

*Protecting Our Water Environment*



*Metropolitan Water Reclamation District of Greater Chicago*

***RESEARCH AND DEVELOPMENT  
DEPARTMENT***

*REPORT NO. 07-60*

*REPORT OF THE FULTON COUNTY  
ENVIRONMENTAL PROTECTION SYSTEM*

*APRIL, MAY, AND JUNE 2007*

*AUGUST 2007*

**Metropolitan Water Reclamation District of Greater Chicago**

100 EAST ERIE STREET CHICAGO, ILLINOIS 60611-3154 312-751-5600

Louis Kollias, P.E., BCEE  
*Director of Research and Development*  
312-751-5190

August 30, 2007

Mr. S. Alan Keller, P.E.  
Manager, Permit Section  
Illinois Environmental  
Protection Agency  
1021 North Grand Avenue East  
P.O. Box 19276  
Springfield, IL 62794-9276

Dear Mr. Keller:

Subject: Metropolitan Water Reclamation District of Greater Chicago –  
April, May, and June 2007 Report of the Fulton County Environ-  
mental Protection System

This letter transmits information and data for the April, May, and June 2007 report of the Fulton County Environmental Protection System. No biosolids data are reported because supernatant and biosolids application was terminated in 1995 and 2004, respectively. Termination of monitoring of soil, crops, and surface water and groundwater sites was approved by the IEPA in September 2006.

During April, a total of 6.74 MG water was released from the runoff retention basin (3-1). The analysis of water is presented in Table 1. A log of runoff retention basin discharge information is presented in Table 2. The daily climatological observations for April 2007 are summarized in Table 3. Total precipitation for the month was 4.31 inches.

During May, a total of 10.2 MG water was released from the runoff retention basin (3-1). The analysis of water is presented in Table 4. A log of runoff retention basin discharge information is presented in Table 5. The daily climatological observations for May 2007 are summarized in Table 6. Total precipitation for the month was 2.09 inches. The monthly reports will be replaced by monthly letters verifying that no new biosolids or supernatant applications have been made to the site.

Subject: Metropolitan Water Reclamation District of Greater Chicago – April, May, and June 2007 Report of the Fulton County Environmental Protection System

During June, a total of 3.39 MG water was released for the runoff retention basin (3-1). The analysis of water is presented in Table 7. A log of runoff retention basin discharge information is presented in Table 8. The daily climatological observations for June 2007 are summarized in Table 9. Total precipitation for the month was 2.49 inches.

Lysimeters and drainage tiles at the reclaimed St. David coal refuse pile site, and lysimeters at Morgan Mine (Big Ten) and the United Electric coal refuse pile sites were sampled during June. Water quality data for these monitoring devices in June are presented in Tables 10 through 13.

Termination of environmental monitoring of the coal refuse areas and runoff retention basin 3-1 was approved by the IEPA in July 2007. Therefore, no environmental monitoring or reporting is required under the current site permit. The April, May, and June 2007 report is the last environmental monitoring report for the site.

Very truly yours,

Louis Kollias  
Director  
Research and Development

LK:GT:spy  
Attachment  
cc w/enc.:

Mr. Valdis Aistars, USEPA Region V  
Mr. Ash Sajjad, USEPA Region V  
Mr. Matthew Williams, USEPA Region V  
IEPA Permit Section, Springfield  
IEPA Surveillance Section, Peoria  
Chairman of the Fulton County Board  
Fulton County Board of Health  
Fulton County Zoning Office  
Mr. Sobanski  
Drs.: Granato  
O'Connor  
Cox

Library  
cc wo/enc.: Messrs.: Jamjun  
Quintanilla

TABLE 1: FULTON COUNTY LAND RECLAMATION PROJECT  
 FIELD RUNOFF BASIN DISCHARGE DATA APRIL 2007

Basin No.	Sample Date	pH	TSS (mg/L)	BOD <sub>5</sub> (mg/L)	F.coli. per 100 mL	Discharge Date	Discharge Amount (MG)
3-1	4/02	8.1	6.8	3	10	4/05	3.10
3-1	4/16	8.2	6.0	<2	10	4/17	3.64

