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APPENDICES

Table A1: Data from nanofiltration experiments for the removal of HAA₅ 60 ppb by ES 10 membrane

pressure (bar)	cross-flow velocity (m/s)	concentrations of HAA ₅ (ppb) in feed solutions						concentrations of HAA ₅ (ppb) in the permeate					
		CAA	BAA	DCAA	TCAA	DBAA	HAA ₅	CAA	BAA	DCAA	TCAA	DBAA	HAA ₅
1	0.3	11.82	12.46	11.47	1.12	11.83	48.71	0.00	0.00	0.00	0.47	0.00	0.47
		11.52	12.13	11.15	9.84	11.68	56.31	0.00	0.00	0.00	0.48	0.00	0.48
	0.5	12.05	12.47	11.38	10.33	11.87	58.09	0.00	0.00	0.87	1.66	0.49	3.03
		13.49	14.16	13.09	11.74	13.46	65.94	0.00	0.00	0.86	1.62	0.48	2.96
	0.7	10.96	11.62	10.65	9.74	11.19	54.15	0.00	0.00	0.00	0.00	0.00	0.00
		11.33	11.94	10.84	10.00	11.46	55.57	0.00	0.00	0.00	0.00	0.00	0.00
3	0.3	13.29	14.74	13.79	14.29	15.29	71.40	0.00	0.00	0.00	1.18	0.00	1.18
		12.27	13.53	12.73	13.13	14.01	65.66	0.00	0.00	0.00	1.28	0.00	1.28
	0.5	12.16	13.26	13.39	12.77	13.76	65.34	0.00	0.00	0.69	2.10	0.40	3.19
		12.58	13.55	12.66	13.13	14.08	66.00	0.00	0.00	0.89	2.70	0.52	4.11
	0.7	12.94	14.23	13.61	13.84	15.01	69.63	0.00	0.00	0.00	0.44	0.00	0.44
		12.23	13.30	12.72	12.94	13.99	65.19	0.00	0.00	0.00	0.59	0.00	0.59
5	0.3	12.09	14.46	13.59	14.44	15.42	70.00	0.00	0.00	1.49	2.71	1.19	5.38
		12.77	14.26	13.37	14.21	15.16	69.77	0.00	0.00	1.39	2.54	0.95	4.89
	0.5	12.59	13.68	12.72	13.01	13.95	65.96	0.00	0.92	2.77	4.08	2.09	9.87
		12.67	13.74	12.81	13.76	14.00	66.99	0.00	0.94	2.91	4.30	2.20	10.36
	0.7	13.57	14.84	13.68	13.82	15.09	71.00	0.00	0.00	1.74	2.93	1.63	6.30
		12.08	13.68	12.06	12.15	13.26	63.24	0.00	0.00	1.78	2.89	1.18	5.86

Table A2: Data from nanofiltration experiments for the removal of HAA₅ 90 ppb by ES 10 membrane

pressure (bar)	cross-flow velocity (m/s)	concentrations of HAA ₅ (ppb) in feed solutions						concentrations of HAA ₅ (ppb) in the permeate					
		CAA	BAA	DCAA	TCAA	DBAA	HAA ₅	CAA	BAA	DCAA	TCAA	DBAA	HAA ₅
1	0.3	19.06	20.58	19.07	17.93	20.32	96.95	0.00	0.00	0.00	0.47	0.00	0.47
		18.79	20.25	18.75	17.61	19.93	95.33	0.00	0.00	0.00	0.48	0.00	0.48
	0.5	17.42	18.77	17.22	15.66	17.86	86.94	0.00	0.00	0.87	1.66	0.49	3.03
		18.25	19.58	17.94	16.35	18.59	90.70	0.00	0.00	0.86	1.62	0.48	2.96
	0.7	17.74	18.96	17.36	15.81	18.04	87.92	0.00	0.00	0.00	0.00	0.00	0.00
		17.09	18.34	16.78	15.22	17.35	84.77	0.00	0.00	0.00	0.00	0.00	0.00
3	0.3	19.16	20.51	18.74	16.86	19.23	94.49	0.00	0.00	0.00	1.18	0.00	1.18
		17.44	18.77	17.11	15.42	17.64	86.37	0.00	0.00	0.00	1.28	0.00	1.28
	0.5	17.23	18.39	16.68	15.38	17.49	85.16	0.00	0.00	0.69	2.10	0.40	3.19
		19.20	20.56	18.87	17.16	19.50	95.30	0.00	0.00	0.89	2.70	0.52	4.11
	0.7	18.56	20.02	18.41	16.75	19.14	92.89	0.00	0.00	0.00	0.44	0.00	0.44
5	0.3	19.61	20.85	19.07	17.39	19.85	96.77	0.00	0.00	1.49	2.71	1.19	5.38
		18.57	19.94	18.20	16.64	19.06	92.41	0.00	0.00	1.39	2.54	0.95	4.89
	0.5	18.65	20.27	18.32	17.01	19.53	93.79	0.00	0.92	2.77	4.08	2.09	9.87
		19.25	21.12	19.29	18.24	20.87	98.77	0.00	0.00	1.74	2.93	1.63	6.30

Table A3: Data from nanofiltration experiments for the removal of HAA₅ 120 ppb by ES 10 membrane

pressure (bar)	cross-flow velocity (m/s)	concentrations of HAA ₅ (ppb) in feed solutions						concentrations of HAA ₅ (ppb) in the permeate					
		CAA	BAA	DCAA	TCAA	DBAA	HAA ₅	CAA	BAA	DCAA	TCAA	DBAA	HAA ₅
1	0.3	21.75	25.73	24.46	28.09	29.15	129.18	0.00	2.10	8.30	8.74	6.19	25.34
		20.28	24.07	23.08	26.36	27.24	121.04	0.00	2.49	10.01	10.46	7.42	30.37
	0.5	19.55	23.96	23.60	23.53	26.71	117.34	0.00	0.00	2.77	3.71	1.53	8.01
		23.09	28.39	28.00	27.85	31.68	139.01	0.00	0.00	2.68	3.59	1.47	7.75
	0.7	20.47	25.12	24.75	23.17	27.05	120.55	7.79	9.04	15.43	14.94	13.13	60.34
		20.07	24.63	24.38	22.70	26.55	118.32	7.30	8.63	14.88	14.46	12.65	57.92
3	0.3	25.33	30.33	27.76	28.84	31.52	143.77	5.71	6.39	18.63	17.45	14.89	63.08
		22.43	26.51	24.25	25.36	27.59	126.14	4.70	5.47	15.88	14.87	12.58	53.49
	0.5	21.52	25.25	24.16	28.62	29.15	128.70	0.00	0.00	0.95	2.15	0.07	3.17
		22.77	27.48	25.79	30.82	31.80	138.66	0.00	0.00	0.97	2.18	0.76	3.91
	0.7	20.98	25.44	24.72	29.32	29.88	130.34	0.00	1.07	6.27	8.92	5.14	21.38
		21.07	25.10	23.74	29.09	29.37	128.36	0.00	1.02	5.94	5.48	4.88	17.33
5	0.3	22.16	26.39	24.88	29.86	30.49	133.77	0.00	2.58	4.52	6.73	3.91	17.74
		24.12	28.99	27.29	32.84	33.56	146.80	0.00	2.61	4.41	6.83	3.97	17.82
	0.5	22.99	27.67	25.85	29.73	31.19	137.43	4.62	5.29	12.77	13.07	10.36	46.11
		20.91	24.99	23.25	26.85	28.05	124.05	0.00	5.35	13.07	13.38	11.17	42.97
	0.7	22.30	26.72	24.86	30.01	31.07	134.96	5.81	7.20	14.43	16.30	12.74	56.49
		20.75	25.10	23.32	28.07	29.01	126.26	6.14	7.42	15.06	16.92	13.14	58.68

