in between or on the surface of the large aggregates of HFO with adsorbed As(V). The first type of structure is a thin rosette-like formation, characterized by a round configuration, occasionally with a radial pattern, and 1-10 μm in diameter (Figure B.2A,B). Figure B.2A shows the rosettes directly on the stage, which is visible as diagonal streaks from upper right to lower left. The rosettes were fragile and destroyed by the electron beam when imaged at a higher magnification, indicating that they are very thin. Figure B.2B shows a similar rosette structure on the surface of a larger aggregate. While the composition of the rosettes is unknown, it is possible that they are a secondary precipitate formed because of microbial Fe(III) reduction. It is not known whether the rosettes are formed with As(III) or HFO only.

The second kind of structure is a thin pitted structure shown in Figure B.2C. Although this was only observed in HFO incubated with ANA-3 WT, it was only a small fraction of the total sample, and may have been easily missed. Like the rosettes, its fragility prevented measurement of its composition, but it could also be a secondary mineral precipitate.

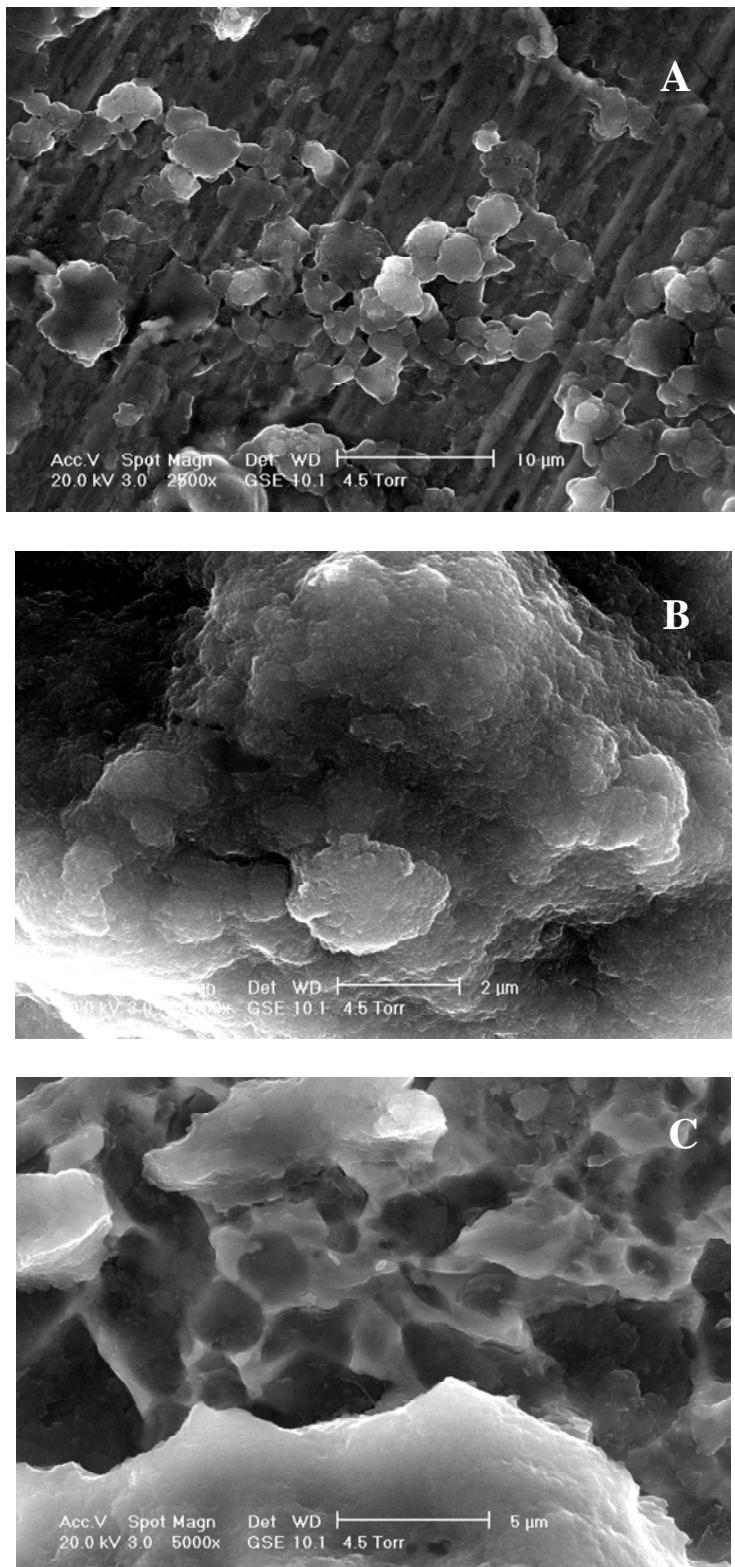


Figure B.2. Rosette structures in HFO pre-equilibrated with As(V) and incubated with ANA-3 WT (a) and mutant (b). Pitted structure of HFO incubated with ANA-3 WT (c).

B4. Bacterial interactions with the mineral surface

Bacteria can be seen on the HFO surfaces, with and without adsorbed As. They appear as darker ovals ~1 μm in length, indicated with arrows in Figure B.3a,b,c. The bacteria appear to be encapsulating themselves in a secondary precipitate or borrowing into the HFO surface (Figure B.3c, Figure B.4a,b,c).

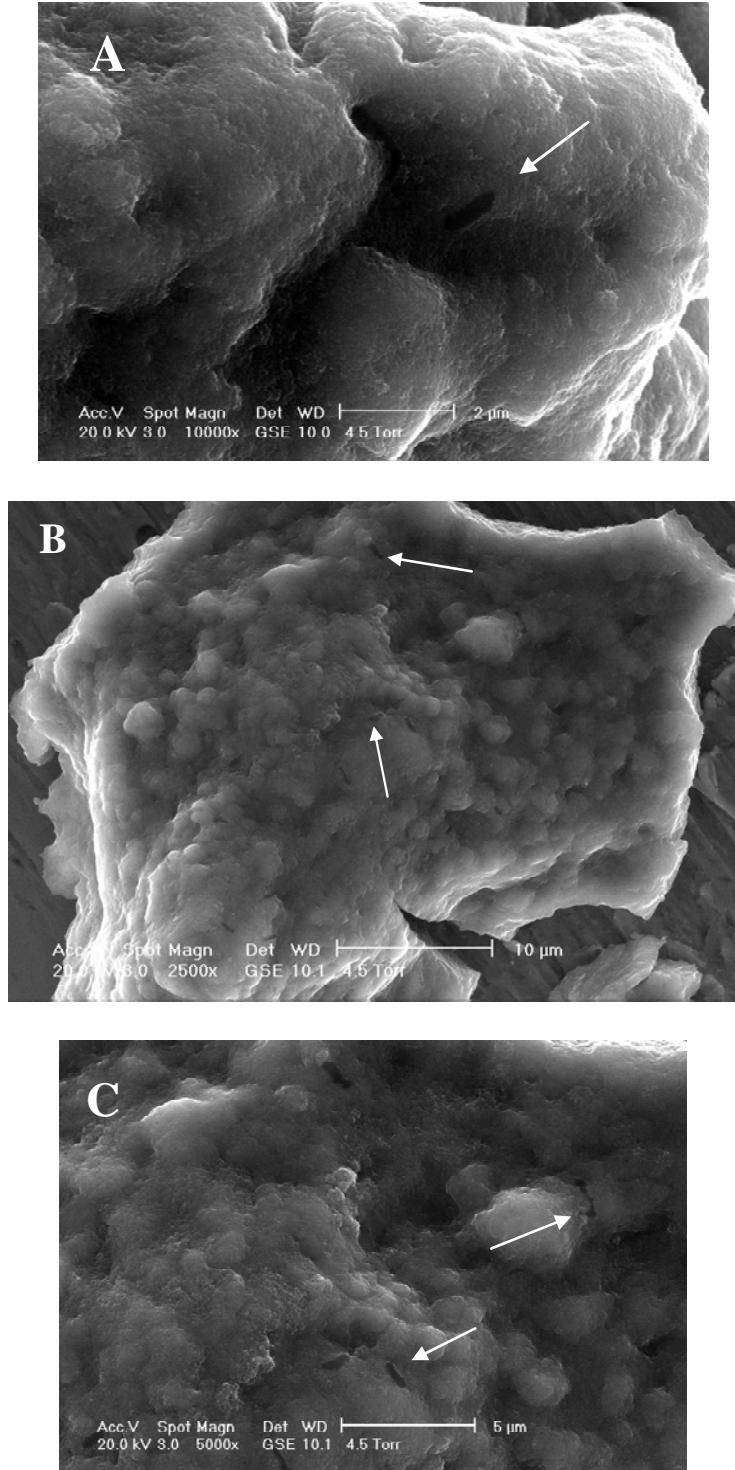


Figure B.3. ANA-3 WT (a) and ANA-3 mutant (b,c) on HFO pre-equilibrated with As(III). Arrows indicate bacterial cells on the HFO surface.