TABLE 2: FIELD RUNOFF BASIN LOG AT THE FULTON COUNTY LAND RECLAMATION PROJECT APRIL 2007

Basin No.	Date Opened	Time Opened	Date Closed	Time Closed	Opening Stage (feet)	Closing Stage (feet)	Time Open (Hours)	Volume Released (MG)	Release Type	Reason Closed	R & D Dept. OK	R & D Dept. Sample
3 - 1	4/05/07	14:26	04/09/07	07:45	4.00	0.00	89.32	3.10	Normal	Empty	yes	yes
3 - 1	4/17/07	12:50	04/23/07	07:40	4.50	0.00	138.83	3.64	Normal	Empty	yes	yes

TABLE 3: RECORD OF CLIMATOLOGICAL OBSERVATIONS FOR APRIL 2007,  
 FULTON COUNTY, ILLINOIS, STATION SEQ, SEC.10, R3E, T6N

Date	Temperature °C			Precipitation		Wind		
	Max	Min	Avg	rain, melted snow	snow, sleet, hail	m/S	m/S	Dir
				(inches & hundredths)	(inches & tenths)	Avg	Max	
1	17.7	10.7	13.8	0.01		4.5	15.6	SW
2	28.1	7.4	16.8	0.00		1.2	7.2	SW
3	19.1	0.8	13.0	0.32		5.6	17.9	W
4	2.5	-4.6	-1.3	0.00		7.8	18.8	W
5	7.5	-2.8	1.0	0.00		4.7	13.9	W
6	3.4	-4.2	-1.5	0.00		5.7	17.0	W
7	3.0	-7.4	-2.0	0.00		5.6	14.3	W
8	5.5	-0.5	2.1	0.00		2.0	6.3	W
9	13.5	0.2	4.8	0.00		1.4	8.9	W
10	13.1	-0.9	5.6	0.31		4.7	15.6	E
11	13.4	0.8	5.5	0.63		6.6	15.2	NE
12	4.4	-0.7	1.5	0.01		5.4	15.2	SW
13	13.4	-3.0	5.2	0.00		1.1	5.4	W
14	11.8	0.1	6.2	0.07		2.3	10.3	NE
15	17.4	-1.7	7.5	0.00		2.4	10.7	NW
16	24.0	0.8	11.9	0.00		1.2	6.3	W
17	27.5	5.8	16.0	0.00		1.8	12.1	W
18	17.9	4.3	10.2	0.00		3.5	10.7	N
19	18.4	4.2	10.1	0.00		1.8	8.0	NE
20	23.7	5.2	14.0	0.00		1.8	7.6	NE
21	26.1	7.2	17.7	0.00		3.2	9.8	SE
22	28.1	11.7	20.3	0.00		5.1	18.3	SE
23	20.6	11.4	17.3	0.00		5.3	13.9	SW
24	26.2	8.4	16.5	0.95		2.7	15.2	NE
25	12.7	9.6	10.0	0.82		5.2	13.4	NE
26	17.8	8.5	11.6	1.19		3.4	9.8	SW
27	21.8	7.9	13.4	0.00		3.8	13.0	SW
28	24.5	10.5	17.3	0.00		3.9	15.2	W
29	29.7	11.6	20.9	0.00		2.9	10.7	SW
30	30.7	15.6	23.6	0.00		3.8	13.0	S
Sum				4.31		Observers: Dan Bergstrom Rosalie Swango Station: R&D Lab		
Avg	17.4	3.9	10.3					
Extreme	30.7	-7.4		1.19				

TABLE 4: FULTON COUNTY LAND RECLAMATION PROJECT  
FIELD RUNOFF BASIN DISCHARGE DATA MAY 2007

Basin No.	Sample Date	pH	TSS (mg/L)	BOD <sub>5</sub> (mg/L)	F.coli. per 100 mL	Discharge Date	Discharge Amount (MG)
3-1	4/30	8.2	14.0	3	<10	5/02	3.33
3-1	5/09	8.1	4.5	3	<10	5/11	3.14
3-1	5/21	8.3	17.0	<2	50	5/22	3.68

TABLE 5: FIELD RUNOFF BASIN LOG AT THE FULTON COUNTY LAND RECLAMATION PROJECT MAY 2007

Basin No.	Date Opened	Time Opened	Date Closed	Time Closed	Opening Stage (feet)	Closing Stage (feet)	Time Open (Hours)	Volume Released (MG)	Release Type	Reason Closed	R & D Dept. OK	R & D Dept. Sample
3 - 1	05/02/07	07:40	05/04/07	10:00	5.00	1.50	50.33	3.33	Normal	Rain	yes	yes
3 - 1	05/11/07	04:00	05/15/07	08:00	4.50	1.00	100.00	3.14	Normal	Empty	yes	yes
3 - 1	05/22/07	02:00	05/25/07	05:20	5.00	1.00	75.33	3.68	Normal	Rain	yes	yes



