

Supplementary Table 1. The ion concentrations of the formation water samples.

number	PH	cation (mg/l)			anion (mg/l)			TDS (mg/l)
		Na <sup>+</sup>	Ca <sup>2+</sup>	Mg <sup>2+</sup>	Cl <sup>-</sup>	SO <sub>4</sub> <sup>2-</sup>	HCO <sub>3</sub> <sup>-</sup>	
1	5.75	1510.60	1826.85	277.01	6192.58	16.56	301.63	10108.67
2	6.33	4727.78	2947.08	297.92	12977.36	9.36	674.32	21624.46
3	6.19	11257.77	18110.15	313.84	49699.48	10.30	1039.07	80420.31
4	6.09	12124.40	25354.21	627.68	64786.82	56.00	1001.51	103894.62
5	6.08	8377.26	7307.39	277.01	26539.64	53.00	183.60	42684.91
6	6.55	1215.77	1473.54	297.92	5190.94	0.00	272.73	8450.90
7	5.88	7892.28	6385.35	595.84	25089.56	2.87	185.95	40148.97
8	5.79	7456.18	12770.69	297.92	34606.29	121.20	595.05	55726.13
9	6.38	18579.37	13753.05	893.76	55370.06	100.30	347.11	88943.35
10	5.49	17980.51	15226.59	595.84	56235.22	196.30	260.33	90298.50
11	6.11	9156.84	13261.87	595.84	38932.08	15.60	652.21	62598.83
12	5.96	19107.92	23801.91	841.53	73661.73	19.50	1101.66	118614.75
13	5.41	12888.12	19156.04	297.92	54982.07	0.00	409.01	87133.16
14	6.05	144.78	186444.86	297.92	35471.45	0.00	1017.00	56863.00
15	4.89	10686.43	7367.71	595.84	31145.66	45.30	165.82	49961.45
16	5.57	8987.48	20432.78	929.61	52664.52	56.30	75.66	83090.05
17	5.91	11296.83	10902.96	300.59	37374.61	78.20	517.84	60292.83
18	6.10	11338.36	11793.14	298.04	38924.81	16.30	485.23	62839.58
19	6.06	42244.39	35623.50	1939.09	133582.87	47.20	345.23	213735.08
20	6.09	5241.89	13753.05	595.84	33741.13	12.50	696.43	54028.33
21	5.53	2824.92	11297.15	595.84	25896.23	100.50	309.52	40923.65
22	5.76	557.75	11749.05	4337.63	33934.87	78.30	618.13	51197.43
23	6.62	15912.61	27402.70	831.04	75195.65	0.00	393.43	119735.43
24	5.77	23928.74	43607.04	2489.34	120997.94	18.30	486.94	191510.00
25	5.80	14983.58	38076.00	303.88	91065.73	52.10	464.36	144893.55
26	6.12	6400.67	21454.42	929.61	50470.16	14.90	100.68	79355.54
27	5.74	27654.52	24319.34	313.84	86086.60	19.50	813.73	139188.03
28	6.73	421.26	913.42	277.01	4653.96	17.20	721.29	4986.95
29	6.35	12481.79	30465.61	596.08	74549.22	0.00	550.81	118643.51
30	6.69	20515.72	23292.29	277.01	23426.34	14.50	354.09	117865.46
31	5.78	9475.31	30060.00	900.62	70219.36	25.30	376.49	111031.78
32	5.97	269.36	4460.30	901.78	10649.89	27.30	491.28	16772.61
33	5.76	19354.73	28216.32	311.17	80377.20	31.20	474.13	128733.55
34	6.14	9742.11	23547.00	607.75	58150.41	32.80	501.58	92548.85
35	5.58	10589.43	19539.00	303.88	51567.34	39.80	351.48	82351.13
36	5.57	10029.08	8920.61	601.19	32837.16	65.40	265.56	52653.59
37	6.85	18687.78	12775.90	894.12	53249.45	39.80	1311.44	86918.69
38	6.17	2166.31	12787.92	277.01	26539.64	87.10	393.43	42164.32
39	5.78	22470.31	24048.00	303.88	37899.60	67.20	275.81	124997.60
40	6.08	968.23	11874.50	277.01	13001.02	98.50	524.58	36645.34
41	6.00	23598.23	3447.69	2767.69	105204.97	45.60	391.14	166438.85
42	7.07	28.75	6129.84	1549.03	15360.48	48.90	75.66	23143.76
43	5.52	3803.51	5030.04	610.18	16532.46	21.50	12.81	25989.00
44	6.31	6967.16	2515.02	915.27	17402.40	16.50	782.28	28582.13
45	5.30	1191.63	4024.03	610.18	10441.44	17.80	504.76	16772.04
46	6.27	1359.99	3521.03	305.09	8701.20	19.60	883.57	14770.88
47	7.02	229.08	1509.01	610.18	4350.42	27.30	757.26	7455.95