Table A4: Data from nanofiltration experiments for the removal of HAA₅ 60 ppb by NTR 7410 membrane

pressure (bar)	cross-flow velocity (m/s)	concentrations of HAA ₅ (ppb) in feed solutions						concentrations of HAA ₅ (ppb) in the permeate					
		CAA	BAA	DCAA	TCAA	DBAA	HAA ₅	CAA	BAA	DCAA	TCAA	DBAA	HAA ₅
1	0.3	14.13	14.56	14.47	14.22	13.28	70.66	0.00	1.68	2.98	3.47	2.54	10.68
		15.98	14.89	15.05	14.51	13.46	73.90	0.00	1.66	2.90	3.43	2.52	10.51
	0.5	15.77	14.85	15.25	16.98	15.36	78.21	0.00	0.98	2.27	2.79	1.92	7.96
		16.20	15.10	15.46	17.19	15.44	79.40	0.00	0.98	2.28	2.80	1.92	7.98
	0.7	17.09	16.01	16.28	17.83	16.31	83.52	0.00	0.84	2.10	2.59	1.76	7.29
		18.23	16.77	17.06	18.69	16.89	87.65	0.00	0.86	2.14	2.64	1.80	7.44
3	0.3	17.47	15.90	16.89	19.97	16.78	87.00	0.00	4.81	7.25	8.31	7.00	27.37
		17.24	15.58	16.70	18.12	16.28	83.93	0.00	5.08	7.58	8.77	7.41	28.84
	0.5	12.91	11.41	15.94	18.15	15.58	73.98	0.00	2.12	5.03	4.55	4.58	16.28
		15.22	13.54	17.97	19.16	18.06	83.95	0.00	2.17	5.12	4.65	4.71	16.65
	0.7	15.84	14.35	14.95	16.58	14.69	76.41	0.00	2.55	3.82	3.04	3.35	12.77
		16.17	14.95	15.34	17.23	15.36	79.05	0.00	2.19	3.19	2.46	2.87	10.71
5	0.3	18.21	16.71	17.39	19.09	16.99	88.40	9.62	8.17	11.88	13.02	11.53	54.23
		18.43	16.86	17.67	19.37	17.22	89.54	11.19	9.53	13.85	13.62	13.43	61.61
	0.5	16.82	15.13	15.63	17.09	15.18	79.86	0.00	4.75	7.03	6.59	6.61	24.98
		17.23	15.59	16.02	17.69	15.79	82.32	5.51	4.80	7.10	6.66	6.69	30.76
	0.7	15.75	14.24	14.85	16.55	14.44	75.84	0.00	3.01	4.79	3.93	4.28	16.01
		16.18	14.74	15.39	16.80	14.96	78.07	0.00	3.06	4.85	4.02	4.39	16.33

Table A5: Data from nanofiltration experiments for the removal of HAA₅ 90 ppb by NTR 7410 membrane

pressure (bar)	cross-flow velocity (m/s)	concentrations of HAA ₅ (ppb) in feed solutions						concentrations of HAA ₅ (ppb) in the permeate					
		CAA	BAA	DCAA	TCAA	DBAA	HAA ₅	CAA	BAA	DCAA	TCAA	DBAA	HAA ₅
1	0.3	21.78	20.12	20.77	22.24	20.11	105.02	0.00	2.49	4.70	4.63	3.91	15.74
		21.93	20.16	20.71	22.38	20.12	105.29	0.00	3.01	5.65	5.58	4.75	18.99
	0.5	15.69	15.97	20.34	21.00	19.85	92.85	0.00	1.68	3.05	2.96	2.41	10.10
		18.42	18.87	20.80	20.36	22.30	100.75	0.00	0.00	3.49	4.23	2.94	10.66
	0.7	19.20	17.71	18.30	19.33	17.63	92.17	0.00	1.24	2.46	2.53	1.95	8.18
		21.60	19.80	20.38	22.05	18.85	102.68	0.00	1.39	2.90	2.74	2.06	9.09
3	0.3	17.54	18.41	21.35	21.38	20.63	99.31	5.43	5.81	8.46	8.64	8.14	36.48
		18.19	19.06	22.01	22.25	21.46	102.97	5.05	5.53	7.99	8.36	7.88	34.82
	0.5	21.06	21.57	21.75	21.67	21.47	107.52	4.82	5.03	5.74	5.80	5.71	27.09
		22.23	21.82	22.11	20.94	20.59	107.68	4.67	5.05	5.75	8.79	5.75	30.02
	0.7	22.45	23.03	23.25	22.59	22.75	114.07	0.00	4.16	5.45	5.22	5.04	19.88
		20.79	22.46	22.77	20.85	20.97	107.83	0.00	4.26	5.58	5.31	5.18	20.32
5	0.3	20.87	21.29	20.99	21.27	20.90	105.33	6.91	7.00	8.92	8.70	8.60	40.11
		20.42	20.89	21.67	21.92	20.54	105.44	7.62	8.07	10.21	10.05	10.00	45.95
	0.5	21.05	21.56	21.60	21.40	21.33	106.95	5.12	5.30	6.50	6.12	6.19	29.23
		20.88	21.48	21.44	21.17	21.11	106.08	6.22	6.36	8.09	7.51	7.65	35.85
	0.7	20.47	21.42	21.21	20.75	21.10	104.95	0.00	4.27	5.43	5.33	5.31	20.35
		18.31	17.34	20.15	21.53	20.63	97.96	0.00	4.95	6.39	6.16	6.12	23.63

Table A6: Data from nanofiltration experiments for the removal of HAA₅ 120 ppb by NTR 7410 membrane

pressure (bar)	cross-flow velocity (m/s)	concentrations of HAA ₅ (ppb) in feed solutions						concentrations of HAA ₅ (ppb) in the permeate					
		CAA	BAA	DCAA	TCAA	DBAA	HAA ₅	CAA	BAA	DCAA	TCAA	DBAA	HAA ₅
1	0.3	25.79	26.56	26.59	26.04	26.09	131.06	0.00	2.05	4.03	4.04	3.41	13.53
		23.31	24.28	24.36	23.72	23.87	119.54	0.00	2.78	5.46	5.50	4.65	18.40
	0.5	18.91	19.28	24.45	24.51	23.73	110.87	0.00	1.42	3.84	4.02	3.22	12.50
		23.95	24.80	21.53	21.53	20.55	112.36	0.00	1.55	4.18	4.38	3.48	13.59
	0.7	25.85	27.15	27.32	26.66	27.04	134.02	0.00	1.82	3.42	3.40	2.86	11.51
		19.90	20.22	20.19	21.36	20.78	102.45	0.00	2.09	3.92	3.87	3.24	13.13
3	0.3	27.98	28.48	29.49	29.16	28.55	143.66	7.89	7.90	11.16	11.45	10.77	49.17
		26.56	27.16	28.03	27.83	27.35	136.93	8.19	8.79	12.43	12.67	12.01	54.09
	0.5	26.00	27.96	29.31	28.95	27.77	140.00	4.88	5.07	7.05	7.22	6.73	30.94
		23.57	23.98	25.67	25.42	23.98	122.62	5.08	5.61	7.84	8.03	7.50	34.06
	0.7	23.34	23.53	24.09	24.39	23.53	118.88	0.00	3.30	5.04	5.09	4.78	18.20
		20.63	21.23	20.02	20.34	20.10	102.32	0.00	3.24	4.89	4.87	4.56	17.56
5	0.3	23.46	23.73	24.42	24.16	23.59	119.36	7.20	7.79	12.15	12.37	11.69	51.20
		23.22	23.90	24.55	24.39	24.05	120.11	7.77	7.78	12.09	12.39	11.64	51.67
	0.5	24.85	25.40	25.68	25.46	25.25	126.65	6.91	7.40	10.37	10.11	9.98	44.77
		24.93	25.24	26.01	25.36	24.89	126.43	5.22	5.47	7.70	7.46	7.31	33.15
	0.7	27.58	28.15	29.07	28.55	28.06	141.42	0.00	4.24	5.74	5.10	5.29	20.37
		24.16	24.83	25.95	25.40	24.63	124.98	0.00	4.44	6.04	5.36	5.52	21.36