TABLE 6: RECORD OF CLIMATOLOGICAL OBSERVATIONS FOR MAY 2007,  
 FULTON COUNTY, ILLINOIS, STATION SEQ, SEC.10, R3E, T6N

Date	Temperature °C			Precipitation		Wind		
	Max	Min	Avg	rain, melted snow	snow, sleet, hail	m/S	m/S	Dir
				(inches & hundredths)	(inches & tenths)	Avg	Max	
1	28.7	17.7	22.6			3.2	10.7	SW
2	19.1	13.8	17.0			3.7	11.2	NE
3	16.7	10.9	13.7	0.30		3.9	12.1	NE
4	17.6	11.9	15.4	0.44		3.3	9.4	NE
5	25.2	16.6	19.5			3.3	12.5	NE
6	22.4	13.0	17.2			4.7	13.0	NE
7	28.3	12.3	19.9			3.5	10.3	NE
8	29.9	13.7	21.4			1.3	6.7	SW
9	31.2	16.7	22.4			1.3	8.0	W
10	31.7	15.0	22.3			0.4	3.1	SW
11	34.8	15.6	23.6			0.9	12.1	NE
12	28.7	11.1	19.5			2.5	9.8	NE
13	27.7	10.0	18.8			2.9	8.9	NE
14	31.8	14.7	23.2			3.8	13.4	S
15	28.9	12.3	18.8	0.19		3.3	12.1	W
16	23.3	9.0	15.3			3.4	13.0	W
17	21.1	6.5	12.7			2.4	11.2	NE
18	23.6	4.4	14.3			1.5	8.9	SE
19	26.7	9.0	18.1			2.9	9.8	S
20	30.2	14.3	21.3			2.0	8.0	S
21	30.1	12.1	21.7			2.1	9.8	SE
22	30.6	16.0	22.9			3.4	12.5	SE
23	30.9	18.7	23.9	0.03		3.6	14.3	SE
24	30.1	15.1	22.8	0.05		4.7	17.9	S
25	22.6	13.0	17.0	0.24		1.8	6.3	E
26	26.2	16.1	19.1	0.69		1.6	17.0	NE
27	26.2	14.3	19.8	0.05		1.1	7.6	W
28	28.4	16.7	21.6	0.01		1.7	6.3	E
29	31.6	18.8	24.6			2.0	8.5	SE
30	28.7	19.0	23.3			2.7	10.7	SE
31	27.2	18.6	21.7	0.09		1.7	5.4	NE
Sum				2.09	0.0	Observers: Dan Bergstrom Rosalie Swango Station: R&D Lab		
Avg	27.1	13.8	19.9					
Extreme	34.8	4.4		0.69	0.0			

TABLE 7: FULTON COUNTY LAND RECLAMATION PROJECT  
FIELD RUNOFF BASIN DISCHARGE DATA JUNE 2007

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Basin No.	Sample Date	pH	TSS (mg/L)	BOD <sub>5</sub> (mg/L)	F.coli. per 100 mL	Discharge Date	Discharge Amount (MG)
3-1	6/11	8.1	14.0	<2	<10	6/13	3.39

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TABLE 8: FIELD RUNOFF BASIN LOG AT THE FULTON COUNTY LAND RECLAMATION PROJECT JUNE 2007

Basin No.	Date Opened	Time Opened	Date Closed	Time Closed	Opening Stage (feet)	Closing Stage (feet)	Time Open (Hours)	Volume Released (MG)	Release Type	Reason Closed	R & D Dept. OK	R & D Dept. Sample
3 - 1	6/13/07	10:40	6/18/07	1:40	4.50	0.50	111.00	3.39	Regular	Regular	yes	yes