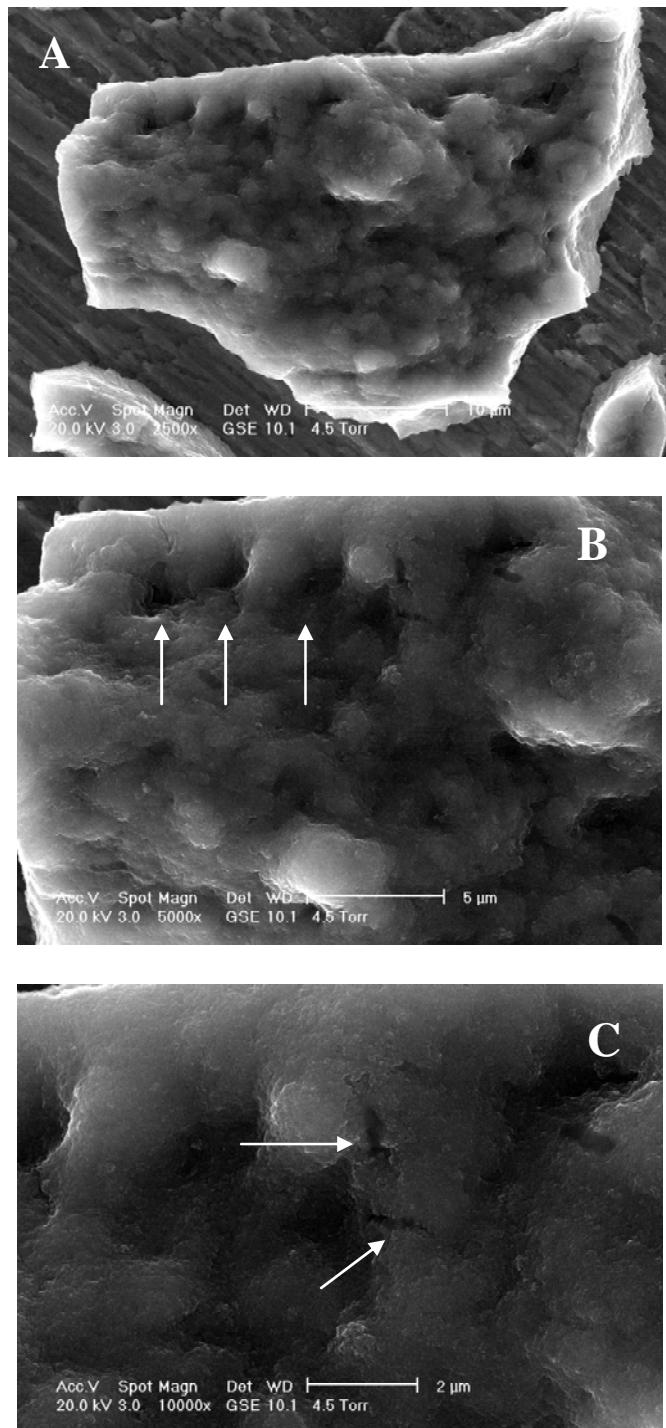


Figure B.4a-c. ANA-3 mutant on HFO pre-equilibrated with As(III). Images are taken from the same particle with increasing magnification. Arrows indicate pits possibly due to bacteria (b) or probable bacterial cells partially encrusted with secondary precipitates (c).

Appendix C

Bacterial Minimal Medium

Table C.1. Chemical constituents of the bacterial minimal medium

Chemical Formula	Concentration	Brand and Purity
K ₂ HPO ₄	0.05 g/L	Mallinckrodt, AR-ACS, 100.0%
KH ₂ PO ₄	0.035 g/L	Mallinckrodt, AR-ACS, 99.8%
NaCl	0.46 g/L	Mallinckrodt, AR-ACS, 100.1%
(NH ₄) ₂ SO ₄	0.225 g/L	Mallinckrodt, AR-ACS
MgSO ₄ ·7H ₂ O	0.117 g/L	Allied Chemical, 99.5%
NaHCO ₃	8.4%	Mallinckrodt, AR-ACS, 100.2%
NaOH	1M	Mallinckrodt, AR-ACS, 99%
HCl	1M	Mallinckrodt, ACS reagent grade
NaC ₃ H ₅ O ₃	60% syrup	Sigma
NaC ₂ H ₃ O ₂ ·3H ₂ O		J.T. Baker, 99.9%
Vitamin Mix	5mL	See Table 5.2
Mineral Mix	5 mL	See Table 52

Table C.2. Vitamin and minerals used in bacterial minimal medium

Vitamin Mix	
Biotin	2 mg/L
Folic acid	2 mg/L
Pyridoxine HCl	10 mg/L
Riboflavin	5 mg/L
Thiamine	5 mg/L
Nicotinic acid	5 mg/L
Pantothenic acid	5 mg/L
B-12	0.1 mg/L
p-aminobenzoic acid	5 mg/L
Thioctic acid	5 mg/L

Mineral Mix	
NTA	1.5 g/L
MgSO ₄	3.0 g/L
MnSO ₄ ·H ₂ O	0.5 g/L
NaCl	1.0 g/L
FeSO ₄ ·7H ₂ O	0.1 g/L
CaCl ₂ ·2H ₂ O	0.1 g/L
CoCl ₂ ·6H ₂ O	0.1 g/L
ZnCl ₂	0.13 g/L
CuSO ₄ ·5H ₂ O	0.01 g/L
AlK(SO ₄) ·12H ₂ O	0.01 g/L
H ₃ BO ₃	0.01 g/L
Na ₂ MoO ₄	0.025 g/L
NiCl ₂ ·6H ₂ O	0.024 g/L
Na ₂ WO ₄ ·2H ₂ O	0.025 g/L

Appendix D

Gel Probe Field Data

Gel probes deployed in July 2003, October 2003, October 2004, August 2005, and May 2006 were analyzed according to the methods described in Chapter 3. In July 2003, October 2003, and October 2004, As, Fe, Mn, and P were measured. In August 2005 and May 2006, gel probes were analyzed for P, Cr, Mn, Ni, Cu, As, Se, Sr, Mo, Sb, Ba, W, Pb, and U. Any elements not reported in the tables below were not detected.

Table D1. July 2003 field deployment, clear gels only

Depth (cm)	As (μM)	Fe (μM)	Mn (μM)	P (μM)
-13.44	0.02	5.57	0.08	3.32
-12.80	0.04	6.22	0.13	3.97
-12.16	0.03	6.07	0.15	4.47
-11.52	0.02	5.11	0.09	4.21
-10.88	0.02	6.19	0.10	4.38
-10.24	0.03	5.10	0.08	2.20
-9.60	0.03	6.83	0.16	3.38
-8.96	0.04	9.33	0.27	2.80
-8.32	0.02	2.54	0.07	2.10
-7.68	0.01	2.61	0.08	2.25
-7.04	0.02	4.74	0.12	3.47
-6.40	0.02	2.59	0.29	4.46
-5.76	0.07	8.97	0.35	6.17
-5.12	0.04	3.27	0.31	5.30
-4.48	0.02	1.23	0.28	5.62
-3.84	0.01	0.45	0.24	4.85
-3.20	0.02	1.75	0.27	5.58
-2.56	0.00	2.16	0.24	3.72
-1.92	0.02	1.68	0.25	5.36
-1.28	0.03	3.85	0.29	5.79
-0.64	0.02	2.89	0.29	4.80
0.00	0.03	2.63	0.30	4.87
0.64	0.03	5.24	0.29	4.47
1.28	0.02	2.65	0.29	4.18
1.92	0.02	1.95	0.26	4.33
2.56	0.03	2.49	0.26	5.58
3.20	0.04	2.77	0.29	6.05
3.84	0.07	8.36	0.30	7.05
4.48	0.04	2.39	0.29	5.79
5.12	0.03	3.18	0.33	4.25
5.76	0.04	3.49	0.34	4.31
6.40	0.04	2.92	0.29	3.76
7.04	0.03	5.08	0.35	4.67
7.68	0.02	6.28	0.27	3.68
8.32	0.03	1.64	0.25	4.78
8.96	0.04	0.85	0.26	4.63
9.60	0.02	2.24	0.29	5.45
10.24	0.04	4.89	0.37	5.11
10.88	0.04	4.25	0.39	5.80
11.52	0.03	3.01	0.33	5.35
12.16	0.05	5.42	0.53	6.18
12.80	0.29	13.22	1.10	4.40
13.44	0.45	22.41	2.25	4.51
14.08	0.38	27.07	2.82	5.02
14.72	0.57	105.04	5.38	5.70
15.36	0.52	117.05	9.86	5.82
16.00	0.68	215.09	7.97	6.18
16.64	1.47	246.76	7.41	8.22
17.28	3.48	533.91	9.04	18.14
17.92	6.22	618.46	7.46	32.95
18.56	5.73	724.34	12.05	34.42

