

*Protecting Our Water Environment*



*Metropolitan Water Reclamation District of Greater Chicago*

***MONITORING AND RESEARCH  
DEPARTMENT***

*REPORT NO. 09-16*

*HARLEM AVENUE SOLIDS MANAGEMENT AREA*

*MONITORING REPORT FOR*

*FOURTH QUARTER 2008*

*MARCH 2009*

# Protecting Our Water Environment

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## 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

March 12, 2009

Mr. S. Allan 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: Harlem Avenue Solids Management Area – Stickney Water Reclamation Plant, Contract No. 84-111-2P, Illinois Environmental Protection Agency Permit No. 2004-AO-2591, Monitoring Report for October, November, and December 2008

The attached eleven tables contain the monitoring data for the Harlem Avenue Solids Management Area (SMA) for October, November, and December 2008 as required by Illinois Environmental Protection Agency (IEPA) Operating Permit No. 2004-AO-2591.

The data reported are as follows:

Table 1, Analysis of Water Lysimeters L-1N-1 through L-3 at the Harlem Avenue SMA Sampled on October 8, 2008

Table 2, Analysis of Water from Lysimeters L-1N-1 through L-3 at the Harlem Avenue SMA Sampled on October 22, 2008

Table 3, Analysis Water from Lysimeters L-1N-1 through L-3 at the Harlem Avenue SMA Sampled on November 5, 2008

Table 4, Analysis Water from Lysimeters L-1N-1 through L-3 at the Harlem Avenue SMA Sampled on November 19, 2008

Table 5, Analysis Water from Lysimeters L-1N-1 through L-3N at the Harlem Avenue SMA Sampled on December 3, 2008

Table 6, Analysis Water from Lysimeters L-1N-1 through L-3N at the Harlem Avenue SMA Sampled on December 17, 2008

Subject: Harlem Avenue Solids Management Area – Stickney Water Reclamation Plant, Contract No. 84-111-2P, Illinois Environmental Protection Agency Permit No. 2004-AO-2591, Monitoring Report for October, November, and December 2008

Table 7, Analysis Water from Lysimeters L-1N-1 through L-3N at the Harlem Avenue SMA Sampled on December 29, 2008

Table 8, Analysis of Monthly Composited Digested Biosolids Placed in the Harlem Avenue Solids Management Drying Area During November 2008

Table 9, Analysis of Monthly Composited Digested Biosolids Placed in the Harlem Avenue Solids Management Drying Area During December 2008

Table 10, Analysis of Monthly Composited Processed Digested Biosolids Removed in the Harlem Avenue Solids Management Drying Area During October 2008

Table 11, Analysis of Monthly Composited Processed Digested Biosolids Removed in the Harlem Avenue Solids Management Drying Area During November 2008

Two new lysimeters, L-2N and L-3N, were installed at this site in September 2008 as replacements for L-2 and L-3, respectively. The old and new lysimeters will be monitored simultaneously for one year. A request will then be submitted to the IEPA to terminate monitoring of the old lysimeters.

Biosolids were placed in the solids drying area during November and December 2008. Biosolids were removed from the solids drying area during October and November 2008.

Very truly yours,

Louis Kollias  
Director  
Monitoring and Research

LK:PL:kq  
Attachments  
cc: Mr. R. Sulski, IEPA  
Records Unit, IEPA  
Stuba/Granato/Cox/Lindo/M. Patel

TABLE 1: ANALYSIS<sup>1</sup> OF WATER FROM LYSIMETERS  
L-1N-1 THROUGH L-3 AT THE HARLEM AVENUE  
SOLIDS MANAGEMENT AREA SAMPLED ON OCTOBER 8, 2008