TABLE 9: RECORD OF CLIMATOLOGICAL OBSERVATIONS FOR JUNE 2007,  
 FULTON COUNTY, ILLINOIS, STATION SEQ, SEC.10, R3E, T6N

Date	Temperature °C			Precipitation		Wind		
	Max	Min	Avg	rain, melted snow	snow, sleet, hail	m/S	m/S	Dir
				(inches & hundredths)	(inches & tenths)	Avg	Max	
1	29.7	20.4	26.0	0.01		2.7	11.6	SW
2	25.3	19.1	21.6	0.04		1.9	10.7	SW
3	24.4	17.4	20.2	0.02		1.3	9.8	SW
4	24.2	16.2	19.6	0.00		1.2	8.5	SW
5	24.1	15.6	20.2	0.00		0.7	6.3	N
6	29.9	13.6	22.2	0.00		3.1	10.7	S
7	31.8	21.9	27.3	0.00		5.8	16.1	SW
8	26.8	16.8	21.7	0.01		2.0	13.4	W
9	30.3	13.2	21.7	0.00		0.4	5.4	S
10	24.7	16.7	21.2	0.01		1.1	6.3	S
11	33.2	17.9	25.2	0.00		1.1	6.3	SE
12	35.3	19.5	27.2	0.00		1.3	7.2	E
13	35.6	19.8	27.4	0.00		1.3	8.5	E
14	36.8	21.4	28.7	0.00		0.8	4.5	NE
15	37.7	23.6	29.9	0.00		0.8	4.0	E
16	34.7	22.6	28.6	0.00		0.8	5.4	SW
17	34.8	22.5	28.8	0.00		1.7	8.0	SW
18	30.8	22.6	25.8	0.18		3.4	17.4	SW
19	28.3	19.6	24.1	0.11		0.8	5.8	W
20	31.5	17.2	24.3	0.00		0.7	5.4	SW
21	33.3	20.1	25.8	0.59		1.0	11.6	SW
22	28.5	19.6	22.9	0.85		1.8	8.0	E
23	27.0	20.3	22.3	0.52		1.8	6.3	E
24	26.0	18.9	21.8	0.00		0.4	4.5	NE
25	33.0	19.6	26.2	0.00		0.6	4.5	SE
26	33.6	23.6	28.2	0.00		1.5	5.8	S
27	32.3	23.2	26.5	0.04		2.0	9.8	SW
28	24.4	19.7	22.7	0.11		1.2	6.7	NE
29	25.1	16.1	25.1	0.00		1.7	7.6	NE
30	27.6	16.4	27.6	0.00		1.4	5.4	NE
Sum				2.49	0.0	Observers: Dan Bergstrom Rosalie Swango Station: R&D Lab		
Avg	30.0	19.2	24.7					
Extreme	37.7	13.2		0.85	0.0			

TABLE 10: ANALYSIS OF WATER FROM LYSIMETERS ON THE RECLAIMED ST. DAVID COAL REFUSE PILE SITE SAMPLED ON JUNE 27, 2007

Constituent	Units	Lysimeter Designation			
		1	2	3	4
pH			7.8		
E.C.	mS/m		290		
Acidity*	mg/L		6.0		
Alkalinity*	"		161		
Total P	"		<0.09		
		L		L	L
		Y		Y	Y
Cl <sup>-</sup>	"	S	7.0	S	S
SO <sub>4</sub> <sup>=</sup>	"	I	1,981	I	I
NH <sub>3</sub> -N	"	M	<0.04	M	M
NO <sub>2</sub> +NO <sub>3</sub> -N	"	E	<0.02	E	E
Al	"	T	0.039	T	T
		E		E	E
		R		R	R
Cd	"		0.0291		
Cr	"	D	0.0055	D	D
Cu	"	R	0.022	R	R
Fe	"	Y	0.129	Y	Y
Mn	"		0.005		
Ni	"		0.128		
Pb	"		<0.002		
Zn	"		1.42		

TABLE 10 (Continued): ANALYSIS OF WATER FROM LYSIMETERS ON THE RECLAIMED ST. DAVID COAL REFUSE PILE SITE SAMPLED ON JUNE 27, 2007

Constituent	Units	Lysimeter Designation			
		5	6	7	8
pH		7.7			
E.C.	mS/m	250			
Acidity*	mg/L	13			
Alkalinity*	"	175			
Total P	"	<0.09			
			L	L	L
			Y	Y	Y
Cl <sup>-</sup>	"	9.0	S	S	S
SO <sub>4</sub> <sup>=</sup>	"	1,441	I	I	I
NH <sub>3</sub> -N	"	<0.04	M	M	M
NO <sub>2</sub> +NO <sub>3</sub> -N	"	2.55	E	E	E
Al	"	<0.007	T	T	T
			E	E	E
			R	R	R
Cd	"	0.0223			
Cr	"	0.0051	D	D	D
Cu	"	0.006	R	R	R
Fe	"	0.085	Y	Y	Y
Mn	"	0.002			
Ni	"	0.032			
Pb	"	<0.002			
Zn	"	1.47			

