Supplementary Information

Behavior of NDMA Precursors at 21 Full-Scale Water Treatment Facilities

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Table S1. Treatment /disinfection processes at participating DWTPs

Plt	Pre-Treat.	Coag.	Poly.	Lime Soft.	Filt.	BAF	BAC	PAC	GAC	Cl_2	ClO_2	O_3	NH_3	UV
1		X			X					int., post		int.		
2		X	PAM				X			post		int.	post	
3		X	pDAD	X	X			X		int.			int.	
4	RBF			X	X					int.			post	
5		X	pDAD		X				X	post				
6		X	pDAD	X			X			post		int.	post	
7		X		X	X			X		int., post			int.	
8		X	pDAD	X	X					pre, post		pre	pre, post	
9		X	pDAD				X			post		pre, int.	post	
10		X	pDAD						X	pre, post			post	
11		X	pDAD						X	post	pre, int.		post	
12		X			UF					pre, post			post	X
13		X	pDAD		X					pre, post			post	X
14		X or DAF	pDAD		X or MF				X	int., post				
15		X			UF					pre			int.	
16		X	pDAD			X				pre, post		pre	pre, post	
17		X	pDAD				X			pre, post		int., post	post	

(continued)

Table S1 (continued)

Plt	Pre-Treat.	Coag.	Poly.	Lime Soft.	Filt.	BAF	BAC	PAC	GAC	Cl_2	ClO_2	O_3	NH_3	UV
18		X	pDAD		X					pre, int.		int.	post	
19			pDAD		in-line					pre, post			post	
20	MIEX	X	poly-amine		X					post				
21	activ. SiO_2	X			X					post			post	

Abbreviations:

BAC = biologically active carbon

BAF = biofiltration

Cl_2 = chlorine (or hypochlorite)

ClO_2 = chlorine dioxide

CO_2 = carbon dioxide

coag. = coagulation

DAF = dissolved air flotation

filt. = filtration

GAC = granular activated carbon

int. = intermediate-oxidation/intermediate-disinfection (e.g., at filter influent)

MIEX = magnetic ion exchange resin

MF = microfiltration

NH_3 = ammonia

O_3 = ozonation

PAC = powdered activated carbon

PAM = polyacrylamide

pDAD = polyDADMAC

poly. = polymer

post = post-oxidation/post-disinfection (e.g., at filter effluent)

pre = pre-oxidation/pre-disinfection (e.g., at plant influent)

RBF = riverbank filtration

SiO_2 = silica dioxide

soft. = softening

UF = ultrafiltration

UV = ultraviolet

Table S2. Water quality at participating DWTPs (basic survey samples)

		Plant Influent				Treated Water		
Plant	Date	TOC (mg/L)	UV_{254} (cm^{-1})	NDMA FP (ng/L)	Sucralose (μg/L	TOC (mg/L)	UV_{254} (cm^{-1})	NDMA FP (ng/L)
2	3/5/12	4.4	0.13	7.7	ND	1.5	0.14	29
2	6/4/13	2.1	0.078	6.3	0.3	0.2	0	3.6
3	2/6/12	2.7	0.066	14	0.28	1.5	0.024	11
3	8/13/12	3.2	0.071	22	1.3	2.3	0.045	16
4	2/6/12	1.5	0.026	3.8	0.35	1.4		2.1
4	8/13/12	1.4	0.024	10	0.99	1.3	0.031	---
5	2/6/12	3.0	0.07	16	0.18	1.0	0.005	3.4
5	2/4/13	3.8	0.104	12	0.13	1.0	0.024	4.6
6	3/26/12	4.9	0.208	74	0.26	3.1	0.044	13
6	9/24/12	4.3	0.108	33	1.2	2.2	0.025	12
7	2/21/12	7.0	0.13	44	0.92	3.4	0.05	39
7	8/20/12	12.7	0.407	53	<0.2	5.7	0.104	44
9	7/30/12	6.2	0.097	23	0.44	3.0	0.028	19
10	10/8/12	3.2	0.042	13	ND	1.4	0.015	9.0
11	10/8/12	4.5	0.108	11	ND	2.6	0.044	7.9
12	7/9/12	5.3	0.077	46	6.3	4.2	0.059	10
12	1/7/13	3.8	0.050	63	4.4	3.8	0.050	---
13	7/9/12	1.76	0.028	7.3	0.24	1.5	0.022	16

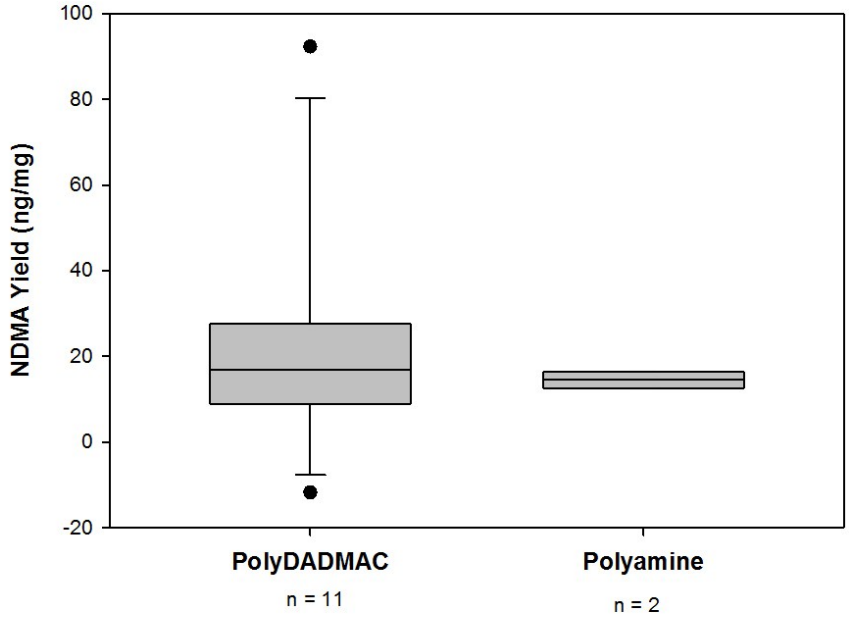
(continued)