Parameter	Unit	Lysimeter No.		
		L-1N-1	L-2	L-3
pH <sup>2</sup>		7.5	7.0	7.1
EC	mS/m	247	301	228
Total Dissolved Solids	mg/L	904	2,680	1,680
Total Diss. Org. Carbon	"	20	3	6
Cl <sup>-</sup>	"	47	280	130
SO <sub>4</sub> <sup>=</sup>	"	<2	827	276
TKN	"	4	0.3	0.3
NH <sub>3</sub> -N	"	3	<0.1	<0.1
NO <sub>2</sub> + NO <sub>3</sub> -N	"	0.3	0.4	0.3
Total P	"	<0.25	<0.25	<0.25
Alkalinity as CaCO <sub>3</sub>	"	563	490	841
Al	"	<0.035	0.066	0.049
Ca	"	145	448	290
Cd	"	<0.002	<0.002	<0.002
Cr	"	<0.003	<0.003	<0.003
Cu	"	<0.01	<0.01	<0.01
Fe	"	0.23	<0.02	<0.02
Hg	μg/L	<0.20	<0.20	<0.20
K	mg/L	2	<1	<1
Mg	"	90	111	121
Mn	"	0.181	0.160	0.553
Na	"	22	97	60
Ni	"	<0.002	<0.002	<0.002
Pb	"	<0.02	<0.02	<0.02
Zn	"	<0.01	<0.01	<0.01

<sup>1</sup>Limit of quantitation (LOQ) instead of MDL was used as reporting limit.

<sup>2</sup>pH analyzed beyond recommended holding time of 15 minutes.

TABLE 2: ANALYSIS<sup>1</sup> OF WATER FROM LYSIMETERS  
L-1N-1 THROUGH L-3 AT THE HARLEM AVENUE  
SOLIDS MANAGEMENT AREA SAMPLED ON OCTOBER 22, 2008

Parameter	Unit	Lysimeter No.		
		L-1N-1	L-2	L-3
pH <sup>2</sup>		7.2	7.1	7.3
EC	mS/m	205	239	186
Total Dissolved Solids	mg/L	1,392	NA	1,492
Total Diss. Org. Carbon	"	34	4	7
Cl <sup>-</sup>	"	95	285	119
SO <sub>4</sub> <sup>=</sup>	"	4	775	274
TKN	"	9	0.6	0.5
NH <sub>3</sub> -N	"	5	<0.1	<0.1
NO <sub>2</sub> + NO <sub>3</sub> -N	"	<0.1	0.2	0.3
Total P	"	<0.25	<0.25	<0.25
Alkalinity as CaCO <sub>3</sub>	"	929	416	879
Al	"	0.058	0.076	0.062
Ca	"	306	444	311
Cd	"	<0.002	<0.002	<0.002
Cr	"	<0.003	<0.003	<0.003
Cu	"	<0.01	<0.01	<0.01
Fe	"	2.6	<0.02	<0.02
Hg	μg/L	<0.20	<0.20	<0.20
K	mg/L	4	<1	<1
Mg	"	180	107	129
Mn	"	0.388	0.020	0.577
Na	"	47	89	53
Ni	"	<0.002	<0.002	<0.002
Pb	"	<0.02	<0.02	<0.02
Zn	"	<0.01	<0.01	<0.01

<sup>1</sup>Limit of quantitation (LOQ) instead of MDL was used as reporting limit.

<sup>2</sup>pH analyzed beyond recommended holding time of 15 minutes.

NA = No analysis; insufficient sample.

TABLE 3: ANALYSIS<sup>1</sup> OF WATER FROM LYSIMETERS  
L-1N-1 THROUGH L-3 AT THE HARLEM AVENUE  
SOLIDS MANAGEMENT AREA SAMPLED ON NOVEMBER 5, 2008

Parameter	Unit	Lysimeter No.		
		L-1N-1	L-2	L-3
pH <sup>2</sup>		7.6	7.2	7.6
EC	mS/m	184	211	164
Total Dissolved Solids	mg/L	1,317	2,396	1,092
Total Diss. Org. Carbon	"	38	3	NA
Cl <sup>-</sup>	"	103	316	60
SO <sub>4</sub> <sup>=</sup>	"	11	750	133
TKN	"	9	0.6	0.4
NH <sub>3</sub> -N	"	5	<0.1	<0.1
NO <sub>2</sub> + NO <sub>3</sub> -N	"	0.2	<0.1	0.5
Total P	"	<0.25	<0.25	<0.25
Alkalinity as CaCO <sub>3</sub>	"	1,184	453	321
Al	"	0.046	0.062	<0.035
Ca	"	305	412	142
Cd	"	<0.002	<0.002	<0.002
Cr	"	<0.003	<0.0025	<0.003
Cu	"	<0.01	<0.01	<0.01
Fe	"	9.2	<0.02	<0.02
Hg	μg/L	<0.20	<0.20	<0.20
K	mg/L	4	<1	<1
Mg	"	174	100	63
Mn	"	0.387	0.011	0.220
Na	"	47	83	22
Ni	"	<0.002	<0.002	<0.002
Pb	"	0.04	0.04	0.04
Zn	"	<0.01	<0.01	<0.01