TABLE 10 (Continued): ANALYSIS OF WATER FROM LYSIMETERS ON THE RECLAIMED ST. DAVID COAL REFUSE PILE SITE SAMPLED ON JUNE 27, 2007

Constituent	Units	Lysimeter Designation			
		9	10	A	B
pH				6.1	7.4
E.C.	mS/m			240	390
Acidity*	mg/L			16	39
Alkalinity*	"			12	321
Total P	"			0.21	0.09
		L	L		
		Y	Y		
Cl <sup>-</sup>	"	S	S	12.0	22.0
SO <sub>4</sub> <sup>=</sup>	"	I	I	1,590	2,800
NH <sub>3</sub> -N	"	M	M	0.52	<0.04
NO <sub>2</sub> +NO <sub>3</sub> -N	"	E	E	2.48	0.50
Al	"	T	T	0.069	0.15
		E	E		
		R	R		
Cd	"			<0.0004	<0.0004
Cr	"	D	D	0.0047	0.0054
Cu	"	R	R	0.008	0.005
Fe	"	Y	Y	1.95	2.21
Mn	"			1.78	2.19
Ni	"			0.023	0.064
Pb	"			<0.002	<0.002
Zn	"			0.401	0.202

TABLE 10 (Continued): ANALYSIS OF WATER FROM LYSIMETERS ON THE RECLAIMED ST. DAVID COAL REFUSE PILE SITE SAMPLED ON JUNE 27, 2007

Constituent	Units	Lysimeter Designation			
		C	D	E	F
pH			2.2		7.4
E.C.	mS/m		790		230
Acidity*	mg/L		11,000		35
Alkalinity*	"		<2		298
Total P	"		27.9		<0.09
		L		L	
		Y		Y	
Cl <sup>-</sup>	"	S	0.3	S	3.0
SO <sub>4</sub> <sup>=</sup>	"	I	17,381	I	1,275
NH <sub>3</sub> -N	"	M	2.88	M	<0.04
NO <sub>2</sub> +NO <sub>3</sub> -N	"	E	1.14	E	0.78
Al	"	T	195	T	<0.007
		E		E	
		R		R	
Cd	"		1.54		<0.0004
Cr	"	D	1.27	D	0.0040
Cu	"	R	1.18	R	0.004
Fe	"	Y	1,846	Y	0.490
Mn	"		20.1		0.030
Ni	"		1.69		0.006
Pb	"		<0.002		<0.002
Zn	"		109		0.060



TABLE 10 (Continued): ANALYSIS OF WATER FROM LYSIMETERS ON THE RECLAIMED ST. DAVID COAL REFUSE PILE SITE SAMPLED ON JUNE 27, 2007

Constituent	Units	Lysimeter Designation		
		G	H	I
pH		7.0	7.8	7.2
E.C.	mS/m	260	240	320
Acidity*	mg/L	30	12	21
Alkalinity*	"	117	214	107
Total P	"	<0.09	<0.09	<0.09
Cl <sup>-</sup>	"	6.0	13.0	13.0
SO <sub>4</sub> <sup>=</sup>	"	1,736	1,389	2,169
NH <sub>3</sub> -N	"	3.01	<0.04	<0.04
NO <sub>2</sub> +NO <sub>3</sub> -N	"	0.76	5.84	2.10
Al	"	0.28	<0.007	<0.007
Cd	"	0.0114	<0.0004	<0.0004
Cr	"	0.0050	0.0049	0.0054
Cu	"	0.007	0.008	0.006
Fe	"	0.440	0.140	3.15
Mn	"	0.590	0.120	5.67
Ni	"	0.062	0.008	0.120
Pb	"	<0.002	<0.002	<0.002
Zn	"	1.20	0.055	1.69

\*As calcium carbonate.