Table S2 (continued)

		Plant Influent				Treated Water		
Plant	Date	TOC (mg/L)	UV_{254} (cm^{-1})	NDMA FP (ng/L)	Sucralose (μg/L	TOC (mg/L)	UV_{254} (cm^{-1})	NDMA FP (ng/L)
14	Apr '12	3.1	0.048	27	0.80	1.6	0.012	6.2
14	3/18/13	3.0	0.046	12	0.65	1.3	0.014	4.0
15	4/16/12	5.6	0.16	16	1.0	3.4	0.070	---
16	4/16/12	5.8	0.16	16	1.0	3.0	0.038	18
16	10/22/12	3.4	0.076	10	0.72	2.0	0.027	5.0
17	9/17/12	2.5	0.064	10	0.76	1.3	0.011	10
17	4/15/13	3.2	0.085	11	0.62	2.1	0.024	4.3
18	5/7/12	4.9	0.13	9.6	<0.20	2.9	0.039	6.9
19	7/22/13	1.6	0.037	2.0	ND	1.4	0.023	2.0
20	11/5/12	3.3	0.068	4.8	ND	1.4	0.014	24
20	5/6/13	3.2	0.078	4.8	ND	1.3	0.013	19
21	6/4/12	7.4	0.26	5.5	<0.20	3.2	0.062	5.2

ND = Not detected

--- = Not analyzed



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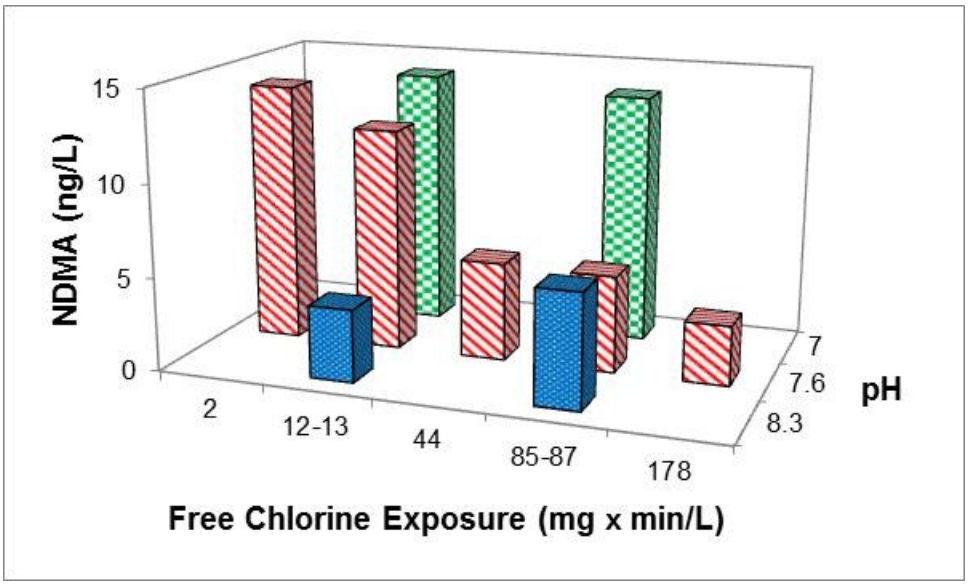

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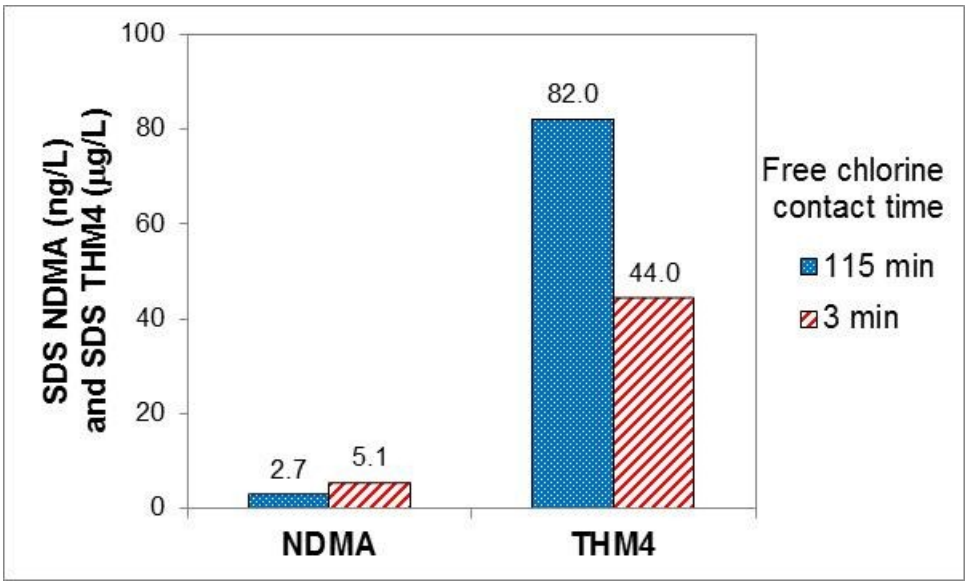

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