Section 4

Results and Recommendations

TEST RESULTS

Results of the tests were reviewed to detect changes between upstream and downstream sampling points and also against generally accepted standards.

Results by Site

The following tables identify the results for each site for samples collect on September 26th, 2013.

Half Day_N						
Parameter	Accepted Limits	Test Results		Change	Within Range	Recommendation
		2012	2013			
Ammonia (mg/L)	15.0	< 0.07	0.11	Increase	Y	Continue annual monitoring
Chloride (mg/L)	500.0	283.0	329.0	Increase	Y	Continue annual monitoring
Fluoride (mg/L)	1.4	<0.5	<0.5	Stable	Y	Continue annual monitoring
BOD (mg/L)	< 8.0	<5.0	<5.0	Stable	Y	Continue annual monitoring
Phenolics (mg/L)	0.100	<0.005	<0.01	Increase	Y	Continue annual monitoring
Total Phosphorus (mg/L)	0.05	0.11	0.08	Decrease	N	Continue annual monitoring
TSS (mg/L)	15.0-30.0	7.0	2.0	Decrease	Y	Continue annual monitoring
TKN (mg/L)	< 20.0	0.6	0.975	Increase	Y	Continue annual monitoring
Potassium (mg/L)	20.0	2.6	1.46	Decrease	Y	Continue annual monitoring
Temperature (°F)	≤ 90.0 Apr-Nov	45.9	77.8	Increase	Y	Continue annual monitoring
pH	6.5 - 9.0	8.1	9.6	Increase	N	Continue annual monitoring

Duffy						
Parameter	Accepted Limits	Test Results		Change	Within Range	Recommendation
		2012	2013			
Ammonia (mg/L)	15.0	<0.07	1.17	Increase	Y	Continue annual monitoring
Chloride (mg/L)	500.0	424.0	382.0	Decrease	Y	Continue annual monitoring
Fluoride (mg/L)	1.4	<0.5	<0.5	Stable	Y	Continue annual monitoring
BOD (mg/L)	< 8.0	<5.0	<5.0	Stable	Y	Continue annual monitoring
Phenolics (mg/L)	0.100	<0.005	<0.01	Increase	Y	Continue annual monitoring
Total Phosphorus (mg/L)	0.05	0.07	<0.05	Decrease	Y	Continue annual monitoring
TSS (mg/L)	15.0-30.0	6.0	5.0	Decrease	Y	Continue annual monitoring
TKN (mg/L)	< 20.0	0.7	0.35	Decrease	Y	Continue annual monitoring
Potassium (mg/L)	20.0	4.6	4.7	Increase	Y	Continue annual monitoring
Temperature (°F)	≤ 90.0 Apr-Nov	47.5	69.6	Increase	Y	Continue annual monitoring
pH	6.5 - 9.0	8.6	8.2	Decrease	Y	Continue annual monitoring

Chicago_S						
Parameter	Accepted Limits	Test Results		Change	Within Range	Recommendation
		2012	2013			
Ammonia (mg/L)	15.0	0.10	0.74	Increase	Y	Continue annual monitoring
Chloride (mg/L)	500.0	248.0	326.0	Increase	Y	Continue annual monitoring
Fluoride (mg/L)	1.4	<0.5	<0.5	Stable	Y	Continue annual monitoring
BOD (mg/L)	< 8.0	6.0	8.1	Increase	N	Continue annual monitoring
Phenolics (mg/L)	0.100	0.006	<0.01	Stable	Y	Continue annual monitoring
Total Phosphorus (mg/L)	0.05	0.30	0.315	Increase	N	Continue annual monitoring
TSS (mg/L)	15.0-30.0	52.0	108	Increase	N	Continue annual monitoring
TKN (mg/L)	< 20.0	1.1	2.23	Increase	Y	Continue annual monitoring
Potassium (mg/L)	20.0	7.2	4.4	Decrease	Y	Continue annual monitoring
Temperature (°F)	≤ 90.0 Apr-Nov	44.6	61.5	Increase	Y	Continue annual monitoring
pH	6.5 - 9.0	8.0	7.6	Decrease	Y	Continue annual monitoring