TABLE 11: FULTON COUNTY LAND RECLAMATION PROJECT ST. DAVID COAL  
REFUSE PILE SITE DRAINAGE TILE WATER ANALYSIS FOR JUNE 2007

Constituent	Units	Tile Drain		
		D1 06/27	D2 06/27	D3 06/27
pH		N O	N O	6.7
Total Suspended Solids	mg/L	F L O	F L O	35.0
Total Fe	mg/L	W	W	65.3

TABLE 12: ANALYSIS OF WATER FROM LYSIMETERS ON THE RECLAIMED MORGAN MINE COAL REFUSE PILE SITE SAMPLED ON JUNE 25, 2007

Constituent	Units	Lysimeter Designation		
		1	2	3
pH		6.9	7.4	
E.C.	mS/m	210	320	
Acidity*	mg/L	19	19	
Alkalinity*	"	73	267	
Total P	"	<0.09	0.09	
				L
				Y
Cl <sup>-</sup>	"	14.3	24.2	S
SO <sub>4</sub> <sup>=</sup>	"	1,156	1,797	I
NH <sub>3</sub> -N	"	0.06	1.03	M
NO <sub>2</sub> +NO <sub>3</sub> -N	"	0.79	16.2	E
Al	"	0.14	0.07	T
				E
				R
Cd	"	<0.0004	<0.0004	
Cr	"	0.0019	0.0020	D
Cu	"	0.009	0.012	R
Fe	"	1.18	0.517	Y
Mn	"	0.873	1.11	
Ni	"	0.064	0.019	
Pb	"	<0.004	<0.004	
Zn	"	0.316	0.112	

\*As calcium carbonate.

TABLE 13: ANALYSIS OF WATER FROM LYSIMETERS ON THE RECLAIMED UNITED ELECTRIC COAL REFUSE PILE SITE SAMPLED ON JUNE 25, 2007

Constituent	Units	Lysimeter Designation				
		1	2	3	4	5
pH			7.5	7.4	7.5	7.6
E.C.	mS/m		170	240	380	310
Acidity*	mg/L		13	16	21	9.0
Alkalinity*	"		235	213	323	210
Total P	"		0.14	0.12	0.09	0.19
		L				
		Y				
Cl <sup>-</sup>	"	S	2.1	18.6	32.3	23.9
SO <sub>4</sub> <sup>=</sup>	"	I	668	1,290	1,961	1,825
NH <sub>3</sub> -N	"	M	<0.04	0.04	<0.04	0.24
NO <sub>2</sub> +NO <sub>3</sub> -N	"	E	14.2	2.28	43.4	1.87
Al	"	T	0.10	0.05	0.06	0.07
		E				
		R				
Cd	"		0.0061	0.0117	<0.0004	<0.0004
Cr	"	D	0.0011	0.0032	0.0012	0.0019
Cu	"	R	0.044	0.102	0.033	0.033
Fe	"	Y	0.348	0.261	0.163	0.147
Mn	"		0.104	0.204	0.124	0.626
Ni	"		0.036	0.129	0.028	0.034
Pb	"		<0.002	<0.002	<0.002	<0.002
Zn	"		0.174	1.44	0.307	0.297

TABLE 13: ANALYSIS OF WATER FROM LYSIMETERS ON THE RECLAIMED UNITED ELECTRIC COAL REFUSE PILE SITE SAMPLED ON JUNE 25, 2007

Constituent	Units	Lysimeter Designation				
		6	7	8	9	10
pH			7.8	7.3	7.4	
E.C.	mS/m		240	580	490	
Acidity*	mg/L		4.0	65	490	
Alkalinity*	"		203	663	489	
Total P	"		0.15	<0.09	<0.09	
		L				L
		Y				Y
Cl <sup>-</sup>	"	S	8.3	75.9	88.7	S
SO <sub>4</sub> <sup>=</sup>	"	I	1,336	4,353	3,346	I
NH <sub>3</sub> -N	"	M	0.04	9.08	0.05	M
NO <sub>2</sub> +NO <sub>3</sub> -N	"	E	11.6	2.41	0.53	E
Al	"	T	0.15	0.15	0.15	T
		E				E
		R				R
Cd	"		<0.0004	<0.0004	<0.0004	
Cr	"	D	0.0014	0.0020	0.0006	D
Cu	"	R	0.034	0.005	0.013	R
Fe	"	Y	0.448	1.65	0.203	Y
Mn	"		0.187	8.31	1.14	
Ni	"		0.036	0.129	0.028	
Pb	"		<0.002	<0.002	<0.002	
Zn	"		0.174	1.44	0.307	

\*As calcium carbonate.