Table A7: Data from nanofiltration experiments for the removal of HAA₅ 60 ppb by NTR 729HF membrane

pressure (bar)	cross-flow velocity (m/s)	concentrations of HAA ₅ (ppb) in feed solutions						concentrations of HAA ₅ (ppb) in the permeate					
		CAA	BAA	DCAA	TCAA	DBAA	HAA ₅	CAA	BAA	DCAA	TCAA	DBAA	HAA ₅
1	0.3	10.31	13.01	12.16	12.23	13.59	61.31	0.00	1.22	5.68	6.64	4.72	18.27
		12.59	14.68	13.70	13.78	15.43	70.18	0.00	1.21	4.62	6.65	4.75	17.24
	0.5	13.59	13.27	12.23	12.92	10.70	62.71	0.00	2.83	2.33	11.23	0.90	17.29
		13.09	13.03	11.82	12.42	10.48	60.85	0.00	2.44	1.97	9.75	0.78	14.95
	0.7	12.17	12.08	11.32	11.58	10.30	57.46	0.00	1.29	5.43	7.54	4.24	18.50
		14.00	13.83	13.13	13.48	11.94	66.37	0.00	1.28	5.42	7.52	4.18	18.41
3	0.3	14.46	14.74	15.36	12.03	14.13	70.72	0.00	0.74	4.10	3.90	3.14	11.89
		14.08	14.15	14.93	11.61	13.53	68.30	0.00	0.77	4.24	3.98	3.20	12.20
	0.5	12.60	12.61	12.47	12.50	12.93	63.10	0.00	2.89	7.49	9.05	6.22	25.65
		16.36	15.12	15.93	16.14	15.31	78.85	0.00	2.93	7.67	9.03	6.29	25.92
	0.7	13.38	13.07	13.35	12.49	12.31	64.61	0.00	2.76	7.12	8.00	5.87	23.75
		12.90	12.84	12.78	12.27	12.17	62.97	0.00	2.87	7.41	8.33	6.11	24.72
5	0.3	12.55	12.54	12.75	12.62	12.14	62.61	0.00	0.00	0.69	2.01	0.40	3.10
		14.85	14.88	15.35	15.19	14.57	74.84	0.00	0.00	0.79	2.32	0.46	3.58
	0.5	15.06	15.10	15.10	14.80	14.52	74.58	0.00	2.14	5.36	5.50	3.55	16.54
		15.21	15.12	15.07	14.84	14.61	74.85	0.00	2.41	5.74	6.28	4.07	18.49
	0.7	12.89	12.70	12.68	12.80	12.36	63.43	0.00	1.00	3.01	3.31	1.78	9.11
		12.31	12.28	12.74	12.36	12.01	61.69	0.00	1.01	3.17	3.36	1.81	9.36

Table A7: Data from nanofiltration experiments for the removal of HAA₅ 60 ppb by NTR 729HF membrane

pressure (bar)	cross-flow velocity (m/s)	concentrations of HAA ₅ (ppb) in feed solutions						concentrations of HAA ₅ (ppb) in the permeate					
		CAA	BAA	DCAA	TCAA	DBAA	HAA ₅	CAA	BAA	DCAA	TCAA	DBAA	HAA ₅
1	0.3	10.31	13.01	12.16	12.23	13.59	61.31	0.00	1.22	5.68	6.64	4.72	18.27
		12.59	14.68	13.70	13.78	15.43	70.18	0.00	1.21	4.62	6.65	4.75	17.24
	0.5	13.59	13.27	12.23	12.92	10.70	62.71	0.00	2.83	2.33	11.23	0.90	17.29
		13.09	13.03	11.82	12.42	10.48	60.85	0.00	2.44	1.97	9.75	0.78	14.95
	0.7	12.17	12.08	11.32	11.58	10.30	57.46	0.00	1.29	5.43	7.54	4.24	18.50
		14.00	13.83	13.13	13.48	11.94	66.37	0.00	1.28	5.42	7.52	4.18	18.41
3	0.3	14.46	14.74	15.36	12.03	14.13	70.72	0.00	0.74	4.10	3.90	3.14	11.89
		14.08	14.15	14.93	11.61	13.53	68.30	0.00	0.77	4.24	3.98	3.20	12.20
	0.5	12.60	12.61	12.47	12.50	12.93	63.10	0.00	2.89	7.49	9.05	6.22	25.65
		16.36	15.12	15.93	16.14	15.31	78.85	0.00	2.93	7.67	9.03	6.29	25.92
	0.7	13.38	13.07	13.35	12.49	12.31	64.61	0.00	2.76	7.12	8.00	5.87	23.75
		12.90	12.84	12.78	12.27	12.17	62.97	0.00	2.87	7.41	8.33	6.11	24.72
5	0.3	12.55	12.54	12.75	12.62	12.14	62.61	0.00	0.00	0.69	2.01	0.40	3.10
		14.85	14.88	15.35	15.19	14.57	74.84	0.00	0.00	0.79	2.32	0.46	3.58
	0.5	15.06	15.10	15.10	14.80	14.52	74.58	0.00	2.14	5.36	5.50	3.55	16.54
		15.21	15.12	15.07	14.84	14.61	74.85	0.00	2.41	5.74	6.28	4.07	18.49
	0.7	12.89	12.70	12.68	12.80	12.36	63.43	0.00	1.00	3.01	3.31	1.78	9.11
		12.31	12.28	12.74	12.36	12.01	61.69	0.00	1.01	3.17	3.36	1.81	9.36

Table A8: Data from nanofiltration experiments for the removal of HAA₅ 90 ppb by NTR 729HF membrane

pressure (bar)	cross-flow velocity (m/s)	concentrations of HAA ₅ (ppb) in feed solutions						concentrations of HAA ₅ (ppb) in the permeate					
		CAA	BAA	DCAA	TCAA	DBAA	HAA ₅	CAA	BAA	DCAA	TCAA	DBAA	HAA ₅
1	0.3	18.76	21.89	21.03	20.48	23.31	105.47	0.00	6.78	13.43	16.33	14.19	50.72
		17.78	20.49	19.51	19.15	21.81	98.74	0.00	7.92	15.74	19.06	16.76	59.48
	0.5	17.59	20.26	19.57	18.97	21.47	97.86	0.00	4.29	12.98	14.34	13.00	44.61
		17.42	20.04	19.30	18.67	21.19	96.62	0.00	4.48	13.41	15.06	13.68	46.63
	0.7	16.54	19.05	18.27	16.97	19.64	90.47	0.00	3.66	12.14	13.46	12.11	41.37
		16.33	18.98	18.37	16.97	19.59	90.25	0.00	3.74	11.95	13.76	12.38	41.84
3	0.3	17.15	21.04	20.72	21.52	23.81	104.24	0.00	3.80	5.52	9.85	4.39	23.55
		14.99	18.25	17.92	18.76	20.50	90.42	0.00	3.91	5.60	10.24	4.53	24.27
	0.5	16.80	19.64	17.41	20.25	18.01	92.10	0.00	0.89	1.64	6.66	0.68	9.87
		16.21	19.13	17.03	19.66	17.54	89.56	0.00	0.87	1.59	6.52	0.66	9.64
	0.7	14.44	17.50	17.70	17.56	19.85	87.05	0.00	0.00	0.00	1.13	0.00	1.13
		16.23	19.40	19.35	19.44	21.79	96.20	0.00	0.00	0.00	1.23	0.00	1.23
5	0.3	19.32	19.25	19.83	19.11	19.03	96.54	0.00	0.00	3.16	3.68	2.10	8.94
		19.06	19.10	19.69	18.91	18.81	95.57	0.00	0.00	3.27	3.82	2.19	9.29
	0.5	18.08	18.07	18.56	17.25	17.51	89.46	0.00	0.00	3.65	3.97	2.49	10.11
		15.53	15.73	15.40	14.49	14.88	76.03	0.00	0.00	4.25	4.78	2.96	11.99
	0.7	16.48	19.69	19.02	19.26	21.70	96.15	0.00	0.00	0.00	0.00	0.00	0.00
		17.12	20.69	20.29	20.23	22.72	101.06	0.00	0.00	0.00	0.00	0.00	0.00