Table D2. October 2003 probe 1, clear gels only

Depth (cm)	As (µM)	Fe (µM)	P (µM)	Mn (µM)
-9.60	0.07	0.00	3.01	0.00
-8.96	0.08	0.00	2.83	0.00
-8.32	0.04	0.00	3.02	0.00
-7.68	0.09	0.00	2.85	0.00
-7.04	0.05	0.00	2.21	0.00
-6.40	0.07	0.00	1.74	0.00
-5.76	0.03	0.00	2.60	0.00
-5.12	0.03	0.00	2.09	0.00
-4.48	0.08	0.00	1.58	0.00
-3.84	0.02	0.00	1.93	0.00
-3.20	0.02	0.00	1.75	0.00
-2.56	0.07	0.00	1.02	0.00
-1.92	0.04	0.00	3.36	0.00
-1.28	0.05	0.00	1.39	0.00
-0.64	0.11	0.00	1.09	0.00
0.00	0.11	0.00	0.96	0.00
0.64	0.12	0.00	0.47	0.00
1.28	0.01	0.00	1.28	0.00
1.92	0.01	0.00	1.09	0.00
2.56	0.08	0.00	0.15	0.00
3.20	0.08	0.00	0.89	0.48
3.84	0.19	3.94	1.10	1.45
4.48	0.41	13.81	1.21	3.37
5.12	0.47	24.14	1.32	2.26
5.76	0.48	14.19	0.62	5.06
6.40	0.51	9.76	0.10	6.48
7.04	0.55	24.84	0.80	7.52
7.68	0.51	25.65	0.47	6.63
8.32	0.54	28.18	0.43	7.88
8.96	0.68	38.68	0.19	8.89
9.60	0.78	60.83	0.47	6.39
10.24	0.84	70.91	1.78	8.04
10.88	0.86	72.41	0.40	8.12
11.52	0.63	64.39	1.01	7.86
12.16	1.47	214.28	1.17	15.39
12.80	1.91	223.12	1.40	11.76
13.44	2.81	427.90	1.40	18.60
14.08	4.94	375.79	4.07	16.19
14.72	3.91	432.97	2.42	15.99
15.36	3.70	515.62	3.42	13.19
16.64	6.55	866.02	6.53	16.04
17.28	7.07	898.07	2.77	17.25
17.92	7.99	774.94	5.47	17.24
18.56	8.27	726.76	3.40	18.35
19.20	9.37	690.46	18.31	18.52
19.84	7.69	571.18	8.57	18.12
21.12	9.32	709.74	19.63	19.70
21.76	11.06	820.70	21.80	21.78
22.40	11.51	847.65	23.70	21.37
23.04	12.02	880.89	34.18	21.35
23.68	7.98	613.00	12.23	19.06
24.32	11.75	990.33	13.78	24.94
24.96	9.47	820.14	17.32	18.26
25.60	9.87	746.46	21.32	15.52

Table D3. October 2003 probe 2, clear gels only

Depth (cm)	As (µM)	Fe (µM)	P (µM)	Mn (µM)
2.56	0.62	62.24	0.96	5.12
3.20	0.85	83.40	3.10	5.07
3.84	0.94	101.07	2.15	5.31
4.48	0.87	90.71	1.83	5.32
5.12	0.89	99.27	1.34	5.51
5.76	0.81	101.01	0.84	5.31
6.40	0.99	91.12	4.65	6.62
7.04	1.36	125.10	1.55	9.12
7.68	1.39	136.06	1.83	9.58
8.32	1.59	136.67	2.32	11.92
8.96	1.48	190.09	1.07	10.31
9.60	2.25	192.87	0.63	10.20
10.24	1.88	205.54	0.19	12.02
10.88	2.03	196.75	1.96	12.74
11.52	1.90	199.35	3.11	7.71
12.16	2.33	221.34	1.86	11.77
12.80	2.57	276.78	1.74	12.98
13.44	3.58	292.76	2.58	15.49
14.08	3.91	321.00	2.25	15.22
14.72	3.32	378.33	6.22	12.15
15.36	2.79	278.93	2.76	11.45
16.00	3.97	353.20	3.83	12.91
16.64	4.11	427.73	8.86	15.87
17.28	5.21	479.22	8.59	15.45
17.92	4.11	387.73	8.86	15.87
18.56	8.17	410.92	21.77	15.87
19.20	8.28	416.30	16.95	16.00
19.84	7.35	459.28	17.68	16.53
20.48	8.69	464.74	19.55	16.20
21.12	8.33	492.56	15.39	19.20
21.76	7.38	492.85	13.64	18.87
22.40	9.10	493.67	15.24	17.90
23.04	10.48	501.78	22.38	16.82
23.68	9.58	589.85	29.03	18.77
24.32	7.05	610.31	12.77	16.53
24.96	8.02	670.75	5.34	14.39
25.60	7.01	644.02	13.44	22.10
26.24	10.76	666.08	16.95	16.00
26.88	7.01	792.64	10.34	17.00
27.52	6.78	702.75	8.59	15.45
28.16	9.56	734.85	17.68	16.53
28.80	13.62	802.85	22.38	16.82
29.44	9.59	788.55	13.64	18.87
30.08	11.30	743.59	19.55	16.20
30.72	10.83	788.09	15.39	19.20
31.36	12.19	890.53	14.43	13.86
32.00	7.93	666.41	13.66	22.81
32.64	11.30	743.59	19.55	16.20
33.28	9.76	752.51	9.62	15.22
33.92	8.30	795.83	15.56	12.15
34.56	12.45	943.76	19.03	18.77
35.20	9.16	976.50	12.77	16.53

Table D4. October 2003 probe 3, clear gels only

Depth (cm)	As (µM)	Fe (µM)	P (µM)	Mn (µM)
-9.60	0.09	0.00	4.85	0.00
-8.96	0.10	0.00	3.91	0.00
-8.32	0.07	0.00	2.98	0.00
-7.68	0.07	0.00	5.30	0.00
-7.04	0.08	0.00	2.09	0.00
-6.40	0.11	0.00	1.58	0.00
-5.76	0.13	0.00	1.93	0.00
-5.12	0.16	0.00	4.79	0.00
-4.48	0.03	0.00	3.91	0.00
-3.84	0.12	0.00	3.54	0.00
-3.20	0.07	0.00	3.31	0.00
-2.56	0.10	0.00	3.93	0.00
-1.92	0.11	0.00	4.02	0.00
-1.28	0.17	0.00	5.66	0.00
-0.64	0.21	0.00	4.51	0.00
0.00	0.23	0.00	5.10	0.00
0.64	0.14	0.00	5.47	0.00
1.28	0.32	0.00	5.01	0.00
1.92	0.24	0.00	6.12	0.00
2.56	0.22	0.00	4.75	0.00
3.20	0.11	0.00	4.30	0.00
3.84	0.24	0.00	4.69	0.00
4.48	0.21	0.00	4.43	0.00
5.12	0.37	0.00	4.92	0.00
5.76	0.27	0.00	3.99	0.00
6.40	0.19	0.00	4.86	0.00
7.04	0.15	0.00	4.19	0.00
7.68	0.13	0.00	3.94	0.32
8.32	0.27	0.00	5.05	0.48
8.96	0.12	5.82	4.61	0.40
9.60	0.21	14.18	4.24	0.43
10.24	0.16	8.17	4.11	0.33
10.88	0.13	7.74	3.73	0.32
11.52	0.13	8.72	4.07	0.28
12.16	0.20	15.26	3.95	0.45
12.80	0.20	29.53	3.66	0.39
13.44	0.45	55.78	5.09	0.61
14.08	0.10	10.81	3.43	0.23
14.72	0.39	33.02	3.42	0.58
15.36	0.23	19.73	3.44	0.43
16.00	0.36	35.47	4.33	0.58
16.64	0.37	33.04	4.05	0.64
17.28	0.49	52.51	4.76	0.73
17.92	0.79	97.32	6.85	1.04
18.56	0.61	67.25	5.30	0.82
19.20	0.69	52.47	2.24	1.28
19.84	0.97	79.59	2.67	2.02
20.48	0.99	78.32	3.81	1.88
21.12	1.36	98.17	6.68	2.80
21.76	1.36	126.39	4.36	2.32
22.40	1.54	103.83	9.04	3.64
23.04	1.28	64.89	2.92	3.02
23.68	2.14	134.85	7.36	3.35