<sup>1</sup>Limit of quantitation (LOQ) instead of MDL was used as reporting limit.

<sup>2</sup>pH analyzed beyond recommended holding time of 15 minutes.

NA = No analysis; insufficient sample.

TABLE 4: ANALYSIS<sup>1</sup> OF WATER FROM LYSIMETERS  
L-1N-1 THROUGH L-3 AT THE HARLEM AVENUE  
SOLIDS MANAGEMENT AREA SAMPLED ON NOVEMBER 19, 2008

Parameter	Unit	Lysimeter No.		
		L-1N-1	L-2	L-3
pH <sup>2</sup>		7.6	6.8	7.3
EC	mS/m	187	248	189
Total Dissolved Solids	mg/L	780	2,392	1,516
Total Diss. Org. Carbon	"	16	2	6
Cl <sup>-</sup>	"	45	351	124
SO <sub>4</sub> <sup>=</sup>	"	<2	744	241
TKN	"	5	0.4	0.5
NH <sub>3</sub> -N	"	3	<0.1	<0.1
NO <sub>2</sub> + NO <sub>3</sub> -N	"	0.3	<0.1	0.3
Total P	"	<0.25	<0.25	<0.25
Alkalinity as CaCO <sub>3</sub>	"	608	441	864
Al	"	<0.035	0.051	0.041
Ca	"	136	410	291
Cd	"	<0.002	<0.002	<0.002
Cr	"	<0.003	<0.003	<0.003
Cu	"	<0.01	<0.01	<0.01
Fe	"	0.33	<0.02	<0.02
Hg	μg/L	<0.20	<0.20	<0.20
K	mg/L	2	<1	<1
Mg	"	81	101	124
Mn	"	0.171	0.012	0.520
Na	"	21	82	54
Ni	"	<0.002	<0.002	<0.002
Pb	"	0.04	0.04	0.04
Zn	"	<0.01	<0.01	<0.01

<sup>1</sup>Limit of quantitation (LOQ) instead of MDL was used as reporting limit.

<sup>2</sup>pH analyzed beyond recommended holding time of 15 minutes.

TABLE 5: ANALYSIS<sup>1</sup> OF WATER FROM LYSIMETERS  
L-1N-1 THROUGH L-3N AT THE HARLEM AVENUE  
SOLIDS MANAGEMENT AREA SAMPLED ON DECEMBER 3, 2008

Parameter	Unit	Lysimeter No.				
		L-1N-1	L-2	L-2N	L-3	L-3N
pH <sup>2</sup>			7.0	7.5	7.4	7.6
EC	mS/m		247	232	157	137
Total Dissolved Solids	mg/L		2,496	2,640	1,192	1,176
Total Diss. Org. Carbon	"		2	7	5	9
Cl <sup>-</sup>	"		316	49	116	115
SO <sub>4</sub> <sup>=</sup>	"		777	1,293	164	174
		L				
TKN	"	Y	0.5	2	0.5	2
NH <sub>3</sub> -N	"	S	<0.1	0.5	<0.1	0.4
NO <sub>2</sub> + NO <sub>3</sub> -N	"	I	0.5	15	0.4	0.3
Total P	"	M	<0.25	<0.25	<0.25	<0.25
Alkalinity as CaCO <sub>3</sub>	"	E	413	458	577	504
		T				
Al	"	E	0.052	0.058	<0.035	<0.035
Ca	"	R	448	466	152	178
Cd	"		<0.002	<0.002	<0.002	<0.002
Cr	"	F	<0.003	0.0035	<0.003	<0.003
Cu	"	R	<0.01	<0.01	<0.01	<0.01
		O				
Fe	"	Z	<0.02	<0.02	0.04	2.1
Hg	μg/L	E	<0.20	<0.20	<0.20	<0.20
K	mg/L	N	<1	3	<1	3
Mg	"		109	159	66	74
Mn	"		0.021	1.07	0.565	0.444
Na	"		86	30	169	64
Ni	"		<0.002	<0.002	<0.002	<0.002
Pb	"		<0.02	0.05	0.05	<0.02
Zn	"		<0.01	0.06	<0.01	0.04