Table A9: Data from nanofiltration experiments for the removal of HAA₅ 120 ppb by NTR 729HF membrane

pressure (bar)	cross-flow velocity (m/s)	concentrations of HAA ₅ (ppb) in feed solutions						concentrations of HAA ₅ (ppb) in the permeate					
		CAA	BAA	DCAA	TCAA	DBAA	HAA ₅	CAA	BAA	DCAA	TCAA	DBAA	HAA ₅
1	0.3	23.30	27.55	25.87	25.47	29.03	131.22	5.55	6.68	17.71	16.80	15.70	62.43
		21.54	25.39	23.80	23.52	27.11	121.36	6.51	7.25	19.54	18.17	17.02	68.49
	0.5	22.66	26.44	25.74	24.41	27.99	127.24	6.54	7.77	19.11	19.52	18.07	71.00
		21.98	25.55	24.56	23.55	26.74	122.37	6.92	7.81	19.59	19.71	18.38	72.39
	0.7	22.10	26.22	25.60	24.57	28.38	126.87	8.46	10.15	19.54	21.26	18.78	78.19
		21.71	24.97	24.35	23.46	26.61	121.10	7.77	9.79	18.83	20.39	17.87	74.65
3	0.3	21.73	25.45	24.45	23.70	27.06	122.39	5.49	6.63	16.99	20.40	17.85	67.36
		21.85	25.51	24.15	23.75	26.99	122.25	6.37	7.46	18.43	20.82	18.87	71.96
	0.5	20.90	24.15	23.04	22.87	25.85	116.80	8.25	8.87	18.00	17.78	17.24	70.14
		19.66	22.66	22.95	21.52	23.38	110.17	8.86	8.94	17.89	17.92	17.27	70.87
	0.7	18.95	21.88	21.41	20.69	23.34	106.27	7.31	7.38	16.17	15.60	14.73	61.19
		23.53	23.93	26.89	25.59	28.84	128.78	7.77	7.85	17.35	16.83	15.86	65.66
5	0.3	24.09	28.11	26.69	25.14	29.25	133.28	5.58	5.62	15.66	15.36	14.27	56.49
		23.48	26.68	26.01	23.85	27.37	127.39	4.96	5.34	15.00	16.20	13.68	55.19
	0.5	24.17	27.61	26.51	26.72	29.90	134.90	7.98	8.17	18.73	19.39	17.72	71.98
		25.74	30.41	28.97	29.37	33.10	147.60	8.27	9.66	19.07	19.79	17.99	74.78
	0.7	23.36	27.74	26.57	26.70	30.64	135.00	0.00	2.30	10.49	12.21	9.21	34.21
		24.28	26.55	25.42	25.12	28.01	129.38	0.00	2.17	10.85	11.43	8.58	33.04

Table A10: Data from ozonation-BAC experiments for the removal of HAA₅ 60 ppb

ozone dose (mgO ₃ / mgC)	contact time (min)	EBCT (min)	initial concentrations of HAA ₅ (ppb) in feed solutions					
			CAA	BAA	DCAA	TCAA	DBAA	HAA ₅
0.5	5	10	13.68	13.61	13.63	11.99	13.47	66.38
			13.67	14.24	14.19	12.52	14.06	68.69
		20	13.95	14.57	14.52	13.59	15.02	71.66
	10	10	13.00	13.81	13.65	12.88	14.12	67.47
			30	14.28	14.32	18.83	12.36	13.97
		10	14.21	14.01	13.87	12.10	13.70	67.89
20	10	13.31	13.45	13.09	11.56	13.14	64.54	
		13.90	14.02	13.88	12.02	13.62	67.44	
		20	13.79	13.94	13.58	12.08	13.71	67.10
	20	10	13.31	13.86	13.50	12.03	13.57	66.26
			30	13.17	13.35	12.69	11.51	13.05
		10	15.70	16.39	15.88	14.12	16.22	78.32
30	10	12.62	13.36	12.81	11.90	13.45	64.13	
		12.92	13.58	13.06	12.14	13.70	65.39	
		20	12.83	13.65	12.92	12.29	13.62	65.30
	30	10	13.12	13.79	13.09	12.44	14.05	66.49
			20	13.04	13.37	13.79	13.06	15.25
		30	12.74	13.06	13.30	12.71	15.20	67.02

Table A10: Continued

ozone dose (mgO ₃ / mgC)	contact time (min)	EBCT (min)	concentrations of HAA ₅ (ppb) after ozonation process					
			CAA	BAA	DCAA	TCAA	DBAA	HAA ₅
0.5	5	10	12.30	12.60	11.58	10.06	12.63	59.17
			12.61	12.99	12.66	11.10	13.67	63.04
	20	10.86	11.43	11.44	10.50	11.78	56.01	
		13.96	14.37	14.06	13.21	14.42	70.03	
	30	13.87	13.92	17.51	12.21	13.55	71.06	
		13.08	13.28	13.11	11.65	13.17	64.29	
10	10	10	12.94	12.96	12.49	11.05	12.42	61.86
			12.24	12.63	12.18	10.74	12.29	60.08
	20	12.54	12.54	12.09	11.76	12.24	61.17	
		11.70	11.78	11.68	12.12	12.30	59.57	
	30	12.99	12.93	12.63	11.56	9.96	60.08	
		14.20	14.56	14.97	13.21	12.57	69.52	
20	10	10	11.55	11.95	10.09	10.82	10.93	55.35
			10.87	11.60	10.95	10.43	10.58	54.44
	20	11.15	11.61	11.90	11.96	12.40	59.02	
		11.22	11.59	11.65	11.95	13.35	59.76	
	30	12.55	12.24	12.70	11.81	13.35	62.64	
		11.38	13.03	12.61	11.63	13.22	61.87	

Table A10: Continued

ozone dose (mgO ₃ / mgC)	contact time (min)	EBCT (min)	concentrations of HAA ₅ (ppb) after BAC column					
			CAA	BAA	DCAA	TCAA	DBAA	HAA ₅
0.5	5	10	0.00	0.00	0.00	0.00	0.00	0.00
			0.00	0.00	0.00	0.00	0.00	0.00
	20	0.00	0.00	0.00	0.00	0.00	0.00	
		0.00	0.00	0.00	0.00	0.00	0.00	
	30	0.00	0.00	0.00	0.00	0.00	0.00	
		0.00	0.00	0.00	0.00	0.00	0.00	
10	10	10	0.00	0.00	0.00	0.00	0.00	0.00
			0.00	0.00	0.00	0.00	0.00	0.00
	20	0.00	0.00	0.00	0.00	0.00	0.00	
		0.00	0.00	0.00	0.00	0.00	0.00	
	30	0.00	0.00	0.00	0.00	0.00	0.00	
		0.00	0.00	0.00	0.00	0.00	0.00	
20	10	10	0.00	0.00	0.00	0.00	0.00	0.00
			0.00	0.00	0.00	0.00	0.00	0.00
	20	0.00	0.00	0.00	0.00	0.00	0.00	
		0.00	0.00	0.00	0.00	0.00	0.00	
	30	0.00	0.00	0.00	0.00	0.00	0.00	
		0.00	0.00	0.00	0.00	0.00	0.00	

Table A10: Continued

ozone dose (mgO ₃ / mgC)	contact time (min)	EBCT (min)	initial concentrations of HAA ₅ (ppb) in feed solutions					
			CAA	BAA	DCAA	TCAA	DBAA	HAA ₅
1	5	10	11.54	11.12	12.79	12.89	14.06	62.41
			12.93	12.18	13.66	14.16	15.12	68.05
		20	13.14	12.72	13.73	13.78	14.96	68.32
			13.07	12.52	13.51	13.64	14.92	67.67
		30	11.19	11.12	11.50	11.19	12.26	57.25
			12.06	12.35	12.84	12.39	13.85	63.48
	10	10	11.16	11.72	11.18	10.65	14.56	59.26
			12.67	13.30	12.86	12.10	16.33	67.27
		20	12.77	12.39	11.72	11.71	12.66	61.25
			12.48	11.92	12.63	12.29	13.53	62.85
		30	12.83	13.20	13.65	13.44	14.70	67.83
			12.44	12.59	12.89	12.89	13.99	64.79
	20	10	12.64	13.19	11.80	10.65	11.82	60.08
			12.67	13.30	12.86	12.10	13.78	64.73
		20	12.25	12.80	12.73	11.25	12.95	61.98
			13.14	13.78	13.69	12.11	13.82	66.53
		30	12.11	12.77	12.39	11.08	12.87	61.23
			11.87	12.48	11.92	10.85	12.21	59.33