(Table D4 continued)

Depth (cm)	As (µM)	Fe (µM)	P (µM)	Mn (µM)
24.32	2.84	169.10	12.05	3.85
25.60	2.91	135.72	6.59	4.30
26.24	4.24	186.58	8.74	5.53
26.88	3.76	183.98	10.53	4.74
27.52	2.37	138.65	6.74	5.54
28.16	2.51	144.59	5.03	5.50
28.80	2.22	132.67	4.19	5.87
29.44	2.57	123.57	4.39	6.97
30.08	2.53	94.82	3.48	6.57
31.36	3.06	108.30	10.83	5.20
32.00	3.66	127.18	11.37	5.44
32.64	2.64	78.69	4.03	4.83
33.28	4.89	168.56	9.69	7.90
33.92	4.31	179.39	11.11	5.94
34.56	5.24	179.92	16.09	6.04
35.20	5.06	204.31	14.44	7.09
35.84	7.52	279.76	15.48	7.90
36.48	6.70	263.94	15.43	7.36
37.12	6.48	268.65	22.80	6.20
37.76	8.17	293.10	17.87	8.33
38.40	7.77	291.28	18.46	6.58
39.04	7.69	271.18	18.57	7.12
39.68	7.32	265.74	17.63	6.70
40.32	7.03	305.70	16.63	8.28

Table D5. October 2003 probe 4, clear gels only

Depth (cm)	As (µM)	Fe (µM)	P (µM)	Mn (µM)
-8.96	0.16	0.00	0.15	0.00
-8.32	0.03	0.00	0.16	0.00
-7.68	0.12	0.00	0.16	0.00
-7.04	0.07	0.00	0.13	0.00
-6.40	0.20	0.00	0.20	0.00
-5.76	0.10	0.00	0.14	0.00
-5.12	0.15	0.00	0.13	0.00
-4.48	0.10	0.00	0.20	0.00
-3.84	0.07	0.00	0.12	0.00
-3.20	0.06	0.00	0.16	0.00
-2.56	0.06	0.00	0.13	0.00
-1.92	0.07	0.00	0.15	0.00
-1.28	0.09	0.00	0.18	0.00
-0.64	0.10	0.00	0.13	0.00
0.00	0.17	0.00	0.23	0.00
0.64	0.11	0.00	0.19	0.00
1.28	0.09	0.00	0.12	0.00
1.92	0.12	0.00	0.16	0.00
2.56	0.22	0.00	0.14	0.00
3.20	0.33	0.00	0.26	0.00
3.84	0.11	0.00	0.16	1.10
4.48	0.21	0.00	0.17	2.79
5.12	0.17	5.88	0.12	3.55
5.76	0.28	22.40	0.23	5.23
6.40	0.36	38.87	0.21	7.09
7.04	0.29	27.30	0.16	6.67
7.68	0.78	79.35	0.17	7.20
8.32	0.55	50.37	0.13	6.36
8.96	1.10	112.91	0.22	9.22
9.60	1.23	93.79	0.17	9.63
10.24	1.82	142.86	0.37	9.64
10.88	3.10	146.95	0.70	13.44
11.52	3.12	143.25	0.93	9.93
12.16	3.45	146.87	0.81	12.02
12.80	3.25	116.69	0.72	13.42
13.44	3.08	125.38	0.64	12.72
14.08	3.13	118.14	0.55	14.17
14.72	2.73	78.10	0.38	15.77
15.36	2.95	108.60	0.35	17.86
16.00	3.21	151.35	0.58	19.64
16.64	3.35	125.69	0.51	25.31
17.28	2.33	90.39	0.37	17.93
17.92	2.48	89.86	0.36	18.87
18.56	2.86	126.71	0.40	20.98
19.20	2.42	117.72	0.44	16.98
19.84	3.28	160.61	0.45	20.34
20.48	2.02	78.29	0.40	13.07
21.12	1.85	66.81	0.19	11.80
21.76	1.75	69.61	0.30	9.67
22.40	1.93	106.61	0.28	13.43
23.04	2.10	128.14	0.34	13.11
23.68	2.50	179.84	0.36	18.18
24.32	2.60	196.89	0.46	17.75
24.96	2.16	191.98	0.48	15.77

Table D6. October 2003 probe 5, clear gels only

Depth (cm)	As (μ M)	Fe (μ M)	P (μ M)	Mn (μ M)
-8.96	0.02	0.00	1.98	0.00
-8.32	0.08	0.00	2.65	0.00
-7.68	0.04	0.00	3.12	0.00
-7.04	0.07	0.00	2.97	0.00
-6.40	0.07	0.00	2.78	0.00
-5.76	0.05	0.00	3.22	0.00
-5.12	0.02	0.00	1.75	0.00
-4.48	0.01	0.00	2.29	0.00
-3.84	0.04	0.00	2.04	0.00
-3.20	0.08	0.00	2.21	0.00
-2.56	0.05	0.00	1.55	0.00
-1.92	0.08	0.00	2.88	0.00
-1.28	0.08	0.00	2.32	0.00
-0.64	0.12	0.00	1.76	0.00
0.00	0.16	0.00	3.44	0.00
0.64	0.09	0.00	1.84	0.00
1.28	0.12	0.00	3.22	0.00
1.92	0.07	0.00	1.70	0.00
2.56	0.17	10.02	3.07	0.00
3.20	0.11	9.67	2.47	0.00
3.84	0.21	15.07	3.91	0.34
4.48	0.34	33.19	5.16	0.58
5.12	0.87	31.30	4.06	2.61
5.76	0.38	57.51	5.44	0.68
6.40	0.31	30.27	4.91	0.58
7.04	0.62	68.31	9.08	1.02
7.68	0.62	88.73	11.62	0.94
8.32	0.17	25.73	4.77	0.35
8.96	0.60	74.73	10.40	0.99
9.60	0.55	59.46	8.10	1.05
10.24	0.88	69.21	6.61	2.35
10.88	1.02	57.25	5.09	3.38
11.52	1.37	96.24	8.51	3.46
12.16	0.53	24.24	3.77	1.93
12.80	0.59	41.05	4.35	2.14
13.44	1.10	76.28	7.24	3.59
14.08	1.10	65.40	7.04	3.85
14.72	2.13	96.75	10.14	5.75
15.36	3.47	173.42	6.71	0.70
16.00	3.60	144.88	14.75	6.78
16.64	2.91	111.49	12.67	6.59
17.28	3.65	145.48	12.64	8.72
17.92	3.37	143.78	10.79	6.90
18.56	2.81	100.41	8.90	7.35
19.20	4.00	115.73	11.45	8.23
19.84	4.70	120.26	10.35	9.20
20.48	4.72	135.73	17.16	7.59
21.12	4.59	140.72	21.30	6.13
21.76	4.77	165.01	21.05	7.29
22.40	4.35	125.52	20.26	9.35
23.04	3.77	122.42	17.12	7.66
23.68	3.10	129.66	12.98	7.66
24.32	4.12	146.89	18.46	8.75
24.96	4.23	151.98	15.48	9.77