<sup>1</sup>Limit of quantitation (LOQ) instead of MDL was used as reporting limit.

<sup>2</sup>pH analyzed beyond recommended holding time of 15 minutes.



TABLE 6: ANALYSIS<sup>1</sup> OF WATER FROM LYSIMETERS  
L-1N-1 THROUGH L-3N AT THE HARLEM AVENUE  
SOLIDS MANAGEMENT AREA SAMPLED ON DECEMBER 17, 2008

Parameter	Unit	Lysimeter No.				
		L-1N-1	L-2	L-2N	L-3	L-3N
pH <sup>2</sup>		7.6			7.5	
EC	mS/m	181			154	
Total Dissolved Solids	mg/L	796			1,484	
Total Diss. Org. Carbon	"	19			6	
Cl <sup>-</sup>	"	45			115	
SO <sub>4</sub> <sup>=</sup>	"	8			202	
TKN	"	4	L	L		L
NH <sub>3</sub> -N	"	3	Y	Y	0.9	Y
NO <sub>2</sub> + NO <sub>3</sub> -N	"	<0.1	S	S	<0.1	S
Total P	"	<0.1	I	I	0.6	I
Alkalinity as CaCO <sub>3</sub>	"	<0.25	M	M	<0.25	M
		617	E	E	770	E
			T	T		T
Al	"	<0.035	E	E	0.036	E
Ca	"	158	R	R	235	R
Cd	"	<0.002			<0.002	
Cr	"	<0.003	F	F	<0.003	F
Cu	"	<0.01	R	R	<0.01	R
			O	O		O
Fe	"	1.1	Z	Z	<0.02	Z
Hg	μg/L	<0.20	E	E	<0.20	E
K	mg/L	2	N	N	<1	N
Mg	"	94			95	
Mn	"	0.218			1.07	
Na	"	28			128	
Ni	"	<0.002			<0.002	
Pb	"	0.05			0.05	
Zn	"	<0.01			0.02	

<sup>1</sup>Limit of quantitation (LOQ) instead of MDL was used as reporting limit.

<sup>2</sup>pH analyzed beyond recommended holding time of 15 minutes.

TABLE 7: ANALYSIS<sup>1</sup> OF WATER FROM LYSIMETERS  
L-1N-1 THROUGH L-3N AT THE HARLEM AVENUE  
SOLIDS MANAGEMENT AREA SAMPLED ON DECEMBER 29, 2008

Parameter	Unit	Lysimeter No.				
		L-1N-1	L-2	L-2N	L-3	L-3N
pH <sup>2</sup>		7.5	7.0	7.4	7.3	7.4
EC	mS/m	267	279	290	228	202
Total Dissolved Solids	mg/L	1,444	2,472	3,300	1,536	1,488
Total Diss. Org. Carbon	"	37	3	5	6	11
Cl <sup>-</sup>	"	103	322	47	121	104
SO <sub>4</sub> <sup>=</sup>	"	<2	875	1,521	197	130
TKN	"	9	0.9	1	1	2
NH <sub>3</sub> -N	"	5	<0.1	<0.1	<0.1	0.5
NO <sub>2</sub> + NO <sub>3</sub> -N	"	<0.1	0.6	0.3	0.5	<0.1
Total P	"	<0.25	<0.25	<0.25	<0.25	<0.25
Alkalinity as CaCO <sub>3</sub>	"	1,274	478	682	968	992
Al	"	0.055	0.054	0.068	0.041	0.040
Ca	"	324	459	535	261	271
Cd	"	<0.002	<0.002	<0.002	<0.002	<0.002
Cr	"	<0.003	<0.003	<0.003	<0.003	<0.003
Cu	"	<0.01	<0.01	<0.01	<0.01	<0.01
Fe	"	0.21	<0.02	0.12	0.22	11
Hg	μg/L	<0.20	<0.20	<0.20	<0.20	<0.20
K	mg/L	4	<1	3	<1	2
Mg	"	192	119	229	110	115
Mn	"	0.404	0.095	1.38	1.29	0.746
Na	"	51	86	24	109	42
Ni	"	<0.002	<0.002	<0.002	<0.002	<0.002
Pb	"	0.05	0.05	0.05	<0.02	<0.02
Zn	"	<0.01	<0.01	0.03	<0.01	0.02