48	6.22	1722.01	1006.01	305.09	5220.72	29.60	176.96	8430.79
49	7.01	864.80	2012.02	610.18	6091.02	21.40	999.51	10577.53
50	6.26	1186.48	2587.16	941.53	8874.91	16.90	475.72	14065.79
51	5.54	11289.77	12775.90	298.04	40824.57	0.00	78.69	65266.97
52	6.85	781.37	1474.14	298.04	4437.45	0.00	419.66	7410.66
53	6.45	316.08	6879.33	298.04	13312.36	18.60	367.20	21173.02
54	6.60	333.09	7370.71	298.04	14154.48	17.80	459.00	22615.32
55	6.67	5674.16	17198.33	298.04	39809.46	36.50	393.43	63373.42
56	5.90	8334.40	10047.66	277.01	30962.92	37.90	799.98	50421.96
57	6.75	53055.74	4110.40	831.04	91119.44	53.20	603.26	149719.88
58	6.62	452.37	2740.27	277.01	6192.58	32.90	275.40	9937.64
59	6.15	338.88	4110.40	831.04	9731.20	37.80	836.51	15848.03
60	6.07	6343.53	5480.54	277.01	19462.40	25.10	1407.46	32970.95
61	4.92	2562.42	3929.44	297.92	11221.70	24.90	942.73	18954.22
62	6.85	8387.21	8841.25	595.84	30212.26	55.30	159.34	48195.89
63	6.09	254.21	982.36	297.92	2589.62	6.10	703.73	4827.35
64	7.04	654.15	1964.72	297.92	5179.25	12.90	298.47	8394.50
65	6.08	5677.66	5894.16	297.92	19853.77	0.00	331.63	32055.15
66	6.12	2273.47	7858.89	297.92	18127.36	12.60	254.25	28811.89
67	6.48	2502.27	1473.54	297.92	6921.26	62.50	707.48	11902.47
68	5.32	9303.81	5894.16	297.92	25089.56	98.60	939.62	41525.08
69	5.72	2865.89	19156.04	595.84	39797.23	45.90	420.07	62835.07
70	5.98	4696.65	10314.79	595.84	26819.87	75.60	694.22	43121.37
71	6.31	1358.21	1964.72	297.92	6056.10	0.00	657.03	10333.98
72	5.66	5321.28	8841.25	595.84	25089.56	15.60	843.98	40690.91
73	6.44	1208.05	5894.16	297.92	12977.36	23.60	309.92	20687.42
74	5.80	4498.03	24067.84	1191.68	52774.59	17.50	359.51	82891.65
75	5.95	191.32	15717.77	297.92	28550.19	36.40	719.02	45476.22
76	5.36	3937.69	5937.25	277.01	16808.44	0.00	983.58	27943.98
77	7.30	3776.14	6669.31	622.34	19142.64	12.40	499.75	30710.18
78	5.06	22974.47	34225.11	2168.94	102037.51	0.00	416.16	161822.19
79	5.63	4065.34	26032.56	297.92	13142.21	0.00	24.38	83612.41
80	5.95	2571.92	4913.81	298.04	13312.36	14.90	367.20	21463.34
81	6.53	753.01	913.42	277.01	3538.62	0.00	78.69	5560.75
82	6.76	238.36	913.42	277.01	2653.96	0.00	236.06	4318.82
83	6.23	2923.06	5023.83	277.01	14154.48	12.90	78.69	22457.06
84	5.85	4459.96	8220.81	277.01	22116.37	23.50	185.89	35260.04
85	6.07	4803.52	11417.79	277.01	28308.95	27.60	172.61	44979.89
86	6.09	8009.24	29962.00	595.84	66466.98	21.40	1062.24	106096.30
87	6.64	305.89	2455.90	297.92	5179.25	36.50	93.03	8331.49
88	5.73	4771.59	18664.86	893.76	5743.57	0.00	743.57	118446.40
89	5.81	4436.15	47644.50	2681.27	98405.66	23.50	917.51	154085.09
90	5.61	24515.35	18664.86	297.92	41646.22	27.60	44.22	115168.56
91	5.80	23490.11	17682.49	297.92	48193.39	12.40	276.36	109940.27
92	5.56	6092.44	38803.25	1489.60	82189.94	11.40	320.58	128895.80
93	5.34	22991.60	28488.46	893.76	88246.04	26.50	331.63	140951.49
94	5.36	17932.76	27506.10	297.92	36999.00	33.50	287.41	123023.19
95	5.30	7828.11	41210.04	2383.35	8706.67	0.00	359.51	143487.68
96	5.33	11706.56	34873.81	2681.27	87380.88	12.60	297.52	136940.05
97	5.35	17366.91	33400.27	1787.51	90841.51	16.50	384.30	143780.50

98	5.54	22412.76	28488.46	893.76	87380.88	0.00	285.13	139460.99
99	5.65	11161.21	37820.89	2383.35	90841.51	11.80	371.90	142578.86
100	5.93	13900.26	35414.11	1787.51	89111.20	24.80	297.52	140510.62

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