Table D7. October 2003 probe 6, clear gels only

Depth (cm)	As (μM)	Fe (μM)	P (μM)	Mn (μM)
-16.00	0.07	0.00	2.60	0.00
-15.36	0.02	0.00	2.09	0.00
-14.72	0.09	0.00	2.85	0.00
-14.08	0.04	0.00	3.36	0.00
-13.44	0.05	0.00	2.92	0.00
-12.80	0.03	0.00	2.36	0.00
-12.16	0.07	0.00	3.12	0.00
-11.52	0.06	0.00	2.70	0.00
-10.88	0.09	0.00	1.96	0.00
-10.24	0.09	0.00	3.25	0.00
-9.60	0.08	0.00	2.65	0.00
-8.96	0.07	0.00	1.73	0.00
-8.32	0.09	0.00	3.22	0.00
-7.68	0.10	0.00	2.06	0.00
-7.04	0.10	0.00	1.60	0.00
-6.40	0.06	0.00	2.59	0.00
-5.76	0.09	0.00	2.21	0.00
-5.12	0.12	0.00	3.28	0.00
-4.48	0.09	0.00	3.27	0.00
-3.84	0.07	0.00	2.68	0.00
-3.20	0.11	0.00	3.19	0.00
-2.56	0.08	0.00	3.49	0.00
-1.92	0.06	0.00	2.19	0.00
-1.28	0.09	0.00	3.79	0.00
-0.64	0.10	0.00	3.07	0.00
0.00	0.20	0.00	3.09	0.00
0.64	0.12	0.00	3.13	0.00
1.28	0.14	0.00	1.80	0.00
1.92	0.26	13.66	3.74	1.34
2.56	0.31	23.66	3.14	0.00
3.20	0.41	34.66	2.84	0.00
3.84	0.38	35.79	4.50	1.21
4.48	0.31	24.86	3.86	1.12
5.12	0.49	54.58	4.06	4.81
5.76	0.60	72.04	9.10	1.97
6.40	0.54	75.45	5.40	5.26
7.04	0.81	106.58	7.04	4.86
7.68	1.57	119.51	7.98	7.91
8.32	1.00	135.44	5.82	8.15
8.96	0.85	108.96	5.36	7.52
9.60	0.48	121.32	4.58	3.58
10.24	1.26	115.89	7.60	10.57
10.88	1.14	79.70	6.70	8.92
11.52	1.53	81.65	5.89	9.33
12.16	0.64	72.47	8.43	3.90
12.80	1.59	79.05	6.50	9.82
13.44	2.27	100.82	8.07	8.90
14.08	2.90	109.48	10.82	11.26
14.72	1.86	130.37	8.97	10.13
15.36	2.59	81.90	10.01	11.32
16.00	1.62	57.89	4.42	9.28
16.64	2.17	86.70	7.83	11.63
17.28	1.52	63.11	10.18	9.91
17.92	1.91	81.01	6.75	10.51

(Table D7 continued)

Depth (cm)	As (μM)	Fe (μM)	P (μM)	Mn (μM)
18.56	0.47	57.08	6.61	2.46
19.20	1.52	63.11	10.18	9.91
19.84	2.01	61.75	11.36	10.60
20.48	2.66	104.09	12.33	12.93
21.12	2.86	90.83	10.53	13.07
21.76	2.67	111.23	15.51	12.12
22.40	2.56	151.09	14.02	12.43
23.04	3.09	143.02	13.89	14.41
23.68	1.44	131.54	9.06	8.92
24.32	3.56	161.88	16.08	13.76
25.60	2.79	95.64	10.37	11.78
26.24	2.40	76.11	8.35	12.52
26.88	2.07	74.28	7.39	9.76
27.52	2.10	74.62	7.72	8.86
28.16	2.56	105.54	8.96	11.64
28.80	1.96	167.84	10.71	12.37
29.44	2.04	109.92	10.35	9.88
30.08	1.90	108.86	21.37	9.78
31.36	2.99	100.30	11.89	11.66
32.00	2.33	137.73	11.39	12.70
32.64	2.28	84.21	10.74	10.52
33.28	2.37	132.26	11.13	10.42
33.92	1.57	174.77	11.67	9.08
34.56	2.81	205.22	11.25	15.41
35.20	2.55	199.74	10.86	11.67

Table D8. October 2004, single probe with HFO and clear gels, probe 1

Clear gels					HFO-doped gels		
Depth (cm)	As (μ M)	Fe (μ M)	P (μ M)	Mn (μ M)	Depth (cm)	mol As/mol Fe	mol P/mol Fe
0.69	0.00	154.95	1.83	1.01	1.37	0.0002	0.0020
2.06	0.00	47.80	1.78	9.02	2.74	0.0008	0.0023
3.43	0.00	56.12	0.58	13.82	4.11	0.0005	0.0014
4.80	0.00	43.95	0.44	14.32	5.48	0.0007	0.0015
6.17	0.33	175.82	0.32	21.29	6.85	0.0023	0.0024
7.54	0.08	162.48	0.00	17.04	8.22	0.0010	0.0013
8.91	0.06	179.12	0.00	18.59	9.59	0.0009	0.0015
10.28	0.00	155.99	0.00	17.32	10.96	0.0012	0.0017
11.65	0.09	164.48	0.00	17.88	12.33	0.0011	0.0018
13.02	0.11	217.80	0.00	19.57	13.70	0.0017	0.0018
14.39	0.27	283.38	0.58	21.59	15.07	0.0011	0.0019
15.76	0.09	226.63	0.00	20.10	16.44	0.0013	0.0017
17.13	0.27	282.55	0.04	22.41	17.81	0.0017	0.0020
18.50	0.35	317.39	0.00	25.69	19.18	0.0012	0.0014
19.87	0.19	229.18	0.15	17.09	20.55	0.0012	0.0014
21.24	0.26	272.80	3.35	21.48	21.92	0.0017	0.0017
22.61	0.33	282.91	3.48	21.44	23.29	0.0014	0.0015
23.98	0.75	327.83	6.18	26.21	24.66	0.0042	0.0044
25.35	1.19	411.27	5.35	24.29	26.03	0.0027	0.0022
26.72	1.13	428.75	5.54	24.64	27.40	0.0028	0.0028
28.09	2.00	510.05	11.23	29.51	28.77	0.0032	0.0023
29.46	1.39	524.74	4.56	28.32	30.14	0.0032	0.0028
30.83	1.20	499.85	4.14	28.81	31.51	0.0029	0.0021
32.20	0.69	349.76	2.69	17.53	32.88	0.0028	0.0026
33.57	1.02	361.08	7.74	20.13	34.25	0.0038	0.0037
34.94	1.70	425.87	3.57	19.31	35.62	0.0031	0.0023
36.31	1.73	495.14	2.81	23.97	36.99	0.0047	0.0047
37.68	1.92	549.05	3.42	24.93	38.36	0.0028	0.0022
39.05	1.77	520.30	2.70	23.42	39.73	0.0033	0.0025
40.42	1.84	542.69	2.57	26.03	41.10	0.0027	0.0023
41.79	1.62	476.44	2.25	21.15	42.47	0.0032	0.0037
43.16	3.45	528.22	22.23	18.65	43.84	0.0070	0.0080
44.53	4.24	584.24	16.06	19.01	45.21	0.0086	0.0101
45.90	6.65	659.37	29.36	19.52	46.58	0.0099	0.0131
47.27	5.21	615.02	48.00	17.86	47.95	0.0115	0.0225
48.64	9.05	860.08	60.89	21.66	49.32	0.0140	0.0324
50.01	6.93	655.56	78.44	17.95	50.69	0.0159	0.0341
51.38	11.86	945.84	91.83	23.23	52.06	0.0106	0.0199
52.75	9.67	844.92	65.59	21.86	53.43	0.0124	0.0193
54.12	7.63	845.09	37.93	25.05	54.80	0.0081	0.0115

Table D9. October 2004, single probe with HFO and clear gels, probe 2

Clear gels					HFO-doped gels		
Depth (cm)	As (µM)	Fe (µM)	P (µM)	Mn (µM)	Depth (cm)	mol As/mol Fe	mol P/mol Fe
-2.74	0.08	35.68	4.59	0.07	-2.06	0.0001	0.0015
-1.37	0.08	17.06	2.66	0.00	-0.69	0.0001	0.0014
0.00	0.06	12.60	2.41	0.00	0.69	0.0001	0.0014
1.37	0.03	8.62	1.94	0.00	2.06	0.0001	0.0013
2.74	0.03	11.47	2.05	0.00	3.43	0.0002	0.0013
4.11	0.14	22.85	4.29	1.10	4.80	0.0004	0.0015
5.48	0.15	42.15	2.50	4.25	6.17	0.0005	0.0012
6.85	0.14	31.09	1.68	5.86	7.54	0.0006	0.0013
8.22	0.28	56.23	2.28	8.37	8.91	0.0012	0.0018
9.59	0.76	149.28	3.22	8.91	10.28	0.0018	0.0015
10.96	1.22	284.67	2.53	14.66	11.65	0.0022	0.0017
12.33	1.48	359.36	2.47	14.95	13.02	0.0036	0.0022
13.70	2.04	429.40	2.35	11.98	14.39	0.0027	0.0015
15.07	1.77	360.91	2.77	7.85	15.76	0.0039	0.0022
16.44	1.53	432.14	2.35	13.19	17.13	0.0032	0.0023
17.81	1.95	530.76	3.78	12.93	18.50	0.0044	0.0033
19.18	3.04	658.36	5.09	14.91	19.87	0.0061	0.0044
20.55	4.43	686.82	14.96	12.29	21.24	0.0073	0.0066
21.92	5.90	907.69	13.90	17.48	22.61	0.0062	0.0047
23.29	4.00	693.31	12.08	16.16	23.98	0.0073	0.0081
24.66	4.21	662.63	23.84	28.68	25.35	0.0072	0.0098
26.03	5.11	619.60	35.80	64.06	26.72	0.0089	0.0173
27.40	6.23	733.15	47.14	76.62	28.09	0.0089	0.0225
28.77	4.78	563.94	50.54	50.83	29.46	0.0092	0.0216
30.14	6.61	753.16	39.06	63.64	30.83	0.0090	0.0199
31.51	6.62	831.16	53.66	51.74	32.20	0.0090	0.0202
32.88	6.29	814.67	41.37	47.75	33.57	0.0051	0.0070