<sup>1</sup>Limit of quantitation (LOQ) instead of MDL was used as reporting limit.

<sup>2</sup>pH analyzed beyond recommended holding time of 15 minutes.

TABLE 8: ANALYSIS<sup>1</sup> OF MONTHLY COMPOSITED DIGESTED  
BIOSOLIDS PLACED IN THE HARLEM AVENUE  
SOLIDS MANAGEMENT DRYING AREA DURING NOVEMBER 2008

Parameter	Unit	Concentration
pH		8.3
Total Solids	%	21.1
Total Volatile Solids <sup>2</sup>	%	42.2
TKN	mg/kg	40,972
NH <sub>3</sub> -N	„	12,283

<sup>1</sup>Values for one samples only.

<sup>2</sup>Total volatile solids as a percentage of total solids.

TABLE 9: ANALYSIS<sup>1</sup> OF MONTHLY COMPOSITED DIGESTED  
BIOSOLIDS PLACED IN THE HARLEM AVENUE  
SOLIDS MANAGEMENT DRYING AREA DURING DECEMBER 2008

Parameter	Unit	Concentration
pH		8.0
Total Solids	%	26.4
Total Volatile Solids <sup>2</sup>	%	55.7
TKN	mg/kg	31,650
NH <sub>3</sub> -N	„	7,230

<sup>1</sup>Values are the means of six samples.

<sup>2</sup>Total volatile solids as a percentage of total solids.

TABLE 10: ANALYSIS<sup>1</sup> OF MONTHLY COMPOSITED PROCESSED DIGESTED BIOSOLIDS REMOVED FROM THE HARLEM AVENUE SOLIDS MANAGEMENT DRYING AREA DURING OCTOBER 2008

Parameter	Unit	Concentration
pH		6.1
Total Solids	%	59.4
Total Volatile Solids <sup>2</sup>	%	39.7
TKN	mg/kg	23,486
NH <sub>3</sub> -N	"	2,587
Total P	"	21,339
Al	"	19,215
As	"	<10
Ca	"	43,195
Cd	"	4
Cr	"	180
Cu	"	442
Fe	"	17,403
Hg	"	1.2
K	"	1,915
Mg	"	18,766
Mn	"	564
Mo	"	14
Na	"	<800
Ni	"	49
Pb	"	158
Se	"	13
Zn	"	960

<sup>1</sup>Values are the means of two samples.

<sup>2</sup>Total volatile solids as a percentage of total solids.

TABLE 11: ANALYSIS<sup>1</sup> OF MONTHLY COMPOSITED PROCESSED DIGESTED BIOSOLIDS REMOVED FROM THE HARLEM AVENUE SOLIDS MANAGEMENT DRYING AREA DURING NOVEMBER 2008

Parameter	Unit	Concentration
pH		6.7
Total Solids	%	56.4
Total Volatile Solids <sup>2</sup>	%	37.3
TKN	mg/kg	25,196
NH <sub>3</sub> -N	"	2,739
Total P	"	19,329
Al	"	19,744
As	"	<10
Ca	"	43,163
Cd	"	4
Cr	"	193
Cu	"	411
Fe	"	17,912
Hg	"	1.1
K	"	2,582
Mg	"	19,195
Mn	"	575
Mo	"	14
Na	"	<800
Ni	"	46
Pb	"	139
Se	"	14
Zn	"	872

<sup>1</sup>Values are the means of four samples.

<sup>2</sup>Total volatile solids as a percentage of total solids.