Table A10: Continued

ozone dose (mgO ₃ / mgC)	contact time (min)	EBCT (min)	concentrations of HAA ₅ (ppb) after ozonation process					
			CAA	BAA	DCAA	TCAA	DBAA	HAA ₅
1	5	10	11.24	11.56	13.19	12.28	13.22	61.50
			11.34	12.60	12.70	13.88	14.38	64.90
		20	12.19	4.49	12.37	12.56	13.23	54.85
			11.86	4.96	12.72	12.93	13.83	56.29
		30	9.40	10.88	10.89	10.82	11.64	53.64
			11.33	12.46	12.69	10.31	11.11	57.89
	10	10	10.18	9.29	10.40	10.88	12.32	53.07
			12.19	11.37	11.33	12.46	13.34	60.69
		20	11.24	11.56	9.15	11.67	11.10	54.71
			11.34	12.60	9.64	11.40	12.95	57.93
		30	6.90	8.27	14.50	14.73	15.72	60.12
			6.80	7.99	13.92	14.41	15.27	58.40
	20	10	11.16	11.72	11.18	9.56	10.80	54.42
			12.71	13.22	11.56	9.58	10.79	57.85
		20	11.64	13.00	11.16	11.24	11.56	58.60
			12.94	12.18	12.29	11.34	12.60	61.35
		30	11.92	12.19	11.37	10.52	11.86	57.86
			11.39	11.86	9.94	9.11	11.59	53.88

Table A10: Continued

ozone dose (mgO ₃ / mgC)	contact time (min)	EBCT (min)	concentrations of HAA ₅ (ppb) after BAC column					
			CAA	BAA	DCAA	TCAA	DBAA	HAA ₅
1	5	10	0.00	0.00	0.53	0.56	1.13	2.22
			0.00	0.00	0.50	0.51	1.04	2.05
		20	0.00	0.00	0.00	0.00	0.00	0.00
			0.00	0.00	0.00	0.00	0.00	0.00
		30	0.00	0.00	0.00	0.00	0.00	0.00
			0.00	0.00	0.00	0.00	0.00	0.00
	10	10	0.00	0.00	0.00	0.00	0.00	0.00
			0.00	0.00	0.00	0.00	0.00	0.00
		20	0.00	0.00	0.00	0.00	0.00	0.00
			0.00	0.00	0.00	0.00	0.00	0.00
		30	0.00	0.00	0.00	0.00	0.00	0.00
			0.00	0.00	0.00	0.00	0.00	0.00
	20	10	0.00	0.00	0.00	0.00	0.00	0.00
			0.00	0.00	0.00	0.00	0.00	0.00
		20	0.00	0.00	0.00	0.00	0.00	0.00
			0.00	0.00	0.00	0.00	0.00	0.00
		30	0.00	0.00	0.00	0.00	0.00	0.00
			0.00	0.00	0.00	0.00	0.00	0.00

Table A10: Continued

ozone dose (mgO ₃ / mgC)	contact time (min)	EBCT (min)	initial concentrations of HAA ₅ (ppb) in feed solutions					
			CAA	BAA	DCAA	TCAA	DBAA	HAA ₅
2	5	10	13.09	13.46	13.45	15.25	16.34	71.59
			12.09	12.68	12.70	14.43	15.41	67.30
		20	11.95	12.60	13.23	15.21	15.78	68.77
			13.52	13.95	14.71	16.92	17.62	76.73
		30	12.94	13.46	13.92	15.95	17.18	73.44
			12.58	13.34	13.87	15.73	16.90	72.41
	10	10	12.09	12.82	13.08	12.89	14.26	65.14
			12.09	12.82	13.08	12.89	14.26	65.14
		20	12.57	12.92	13.59	15.12	15.67	69.87
			11.78	12.25	11.85	14.32	15.19	65.38
		30	11.48	11.97	12.09	15.20	15.63	66.35
			11.82	12.31	12.35	15.60	16.12	68.20
	20	10	13.18	13.35	14.13	14.39	15.61	70.65
			11.02	11.92	12.79	12.85	14.01	62.59
		20	12.79	13.28	13.49	13.38	14.56	67.50
			12.61	13.02	13.02	13.16	14.53	66.33
		30	13.99	14.68	14.65	14.48	16.05	73.85
			14.31	15.19	14.83	15.12	16.57	76.02

Table A10: Continued

ozone dose (mgO ₃ / mgC)	contact time (min)	EBCT (min)	concentrations of HAA ₅ (ppb) after ozonation process					
			CAA	BAA	DCAA	TCAA	DBAA	HAA ₅
2	5	10	10.65	10.73	10.95	12.89	10.52	55.74
			13.01	10.56	9.39	13.82	10.55	57.33
		20	10.80	11.79	12.15	14.83	15.36	64.94
			12.52	10.36	11.60	14.84	15.35	64.65
		30	10.64	12.62	11.68	14.76	16.31	66.01
			11.00	12.71	11.38	14.60	15.37	65.06
	10	10	10.17	11.11	11.55	11.65	13.55	58.03
			10.17	11.11	11.55	11.65	13.55	58.03
		20	11.73	10.30	11.41	9.25	14.85	57.54
			11.61	10.46	10.54	10.27	14.79	57.67
		30	11.89	12.26	13.66	12.45	13.95	64.19
			10.16	10.65	10.82	13.23	13.51	58.38
	20	10	10.00	11.91	13.21	15.10	15.25	65.47
			9.00	9.53	11.77	10.82	13.95	55.07
		20	10.44	10.07	13.27	13.39	14.52	61.69
			9.90	10.49	11.33	10.82	11.95	54.51
		30	11.49	11.45	15.51	14.59	15.32	68.36
			12.96	13.81	13.38	14.66	15.49	70.30

Table A10: Continued

ozone dose (mgO ₃ / mgC)	contact time (min)	EBCT (min)	concentrations of HAA ₅ (ppb) after BAC column					
			CAA	BAA	DCAA	TCAA	DBAA	HAA ₅
2	5	10	0.00	0.00	0.00	0.00	0.00	0.00
			0.00	0.00	0.00	0.00	0.00	0.00
		20	0.00	0.00	0.00	0.00	0.00	0.00
			0.00	0.00	0.00	0.00	0.00	0.00
		30	0.00	0.00	0.52	0.27	0.57	1.36
			0.00	0.00	0.49	0.25	0.54	1.28
	10	10	0.00	0.00	0.00	0.00	0.00	0.00
			0.00	0.91	1.10	0.39	0.41	2.81
		20	0.00	0.00	0.00	0.00	0.00	0.00
			0.00	0.00	0.00	0.00	0.00	0.00
		30	0.00	0.00	0.00	0.00	0.00	0.00
			0.00	0.00	0.00	0.00	0.00	0.00
	20	10	0.00	0.00	0.00	0.00	0.00	0.00
			0.00	0.00	0.00	0.00	0.00	0.00
		20	0.00	0.00	0.52	0.13	1.54	2.19
			0.00	0.00	0.31	0.96	1.99	3.27
		30	0.00	0.00	0.00	0.00	0.00	0.00
			0.00	0.00	0.00	0.00	0.00	0.00

Table A11: Data from ozonation-BAC experiments for the removal of HAA₅ 90ppb

ozone dose (mgO ₃ / mgC)	contact time (min)	EBCT (min)	initial concentrations of HAA ₅ (ppb) in feed solutions					
			CAA	BAA	DCAA	TCAA	DBAA	HAA ₅
0.5	5	10	15.59	16.81	16.35	19.56	20.34	88.66
			18.47	19.25	18.93	22.43	23.07	102.15
		20	17.13	18.59	18.39	22.25	22.93	99.30
			17.15	18.28	17.95	21.62	22.57	97.57
		30	18.56	19.51	19.47	20.82	22.26	100.61
			17.48	18.60	18.43	19.76	21.34	95.62
	10	10	19.38	19.87	18.16	16.27	18.02	91.69
			19.50	20.51	19.04	16.65	18.49	94.19
		20	18.74	19.65	19.96	20.73	22.19	101.27
			18.23	19.44	19.43	20.58	22.02	99.71
		30	16.95	18.52	18.03	17.06	19.14	89.70
			16.78	17.61	17.01	16.17	18.25	85.82
	20	10	16.99	17.89	18.11	18.14	19.98	91.11
			17.61	18.84	18.57	19.11	20.97	95.10
		20	17.06	18.20	18.37	19.65	21.02	94.29
			15.67	17.28	17.90	18.75	20.34	89.95
		30	18.07	19.17	19.39	20.69	22.15	99.47
			17.76	19.03	18.95	20.41	22.19	98.34