Table D.10a. August 2005, double probe 1, clear gels

Depth (cm)	As (μM)	P (μM)	Mn (μM)	Cu (μM)	Sr (μM)	Mo (μM)	Ba (μM)	W (μM)	Depth (cm)	Fe (μM)
-4.80	--	--	--	--	--	--	--	--	-3.43	5.59
-2.74	-0.04	1.23	-0.09	0.00	0.63	0.12	0.07	0.36	-1.37	2.96
-0.69	-0.08	3.79	-0.13	0.00	0.69	0.13	0.06	0.29	0.69	4.70
1.37	-0.09	0.92	-0.14	0.00	0.75	0.13	0.06	0.23	2.74	9.15
3.43	0.10	2.22	0.63	0.05	0.64	0.14	0.07	0.23	4.80	72.97
5.48	0.54	3.28	1.21	0.00	0.63	0.14	0.08	0.26	6.85	126.56
7.54	1.58	15.43	2.85	0.00	0.83	0.13	0.18	0.46	8.91	162.08
9.59	2.15	35.21	3.54	0.24	0.95	0.12	0.27	0.68	10.96	162.08
11.65	1.34	11.97	3.84	0.15	1.07	0.17	0.19	0.47	13.02	232.05
13.70	3.37	39.19	9.12	0.53	1.27	0.24	0.85	0.64	15.07	176.42
15.76	1.18	6.66	4.57	0.01	1.08	0.23	0.14	0.41	17.13	349.07
17.81	1.46	9.61	5.12	0.01	1.01	0.22	0.17	0.45	19.18	391.37
19.87	4.90	62.47	7.85	0.16	1.49	0.20	0.65	1.13	21.24	317.08
21.92	4.16	37.88	5.86	0.18	1.07	0.18	0.47	1.09	23.29	261.11
23.98	5.12	86.23	6.59	0.12	1.10	0.15	0.70	1.11	25.35	421.68
26.03	5.36	62.50	6.24	0.03	1.07	0.19	0.50	1.37	27.40	255.55
28.09	2.98	22.13	4.50	0.02	0.84	0.18	0.22	0.74		
30.14	2.81	19.94	5.96	0.31	0.99	0.21	0.40	0.75		

Table D.10b. August 2005, double probe 1, HFO-doped gels

Depth (cm)	mol As/mol Fe	mol P/mol Fe	mol Mn/mol Fe	mol Sr/mol Fe	mol Mo/mol Fe	mol W/mol Fe
-4.80	0.0038	0.00033	0.0001	0.0002	0.0001	0.0004
-2.74	0.0027	0.0006	0.0001	0.0002	0.0001	0.0003
-0.69	0.0026	0.0007	0.0001	0.0001	0.0002	0.0003
1.37	0.0029	0.0004	0.0000	0.0001	0.0003	0.0002
3.43	0.0030	0.0002	0.0001	0.0001	0.0003	0.0002
5.48	0.0025	0.0009	0.0006	0.0001	0.0002	0.0002
7.54	0.0028	0.0004	0.0010	0.0002	0.0002	0.0001
9.59	0.0030	0.0009	0.0007	0.0001	0.0003	0.0002
11.65	0.0033	0.0025	0.0008	0.0002	0.0002	0.0003
13.70	0.0032	0.0040	0.0009	0.0002	0.0001	0.0004
15.76	0.0043	0.0068	0.0009	0.0002	0.0001	0.0007
17.81	0.0035	0.0045	0.0009	0.0001	0.0001	0.0005
19.87	0.0039	0.0048	0.0012	0.0002	0.0001	0.0006
21.92	0.0041	0.0065	0.0011	0.0002	0.0001	0.0006
23.98	0.0067	0.0130	0.0014	0.0002	0.0001	0.0010
26.03	0.0078	0.0214	0.0018	0.0002	0.0001	0.0013
28.09	0.0070	0.0191	0.0016	0.0002	0.0001	0.0013
30.14	0.0050	0.0088	0.0015	0.0002	0.0001	0.0007

Table D.11a. August 2005, double probe 2, clear gels

Depth (cm)	As (μM)	P (μM)	Mn (μM)	Cu (μM)	Sr (μM)	W (μM)
-2.06	4.00	0.00	8.53	0.22	1.08	0.15
0.00	2.23	2.41	6.23	0.05	1.03	0.19
2.06	5.56	28.93	4.49	0.00	1.61	0.58
4.11	3.22	10.94	4.44	0.00	1.29	0.45
6.17	2.48	10.00	5.30	0.01	1.32	0.38
8.22	3.39	3.94	4.88	0.03	1.26	0.40
10.28	4.26	42.78	3.17	0.00	0.99	0.51
12.33	4.69	41.83	2.50	0.02	0.98	0.82
14.39	4.95	27.90	2.72	0.00	1.07	0.89
16.44	6.55	37.59	2.93	4.95	1.12	1.26
18.50	7.33	46.01	2.68	0.06	1.11	1.46
20.55	7.47	43.87	3.03	0.01	1.14	1.74
22.61	5.91	47.11	2.51	0.02	0.95	1.31
24.66	7.55	82.24	3.96	0.10	1.15	1.48
26.72	7.93	64.38	3.17	0.24	1.30	1.79
28.77	5.55	44.29	3.13	0.05	1.07	1.53
30.83	5.77	38.64	3.70	0.09	1.13	1.59
32.88	6.97	85.85	3.69	0.01	1.24	1.91

Depth (cm)	Fe (μM)
0.00	59.73
1.37	270.70
2.06	144.89
3.43	240.49
4.11	235.57
6.17	273.04
8.22	217.87
9.59	226.70
10.28	203.40
12.33	227.21
13.70	267.18
14.39	263.15
16.44	311.94
17.81	273.42
18.50	358.44
20.55	289.41
21.92	301.17
22.61	311.05
24.66	279.91
26.03	316.44
26.72	353.94
28.77	339.95
30.14	343.34
30.83	303.29
32.88	277.45
34.25	269.34
34.94	262.89

Table D.11b. August 2005, double probe 2, HFO-doped gels

Depth (cm)	mol P/ mol Fe	mol Cr/ mol Fe	mol Mn/ mol Fe	mol As/ mol Fe	mol Sr/ mol Fe	mol Mo/ mol Fe	mol Ba/ mol Fe	mol W/ mol Fe
-2.06	0.0000	0.0002	0.0024	0.0023	0.0001	0.0003	0.0001	0.0001
0.00	0.0000	0.0001	0.0017	0.0020	0.0001	0.0002	0.0001	0.0001
2.06	0.0000	0.0001	0.0017	0.0024	0.0001	0.0003	0.0001	0.0001
4.11	0.0000	0.0001	0.0013	0.0021	0.0001	0.0002	0.0001	0.0001
6.17	0.0000	0.0002	0.0014	0.0027	0.0002	0.0002	0.0001	0.0001
8.22	0.0028	0.0001	0.0014	0.0034	0.0002	0.0002	0.0001	0.0003
10.28	0.0022	0.0002	0.0015	0.0033	0.0002	0.0002	0.0001	0.0002
12.33	0.0015	0.0002	0.0013	0.0032	0.0002	0.0001	0.0001	0.0003
14.39	0.0081	0.0001	0.0012	0.0045	0.0002	0.0001	0.0001	0.0006
16.44	0.0133	0.0001	0.0010	0.0059	0.0002	0.0001	0.0002	0.0013
18.50	0.0106	0.0002	0.0010	0.0064	0.0002	0.0001	0.0002	0.0012
20.55	0.0058	0.0001	0.0011	0.0047	0.0002	0.0001	0.0001	0.0008
22.61	0.0151	0.0002	0.0011	0.0079	0.0002	0.0001	0.0002	0.0015
24.66	0.0222	0.0002	0.0010	0.0087	0.0002	0.0001	0.0002	0.0020
26.72	0.0225	0.0002	0.0011	0.0085	0.0003	0.0000	0.0002	0.0016
28.77	0.0195	0.0001	0.0010	0.0084	0.0002	0.0000	0.0002	0.0016
30.83	--	--	--	--	--	--	--	--
32.88	0.0158	0.0002	0.0012	0.0082	0.0003	0.0001	0.0002	0.0016

Table D.12. August 2005, double probe 3, clear gels

Depth (cm)	As (μM)	P (μM)	Mn (μM)	Cu (μM)	Sr (μM)	Mo (μM)	Ba (μM)	W (μM)	Depth (cm)	Fe (μM)
-4.80	-0.04	51.89	0.00	0.00	0.72	0.10	0.07	0.24	-5.48	11.27
-2.06	-0.05	6.11	0.00	0.00	0.83	0.11	0.05	0.22	-2.74	4.68
0.69	0.00	1.92	1.27	0.00	0.83	0.11	0.07	0.17	0.00	33.34
3.43	1.75	6.87	7.35	0.01	1.48	0.25	0.10	0.43	2.74	72.16
6.17	3.41	16.76	6.59	0.23	1.02	0.22	0.08	0.40	5.48	71.65
8.91	5.31	62.03	9.33	0.82	1.27	0.27	0.47	0.73	8.22	94.42
11.65	7.97	53.89	13.38	0.75	1.83	0.37	0.50	0.69	10.96	134.43
13.70	2.07	118.90	10.03	0.77	1.60	0.39	0.29	0.40	13.70	126.24
17.13	0.78	--	8.54	6.40	1.27	0.27	0.25	0.23	16.44	65.25
19.87	0.36	102.98	8.84	0.44	1.43	0.27	0.19	0.19	19.18	110.10
22.61	0.70	11.12	7.74	1.72	1.16	0.16	0.47	0.22	21.92	56.29
25.35	0.36	7.77	9.30	0.84	1.68	0.23	0.42	0.16	24.66	24.79
28.09	0.21	5.05	6.55	0.10	1.64	0.24	0.11	0.16	27.40	23.09

Table D.13. LC-ICP-MS As speciation data from August 2005 double probes 1, 2, and 3

<i>Double Probe 1</i>			<i>Double Probe 2</i>			<i>Double Probe 3</i>		
depth (cm)	As(III) (µM)	As(V) (µM)	depth (cm)	As(III) (µM)	As(V) (µM)	depth (cm)	As(III) (µM)	As(V) (µM)
-4.11	0.28	0.43	0.69	2.50	0.97	-4.80	0.06	0.18
-2.06	0.28	0.37	4.80	2.20	1.55	-2.06	0.27	0.16
0.00	0.28	0.33	8.91	3.29	1.77	0.69	0.68	1.05
2.06	0.28	0.44	13.02	4.13	1.94	3.43	3.58	0.97
4.11	0.32	0.62	17.13	4.14	1.66	6.17	5.25	0.77
6.17	0.47	0.89	21.24	3.46	1.83	8.91	7.82	1.18
8.22	0.87	0.90	25.35	5.61	2.45	11.65	7.38	1.64
10.28	1.60	1.14	29.46	3.94	2.10	14.39	6.67	1.19
12.33	0.72	0.76	33.57	4.26	1.79	17.13	6.82	1.32
14.39	0.86	1.19				19.87	5.22	1.64
16.44	0.91	1.13				22.61	1.22	0.76
18.50	1.22	0.99				25.35	0.73	0.58
20.55	2.65	1.44				28.09	0.85	0.65
22.61	3.22	1.59						
24.66	2.78	2.03						
26.72	3.43	1.74						
28.77	1.95	1.42						
30.83	1.21	1.17						

Table D.14a. May 2006 clear gels

Depth (cm)	As (µM)	P (µM)	Mn (µM)	Sr (µM)	W (µM)	Fe (µM)
-0.69	0.45	18.74	2.57	1.33	1.03	79.86
0.00	0.49	5.29	1.54	1.18	0.49	81.91
0.69	0.31	0.00	1.28	0.97	0.37	27.66
1.37	0.44	0.41	2.07	1.07	0.36	55.71
2.74	0.60	8.08	2.77	1.04	0.38	72.16
3.43	1.07	13.23	4.10	1.20	0.41	80.93
4.11	1.19	5.34	4.77	1.34	0.46	89.31
4.80	1.15	4.20	5.35	1.44	0.42	108.90
6.17	0.96	5.15	4.32	1.12	0.38	156.18
6.85	1.43	5.31	7.78	1.74	0.56	73.41
7.54	0.93	7.30	4.20	1.07	0.41	139.97
8.22	1.10	33.57	4.98	1.29	0.40	82.70
9.59	1.23	9.52	5.25	1.34	0.35	79.91
10.28	1.11	6.95	4.98	1.27	0.39	106.69
10.96	1.68	10.33	6.93	1.73	0.49	99.06
11.65	1.92	9.52	7.68	1.69	0.48	97.29
13.02	2.10	9.94	7.26	1.61	0.50	133.36
13.70	2.00	8.94	7.94	1.68	0.54	124.16
14.39	1.60	8.28	6.08	1.39	0.49	114.60
15.07	1.70	8.33	7.20	1.61	0.43	110.35
16.44	1.61	13.33	6.34	1.50	0.45	103.58
17.13	1.60	8.60	7.21	1.60	0.44	94.62
17.81	1.64	10.64	7.13	1.64	0.45	104.73
18.50	1.96	9.83	10.93	2.15	0.49	111.81
19.87	1.44	34.08	8.13	1.71	0.44	96.90
20.55	1.96	5.78	13.36	2.58	0.48	146.98
21.24	1.92	9.68	10.29	2.10	0.46	187.26
21.92	1.76	8.13	8.52	1.83	0.42	137.02
23.29	2.37	17.77	7.25	1.65	0.55	138.91
23.98	1.78	9.98	6.81	1.58	0.58	155.31
24.66	2.26	11.72	6.30	1.37	0.74	120.11
25.35	3.53	24.79	5.16	1.33	0.87	106.14
26.72	4.04	150.36	5.02	1.48	0.97	166.76
27.40	--	--	--	--	--	--
28.09	5.40	53.26	4.11	1.42	1.10	159.29
28.77	3.96	65.66	3.97	1.24	0.82	140.68
30.14	--	--	3.91	1.23	0.90	158.34
30.83	4.67	28.11	5.09	1.52	1.76	156.06
31.51	5.05	47.61	4.35	1.40	1.18	199.14
32.20	4.86	79.18	4.25	1.37	1.10	184.46
33.57	6.05	55.60	4.52	1.48	1.22	211.29
34.25	4.79	35.19	4.60	1.43	1.10	157.87
34.94	3.51	11.87	6.81	1.52	0.81	100.87
35.62	2.09	5.93	7.29	1.52	0.52	115.86

Table D.14b. May 2006, HFO-doped gels

Depth (cm)	mol As/mol Fe	mol P/mol Fe	mol Sr/mol Fe	mol W/mol Fe
-0.69	0.0008	0.0139	0.0002	0.0003
0.00	0.0008	0.0000	0.0002	0.0002
0.69	0.0019	0.0036	0.0002	0.0004
1.37	0.0020	0.0230	0.0003	0.0004
2.74	0.0018	0.0016	0.0003	0.0003
3.43	0.0012	0.0000	0.0003	0.0002
4.11	0.0013	0.0000	0.0003	0.0002
4.80	0.0009	0.0000	0.0002	0.0002
6.17	0.0018	0.0000	0.0003	0.0002
6.85	0.0012	0.0000	0.0002	0.0002
7.54	0.0018	0.0055	0.0003	0.0002
8.22	0.0028	0.0064	0.0005	0.0004
9.59	0.0022	0.0057	0.0003	0.0003
10.28	0.0021	0.0017	0.0003	0.0002
10.96	0.0036	0.0045	0.0004	0.0004
11.65	0.0027	0.0023	0.0004	0.0003
13.02	0.0028	0.0035	0.0004	0.0003
13.70	0.0021	0.0008	0.0003	0.0003
14.39	0.0022	0.0141	0.0003	0.0003
15.07	0.0018	0.0019	0.0004	0.0002
16.44	0.0022	0.0012	0.0004	0.0002
17.13	0.0023	0.0039	0.0004	0.0003
17.81	0.0025	0.0046	0.0003	0.0003
18.50	0.0024	0.0030	0.0004	0.0003
19.87	0.0020	0.0010	0.0004	0.0002
20.55	0.0023	0.0082	0.0004	0.0002
21.24	0.0016	0.0008	0.0003	0.0002
21.92	0.0011	0.0000	0.0003	0.0001
23.29	0.0037	0.0090	0.0003	0.0005
23.98	0.0034	0.0075	0.0004	0.0007
24.66	0.0035	0.0086	0.0004	0.0005
25.35	0.0051	0.0163	0.0004	0.0006
26.72	0.0044	0.0108	0.0004	0.0006
27.40	0.0045	0.0156	0.0004	0.0006
28.09	0.0044	0.0138	0.0004	0.0006
28.77	0.0050	0.0164	0.0004	0.0006
30.14	0.0058	0.0184	0.0004	0.0007
30.83	0.0058	0.0190	0.0004	0.0008
31.51	0.0048	0.0141	0.0004	0.0006
32.20	0.0076	0.0189	0.0004	0.0007
33.57	0.0097	0.0275	0.0004	0.0009
34.25	0.0078	0.0221	0.0004	0.0008
34.94	0.0049	0.0115	0.0004	0.0005
35.62	0.0009	0.0000	0.0003	0.0002