Table A11 Continued

ozone dose (mgO ₃ / mgC)	contact time (min)	EBCT (min)	concentrations of HAA ₅ (ppb) after ozonation process					
			CAA	BAA	DCAA	TCAA	DBAA	HAA ₅
0.5	5	10	14.45	15.35	15.95	17.75	18.70	82.19
			16.13	17.13	17.46	19.75	20.75	91.22
	20	15.99	17.23	17.51	20.14	21.80	92.66	
		16.92	17.14	16.10	20.31	22.74	93.21	
	30	15.07	15.96	16.97	17.27	18.96	84.22	
		12.44	15.89	17.03	17.16	18.88	81.40	
10	10	10	18.48	18.09	15.67	15.01	16.99	84.24
			18.74	19.11	14.03	14.00	15.80	81.67
	20	15.79	16.81	16.94	16.64	18.37	84.54	
		14.92	15.33	15.03	15.17	17.05	77.52	
	30	15.45	16.01	16.09	17.78	16.91	82.25	
		14.44	17.33	17.75	19.19	20.50	89.21	
20	10	10	14.05	15.51	16.99	16.49	17.02	80.08
			15.90	16.80	16.84	17.74	18.67	85.95
	20	16.41	17.34	16.49	18.04	18.74	87.02	
		14.44	16.56	15.30	17.27	17.01	80.57	
	30	17.14	16.99	16.12	16.05	19.64	85.93	
		14.92	15.81	16.35	16.64	18.16	81.87	

Table A11 Continued

ozone dose (mgO ₃ / mgC)	contact time (min)	EBCT (min)	concentrations of HAA ₅ (ppb) after BAC column					
			CAA	BAA	DCAA	TCAA	DBAA	HAA ₅
0.5	5	10	0	1.19	1.30	0.49	0.54	3.52
			0	1.31	1.44	0.51	0.59	3.85
	20	0	0.00	0.00	0.00	0.00	0.00	
		0	0.00	0.00	0.00	0.00	0.00	
	30	0	0.00	0.00	0.00	0.00	0.00	
		0	0.00	0.00	0.00	0.00	0.00	
10	10	10	0	0.92	1.24	0.60	0.90	3.66
			0	0.85	1.14	0.55	0.82	3.36
	20	0	0.00	0.00	0.00	0.00	0.00	
		0	0.00	0.00	0.00	0.00	0.00	
	30	0	0.00	0.00	0.00	0.00	0.00	
		0	0.00	0.00	0.00	0.00	0.00	
20	10	10	0	1.05	1.32	0.56	0.56	3.49
			0	1.53	1.32	0.05	0.56	3.47
	20	0	0.00	0.00	0.00	0.00	0.00	
		0	0.00	0.00	0.00	0.00	0.00	
	30	0	0.00	0.00	0.00	0.00	0.00	
		0	0.00	0.00	0.00	0.00	0.00	

Table A11 Continued

ozone dose (mgO ₃ / mgC)	contact time (min)	EBCT (min)	initial concentrations of HAA ₅ (ppb) in feed solutions					
			CAA	BAA	DCAA	TCAA	DBAA	HAA ₅
1	5	10	17.69	19.25	19.90	22.69	23.67	103.20
			18.85	20.71	21.49	24.30	25.34	110.68
		20	19.96	19.21	19.54	18.68	20.74	98.13
			21.02	16.43	15.96	15.00	16.98	85.38
		30	19.86	17.18	17.37	15.87	17.78	88.06
			19.49	17.64	17.77	17.26	19.33	91.49
	10	10	16.96	16.44	15.92	15.39	17.23	81.95
			20.79	16.22	16.48	15.96	17.80	87.25
		20	18.11	17.29	16.83	15.39	17.51	85.13
			21.56	20.57	20.12	18.26	20.91	101.42
		30	18.76	18.17	17.34	15.51	17.78	87.57
			22.26	20.74	19.81	17.78	20.25	100.86
	20	10	18.73	18.16	18.45	18.13	20.19	93.66
			18.71	17.52	17.74	18.53	20.04	92.55
		20	18.71	16.18	16.13	16.04	17.77	84.84
			18.71	17.61	17.52	17.40	19.18	90.41
		30	18.71	18.66	17.34	14.53	16.50	85.75
			19.16	17.86	16.57	14.00	15.73	83.32

Table A11 Continued

ozone dose (mgO ₃ / mgC)	contact time (min)	EBCT (min)	concentrations of HAA ₅ (ppb) after ozonation process					
			CAA	BAA	DCAA	TCAA	DBAA	HAA ₅
1	5	10	16.63	17.71	18.55	19.40	21.07	93.36
			16.65	17.80	18.31	19.44	21.05	93.25
		20	18.09	17.24	16.83	15.71	18.20	86.08
			17.14	16.35	16.60	15.85	17.64	83.57
		30	17.12	16.45	15.86	14.79	16.88	81.10
			16.56	16.23	15.91	15.15	15.63	79.49
	10	10	14.46	15.10	14.34	14.83	15.61	74.32
			16.36	15.94	15.52	14.84	16.62	79.29
		20	15.29	14.71	12.45	13.03	12.88	68.36
			17.78	17.69	16.34	15.20	15.93	82.94
		30	15.48	15.92	15.68	14.70	12.59	74.38
			19.41	18.36	17.05	16.90	15.41	87.13
	20	10	15.36	16.02	16.22	16.96	17.79	82.35
			15.57	17.25	14.47	15.33	17.25	79.86
		20	15.75	15.47	15.68	15.69	13.30	75.88
			15.23	16.95	15.27	15.14	15.05	77.64
		30	16.63	16.10	14.64	13.85	13.34	74.58
			16.19	17.89	15.33	13.00	13.69	76.11

Table A11 Continued

ozone dose (mgO ₃ / mgC)	contact time (min)	EBCT (min)	concentrations of HAA ₅ (ppb) after BAC column					
			CAA	BAA	DCAA	TCAA	DBAA	HAA ₅
1	5	10	0.00	1.06	1.40	0.57	0.92	3.95
			0.00	1.06	1.39	0.63	0.60	3.69
		20	0.00	0.00	0.00	0.00	0.00	0.00
			0.00	0.00	0.00	0.00	0.00	0.00
		30	0.00	0.00	0.00	0.00	0.00	0.00
			0.00	0.00	0.00	0.00	0.00	0.00
	10	10	0.00	1.18	1.44	0.52	0.54	3.67
			0.00	1.23	1.52	0.55	0.56	3.85
		20	0.00	0.00	0.00	0.00	0.00	0.00
			0.00	0.00	0.00	0.00	0.00	0.00
		30	0.00	0.00	0.00	0.00	0.00	0.00
			0.00	0.00	0.00	0.00	0.00	0.00
	20	10	0.00	1.44	1.92	0.64	0.74	4.73
			0.00	1.78	2.42	0.86	0.90	5.97
		20	0.00	0.00	0.62	0.39	0.30	1.31
			0.00	0.00	0.77	0.49	0.37	1.62
		30	0.00	0.00	0.00	0.00	0.00	0.00
			0.00	0.00	0.00	0.00	0.00	0.00

Table A11 Continued

ozone dose (mgO ₃ / mgC)	contact time (min)	EBCT (min)	initial concentrations of HAA ₅ (ppb) in feed solutions					
			CAA	BAA	DCAA	TCAA	DBAA	HAA ₅
2	5	10	16.94	16.68	18.41	16.86	18.42	87.30
			17.26	16.04	18.01	18.08	18.73	88.12
		20	17.04	16.64	16.58	16.14	18.03	84.43
	10	10	19.26	18.95	18.91	18.39	20.63	96.14
			30	20.31	23.32	23.09	23.50	25.25
		10	21.75	24.28	24.10	24.34	25.47	119.94
20	10	16.56	18.96	18.66	18.99	20.39	93.57	
		17.73	19.54	19.29	19.42	21.00	96.99	
		20	15.85	18.22	17.95	18.54	19.68	90.25
		17.50	20.06	19.59	20.40	21.64	99.18	
	20	10	17.37	20.04	19.73	20.42	21.77	99.33
			18.03	20.89	20.56	21.37	22.88	103.74
		10	18.26	20.41	20.07	21.20	22.52	102.47
		15.90	19.00	16.08	17.97	20.98	89.94	
	30	10	17.25	19.08	18.70	19.41	20.68	95.12
			16.97	18.03	18.75	20.04	21.48	95.27
		20	16.82	17.72	18.33	17.49	18.85	89.21
		18.03	19.89	20.56	20.37	20.41	99.26	