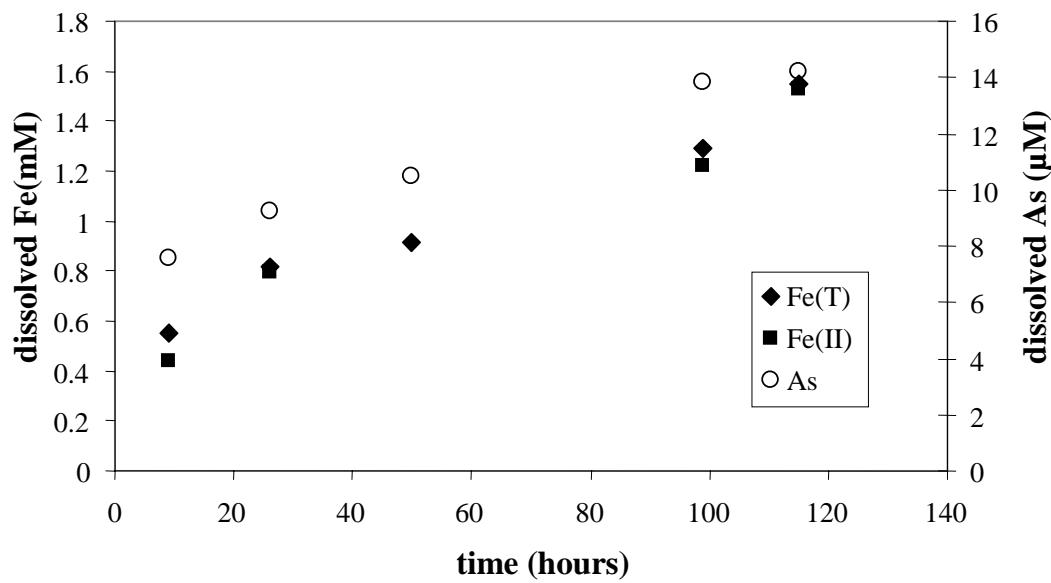
Table D.15. LC-ICP-MS arsenic speciation data for May 2006

Depth (cm)	As(III) (μ M)	As(V) (μ M)
0.69	0.24	0.27
4.11	0.64	0.35
7.54	0.69	0.36
10.96	1.17	0.59
14.39	0.89	0.49
17.81	1.01	0.35
21.24	1.23	0.56
24.66	2.63	0.72
28.09	3.14	0.82
31.51	3.84	1.13

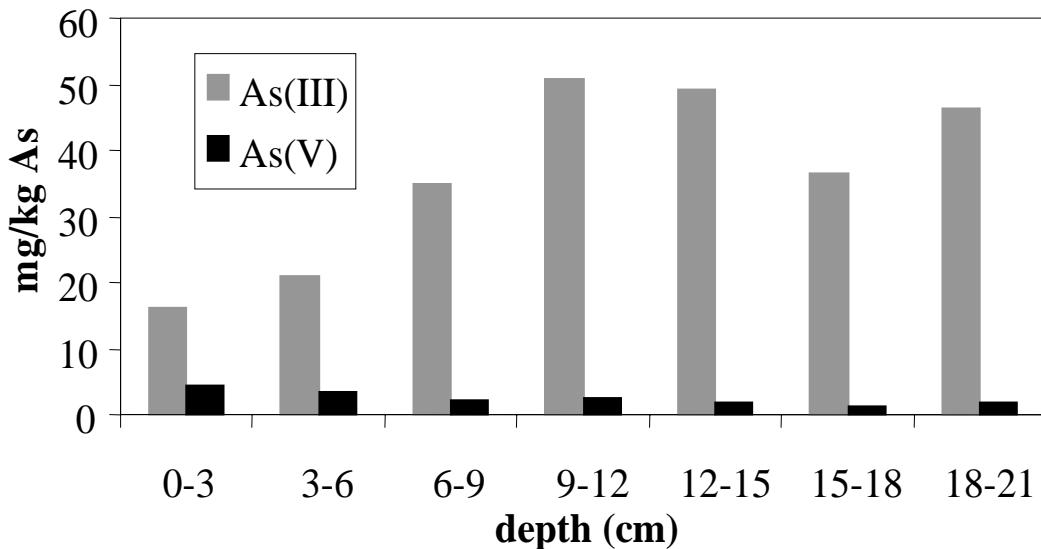
Appendix E

Core Analysis and Microcosm Results

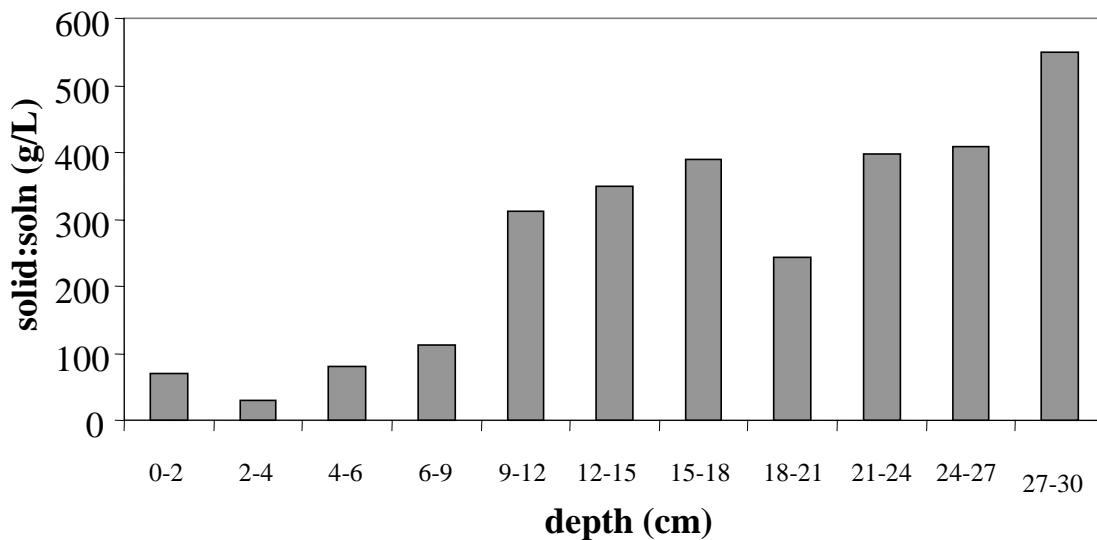
E1. A 600 mL container of sediment was defrosted under N₂ in an anaerobic chamber. At each time point, the sediment was homogenized and a 20 mL aliquot was centrifuged to separate the bulk solids from the porewater. The porewater was syringe filtered (0.2 µm) and analyzed for dissolved total Fe and Fe(II) by a colorometric method and As by ICP-MS.



E2. Sediment core sections from May 2006 were extracted with 25 mM H₃PO₄ under N₂ in an anaerobic chamber. The slurry was centrifuged, the supernatant was syringe filtered (0.2 µm) and analyzed by LC-ICP-MS.



E3. The solid-to-solution ratio was measured by weighing a core section, drying it at 60°C, and reweighing the sample. The core was taken in May 2006 prior to the gel probe deployment when the sediment was soft.



E4. The solid-to-solution ratio was measured by weighing a core section, drying it at 60°C, and reweighing the sample. The core was taken in May 2006 at the time of gel probe deployment, when the sediment was hard.