Table A11 Continued

ozone dose (mgO ₃ / mgC)	contact time (min)	EBCT (min)	concentrations of HAA ₅ (ppb) after ozonation process					
			CAA	BAA	DCAA	TCAA	DBAA	HAA ₅
2	5	10	16.61	16.14	16.25	14.39	14.15	77.55
			16.61	16.06	16.17	14.37	14.45	77.67
		20	15.43	14.92	14.94	14.15	17.18	76.61
			16.46	16.17	16.33	14.27	17.93	81.17
		30	19.40	20.19	20.62	20.64	23.39	104.24
			18.00	20.75	20.22	20.32	21.94	101.23
	10	10	15.14	16.21	16.83	16.67	16.23	81.08
			13.21	15.92	15.73	15.74	17.07	77.67
		20	14.84	17.42	16.08	16.16	17.58	82.08
			16.52	18.61	18.32	18.81	17.11	89.37
		30	14.02	19.69	19.16	17.04	18.35	88.25
			16.26	18.82	21.08	17.83	19.46	93.45
	20	10	16.63	17.92	17.15	17.67	16.91	86.28
			13.49	16.44	13.06	14.66	17.76	75.42
		20	14.63	16.92	15.15	15.67	18.91	81.28
			15.49	14.91	15.66	16.66	19.76	82.49
		30	15.68	14.27	16.51	14.22	15.41	76.08
			15.05	16.47	15.08	15.28	17.31	79.19

Table A11 Continued

ozone dose (mgO ₃ / mgC)	contact time (min)	EBCT (min)	concentrations of HAA ₅ (ppb) after BAC column					
			CAA	BAA	DCAA	TCAA	DBAA	HAA ₅
2	5	10	0.00	1.03	1.19	0.41	0.40	3.03
			0.00	1.03	1.09	0.40	0.40	2.92
		20	0.00	0.00	0.00	0.00	0.00	0.00
			0.00	0.00	0.00	0.00	0.00	0.00
		30	0.00	0.00	0.00	0.00	0.00	0.00
			0.00	0.00	0.00	0.00	0.00	0.00
	10	10	0.00	0.98	1.78	0.66	0.64	4.06
			0.00	1.01	1.83	0.74	0.67	4.25
		20	0.00	0.00	0.00	0.00	0.00	0.00
			0.00	0.00	0.00	0.00	0.00	0.00
		30	0.00	0.00	0.00	0.00	0.00	0.00
			0.00	0.00	0.00	0.00	0.00	0.00
	20	10	0.00	1.34	1.62	0.68	0.62	4.27
			0.00	1.20	1.36	0.60	0.56	3.71
		20	0.00	0.00	0.00	0.00	0.00	0.00
			0.00	0.00	0.00	0.00	0.00	0.00
		30	0.00	0.00	0.00	0.00	0.00	0.00
			0.00	0.00	0.00	0.00	0.00	0.00

Table A12: Data from ozonation-BAC experiments for the removal of HAA₅ 120ppb

ozone dose (mgO ₃ / mgC)	contact time (min)	EBCT (min)	initial concentrations of HAA ₅ (ppb) in feed solutions					
			CAA	BAA	DCAA	TCAA	DBAA	HAA ₅
0.5	5	10	30.00	30.87	29.03	29.75	31.10	150.74
			28.96	29.87	28.19	28.89	30.64	146.56
	20	33.45	30.06	24.28	32.09	26.30	146.19	
		30.12	30.43	27.40	24.89	27.21	140.06	
	30	24.38	25.20	29.14	30.32	24.18	133.21	
		24.38	24.84	29.70	30.89	24.86	134.67	
10	10	10	24.33	25.50	30.46	26.11	26.58	132.97
			24.43	25.48	30.66	26.38	26.57	133.52
	20	25.18	26.12	31.33	26.38	26.40	135.41	
		24.50	25.45	30.55	25.74	26.06	132.30	
	30	23.98	24.93	29.09	25.52	25.72	129.25	
		24.25	25.51	29.94	26.16	25.89	131.75	
20	10	10	23.01	23.94	27.91	24.24	24.01	123.10
			22.81	23.89	27.92	24.23	24.04	122.90
	20	23.00	23.32	32.25	28.52	27.60	134.69	
		23.50	24.37	33.61	30.02	29.32	140.81	
	30	24.51	25.22	30.62	27.02	26.75	134.11	
		24.37	25.98	31.58	28.09	27.77	137.80	

Table A12 Continued

ozone dose (mgO ₃ / mgC)	contact time (min)	EBCT (min)	concentrations of HAA ₅ (ppb) after ozonation process					
			CAA	BAA	DCAA	TCAA	DBAA	HAA ₅
0.5	5	10	27.83	30.11	22.15	22.53	24.01	126.63
			27.22	29.13	21.45	21.89	23.15	122.83
		20	29.28	30.74	22.03	31.18	24.52	137.75
	10	10	27.67	30.12	21.70	30.32	23.84	133.65
			30	21.94	23.24	21.11	21.67	22.98
		10	21.59	22.98	21.07	21.46	22.64	109.74
20	10	10	22.00	23.50	23.19	26.38	26.23	121.30
			23.22	23.09	22.77	25.74	25.72	120.53
		20	23.01	25.09	22.56	25.09	25.03	120.79
	20	10	22.47	24.47	21.92	24.24	24.18	117.28
			30	22.04	21.69	19.39	22.53	21.27
		10	23.67	22.25	19.87	23.38	22.29	111.47
30	10	10	22.01	14.90	19.71	21.67	21.78	100.07
			21.90	14.90	19.63	21.46	21.27	99.15
		20	20.00	29.94	28.57	24.45	23.15	126.11
	20	10	22.00	21.00	28.31	30.02	29.00	130.32
			30	22.98	21.80	27.60	24.02	22.46
		10	23.07	23.30	24.23	30.60	27.00	128.20

Table A12 Continued

ozone dose (mgO ₃ / mgC)	contact time (min)	EBCT (min)	concentrations of HAA ₅ (ppb) after BAC column					
			CAA	BAA	DCAA	TCAA	DBAA	HAA ₅
0.5	5	10	0.00	0.00	0.00	0.00	0.00	0.00
			0.00	0.00	0.00	0.00	0.00	0.00
		20	0.00	0.00	0.00	0.00	0.00	0.00
			0.00	0.00	0.00	0.00	0.00	0.00
		30	0.00	0.00	0.00	0.00	0.00	0.00
			0.00	0.00	0.00	0.00	0.00	0.00
	10	10	0.00	0.00	0.00	0.00	0.00	0.00
			0.00	0.00	0.00	0.00	0.00	0.00
		20	0.00	0.00	0.00	0.00	0.00	0.00
			0.00	0.00	0.00	0.00	0.00	0.00
		30	0.00	0.00	0.00	0.00	0.00	0.00
			0.00	0.00	0.00	0.00	0.00	0.00
20	10	0.00	0.00	0.00	0.00	0.00	0.00	
		0.00	0.00	0.00	0.00	0.00	0.00	
	20	0.00	0.00	0.00	0.00	0.00	0.00	
		0.00	0.00	0.00	0.00	0.00	0.00	
	30	0.00	0.00	0.00	0.00	0.00	0.00	
		0.00	0.00	0.00	0.00	0.00	0.00	

Table A12 Continued

ozone dose (mgO ₃ / mgC)	contact time (min)	EBCT (min)	initial concentrations of HAA ₅ (ppb) in feed solutions					
			CAA	BAA	DCAA	TCAA	DBAA	HAA ₅
1	5	10	24.50	32.61	33.64	26.76	29.58	147.08
			19.12	32.46	33.31	20.63	22.79	128.32
		20	21.26	32.46	32.78	23.34	25.42	135.26
			23.54	34.39	32.56	24.20	26.39	141.08
		30	21.00	32.90	33.53	23.94	25.74	137.12
			20.95	32.90	33.42	23.87	25.72	136.87
	10	10	25.63	40.02	41.15	33.69	36.32	176.81
			25.41	40.02	39.75	35.05	37.72	177.95
		20	25.13	31.87	32.78	29.04	31.32	150.14
			21.35	32.61	33.74	24.45	26.15	138.30
		30	20.55	32.01	33.42	23.95	25.83	135.77
			24.77	31.72	33.10	29.08	31.37	150.04
	20	10	20.62	30.53	30.42	20.83	23.26	125.65
			20.67	30.68	30.63	17.81	19.52	119.32
		20	28.17	30.58	29.10	29.74	30.87	148.46
			28.06	30.36	28.88	29.86	32.01	149.18
		30	29.44	30.41	28.55	28.67	30.64	147.71
			28.64	29.39	27.53	27.57	29.27	142.40

Table A12 Continued

ozone dose (mgO ₃ / mgC)	contact time (min)	EBCT (min)	concentrations of HAA ₅ (ppb) after ozonation process					
			CAA	BAA	DCAA	TCAA	DBAA	HAA ₅
1	5	10	22.66	28.76	31.28	20.36	25.67	128.73
			18.52	28.61	31.64	15.90	18.97	113.63
		20	20.47	27.01	29.03	19.81	20.57	116.89
	10	10	20.62	27.20	27.07	20.73	19.74	115.36
			30	20.29	28.05	29.85	23.43	20.79
		10	20.69	29.35	30.07	22.92	20.29	123.31
20	10	10	24.84	39.57	38.93	29.61	32.33	165.30
			24.72	38.54	38.15	29.45	32.03	162.88
		20	23.58	30.76	29.53	25.98	25.17	135.02
	20	10	23.52	29.87	28.46	20.02	16.69	118.55
			30	20.41	29.42	31.60	15.71	20.03
		10	18.99	29.72	31.70	19.30	21.45	121.16
30	10	10	20.67	28.09	28.70	15.81	19.52	112.79
			20.41	28.38	29.24	12.77	15.49	106.29
		20	27.56	26.24	26.61	23.20	25.60	129.20
	20	10	27.75	28.76	25.09	24.85	28.63	135.08
			30	27.22	28.21	27.05	23.47	26.27
		10	26.56	25.79	27.83	22.54	24.64	127.36

Table A12 Continued

ozone dose (mgO ₃ / mgC)	contact time (min)	EBCT (min)	concentrations of HAA ₅ (ppb) after BAC column					
			CAA	BAA	DCAA	TCAA	DBAA	HAA ₅
1	5	10	0.00	3.48	3.67	1.52	1.71	10.38
			0.00	3.46	3.77	1.28	1.44	9.95
		20	0.00	0.00	0.63	0.27	0.00	0.90
			0.00	0.00	0.62	0.36	0.00	0.99
		30	0.00	0.00	0.00	0.00	0.00	0.00
			0.00	0.00	0.00	0.00	0.00	0.00
	10	10	0.00	4.95	4.45	1.92	2.16	13.47
			0.00	5.03	4.65	1.98	2.22	13.88
		20	0.00	0.00	0.58	0.48	0.00	1.06
			0.00	0.00	0.59	0.42	0.00	1.01
		30	0.00	0.00	0.00	0.00	0.00	0.00
			0.00	0.00	0.00	0.00	0.00	0.00
	20	10	0.00	1.70	1.72	0.80	0.61	4.84
			0.00	1.72	1.68	0.86	0.66	4.92
		20	0.00	0.00	0.00	0.00	0.00	0.00
			0.00	0.00	0.00	0.00	0.00	0.00
		30	0.00	0.00	0.00	0.00	0.00	0.00
			0.00	0.00	0.00	0.00	0.00	0.00

Table A12 Continued

ozone dose (mgO ₃ / mgC)	contact time (min)	EBCT (min)	initial concentrations of HAA ₅ (ppb) in feed solutions					
			CAA	BAA	DCAA	TCAA	DBAA	HAA ₅
2	5	10	22.79	25.59	24.04	23.99	25.55	121.96
			21.50	24.52	23.21	23.13	24.75	117.11
		20	22.02	30.68	31.38	25.41	27.10	136.60
			21.83	29.05	29.02	24.84	26.68	131.42
		30	21.78	29.64	29.99	24.84	26.39	132.65
			20.68	28.01	26.77	22.04	24.16	121.66
	10	10	23.74	30.38	30.85	27.63	29.09	141.69
			24.63	27.38	26.15	27.00	28.63	133.80
		20	24.16	30.98	31.38	24.62	26.63	137.77
			20.05	31.87	32.78	22.50	24.58	131.77
		30	23.11	29.35	29.99	25.37	27.67	135.48
			19.10	31.13	32.13	21.91	23.71	127.98
	20	10	26.78	31.27	32.35	25.14	27.29	142.84
			21.75	30.53	31.60	24.60	26.62	135.10
		20	25.38	30.53	31.60	27.77	30.32	145.60
			24.27	30.83	31.81	25.48	27.93	140.32
		30	24.86	32.61	33.74	27.59	30.28	149.08
			23.01	32.61	33.69	25.49	27.85	142.65

Table A12 Continued

ozone dose (mgO ₃ / mgC)	contact time (min)	EBCT (min)	concentrations of HAA ₅ (ppb) after ozonation process					
			CAA	BAA	DCAA	TCAA	DBAA	HAA ₅
2	5	10	21.58	22.53	20.12	20.80	21.97	107.00
			22.74	21.79	21.79	20.86	21.98	109.17
		20	21.01	23.27	21.51	22.89	20.59	109.27
	10	10	21.74	23.57	20.97	22.44	19.87	108.59
			30	19.76	27.82	28.76	22.73	25.25
		10	19.27	27.12	25.40	22.80	2.27	96.86
10	10	10	19.16	23.12	21.19	19.72	20.92	104.10
			18.11	22.82	20.76	19.11	20.33	101.14
		20	23.37	30.53	30.31	23.87	26.36	134.44
	20	10	19.98	30.09	29.77	20.28	22.41	122.53
			30	20.49	30.68	31.70	23.23	25.00
		10	19.05	29.20	29.77	20.60	22.49	121.12
20	10	10	20.21	30.68	31.28	21.45	23.78	127.40
			19.36	30.83	31.38	20.55	22.87	125.00
		20	21.72	26.83	27.17	22.98	23.31	122.00
	20	10	20.62	26.42	27.81	20.98	21.38	117.21
			30	21.19	30.53	31.38	21.51	23.64
		10	23.91	30.68	31.06	20.55	21.06	127.27

Table A12 Continued

ozone dose (mgO ₃ / mgC)	contact time (min)	EBCT (min)	concentrations of HAA ₅ (ppb) after BAC column					
			CAA	BAA	DCAA	TCAA	DBAA	HAA ₅
2	5	10	3.29	3.43	1.27	1.65	9.64	3.29
			1.53	3.68	1.39	1.75	8.35	1.53
		20	0.00	0.82	0.26	0.00	1.09	0.00
			0.00	0.81	0.26	0.00	1.07	0.00
		30	0.00	0.00	0.00	0.00	0.00	0.00
			0.00	0.00	0.00	0.00	0.00	0.00
	10	10	3.90	3.76	1.55	1.84	11.05	3.90
			3.74	3.78	1.49	1.78	10.79	3.74
		20	0.00	0.64	0.38	0.00	1.02	0.00
			0.00	0.62	0.32	0.00	0.95	0.00
		30	0.00	0.00	0.00	0.00	0.00	0.00
			0.00	0.00	0.00	0.00	0.00	0.00
	20	10	3.81	4.34	2.10	2.22	12.47	3.81
			3.76	4.28	1.58	1.67	11.29	3.76
		20	0.00	0.00	0.00	0.00	0.00	0.00
			0.00	0.00	0.00	0.00	0.00	0.00
		30	0.00	0.00	0.00	0.00	0.00	0.00
			0.00	0.00	0.00	0.00	0.00	0.00

BIOGRAPHY

Ms. Chalutip Ratasuk was born on November 1, 1967 in Kanchanaburi province. After she finished high school in Kanchanaburi, she then went to study at Faculty of Public Health, Khon Kaen University, in the northeastern of Thailand. She graduated from the university with a Bachelor's Degree of Science in Public Health in 1990. After that, she continues her study for a master degree at Faculty of Public Health, Mahidol University. She graduated with a Master's Degree of Science in Environmental Technology in 1996. She started working as a sanitary officer at Bangkok Metropolitan Administration for 5 years, and move to Pollution Control Department (PCD), Ministry of Natural Resource and Environment in the position of environmental officer in 1996. She was encouraged to carry out her further study in Environmental Management (International Program) at Chulalongkorn University in May, 2000.