Waukegan						
Parameter	Accepted Limits	Test Results		Change	Within Range	Recommendation
		2012	2013			
Ammonia (mg/L)	15.0	<0.07	0.22	Increase	Y	Continue annual monitoring
Chloride (mg/L)	500.0	338.0	298.0	Decrease	Y	Continue annual monitoring
Fluoride (mg/L)	1.4	<0.5	<0.5	Stable	Y	Continue annual monitoring
BOD (mg/L)	< 8.0	<5.0	6.25	Increase	Y	Continue annual monitoring
Phenolics (mg/L)	0.100	<0.005	0.016	Increase	Y	Continue annual monitoring
Total Phosphorus (mg/L)	0.05	0.09	0.207	Increase	N	Continue annual monitoring
TSS (mg/L)	15.0-30.0	32.0	100	Increase	N	Continue annual monitoring
TKN (mg/L)	< 20.0	0.7	2.09	Increase	Y	Continue annual monitoring
Potassium (mg/L)	20.0	5.7	6.13	Increase	Y	Continue annual monitoring
Temperature (°F)	≤ 90.0 Apr-Nov	46.0	75.5	Increase	Y	Continue annual monitoring
pH	6.5 - 9.0	8.1	7.1	Decrease	Y	Continue annual monitoring

ChicagoRiv_N						
Parameter	Accepted Limits	Test Results		Change	Within Range	Recommendation
		2012	2013			
Ammonia (mg/L)	15.0	<0.07	<0.06	Stable	Y	Continue annual monitoring
Chloride (mg/L)	500.0	308.0	317.0	Increase	Y	Continue annual monitoring
Fluoride (mg/L)	1.4	<0.5	<0.5	Stable	Y	Continue annual monitoring
BOD (mg/L)	< 8.0	<4.0	<5.0	Stable	Y	Continue annual monitoring
Phenolics (mg/L)	0.100	<0.005	<0.01	Stable	Y	Continue annual monitoring
Total Phosphorus (mg/L)	0.05	0.12	0.289	Increase	N	Continue annual monitoring
TSS (mg/L)	15.0-30.0	<3.36	194	Increase	N	Continue annual monitoring
TKN (mg/L)	< 20.0	0.6	1.25	Increase	Y	Continue annual monitoring
Potassium (mg/L)	20.0	4.9	5.07	Increase	Y	Continue annual monitoring
Temperature (°F)	≤ 90.0 Apr-Nov	42.4	62.9	Increase	Y	Continue annual monitoring
pH	6.5 - 9.0	7.8	7.7	Decrease	Y	Continue annual monitoring

ChicagoRiv_NB						
Parameter	Accepted Limits	Test Results		Change	Within Range	Recommendation
		2012	2013			
Ammonia (mg/L)	15.0	<0.07	<0.06	Stable	Y	Continue annual monitoring
Chloride (mg/L)	500.0	202.0	287.0	Increase	Y	Continue annual monitoring
Fluoride (mg/L)	1.4	<0.5	0.53	Increase	Y	Continue annual monitoring
BOD (mg/L)	< 8.0	<3.0	<3.0	Stable	Y	Continue annual monitoring
Phenolics (mg/L)	0.100	<0.005	<0.01	Stable	Y	Continue annual monitoring
Total Phosphorus (mg/L)	0.05	0.10	0.208	Increase	N	Continue annual monitoring
TSS (mg/L)	15.0-30.0	<3.36	5.5	Increase	Y	Continue annual monitoring
TKN (mg/L)	< 20.0	0.8	1.53	Increase	Y	Continue annual monitoring
Potassium (mg/L)	20.0	5.3	4.43	Decrease	Y	Continue annual monitoring
Temperature (°F)	≤ 90.0 Apr-Nov	58.6	61.8	Increase	Y	Continue annual monitoring
pH	6.5 - 9.0	8.0	8.3	Increase	Y	Continue annual monitoring

Results by Parameter

The following tables identify the results for each parameter.

Ammonia (15.0 mg/L)				
Site	Test Results		Change	Within Range
	2012	2013		
Half Day_N	< 0.07	0.11	Increase	Y
Duffy	< 0.07	1.17	Increase	Y
Chicago_S	0.10	0.74	Increase	Y
Waukegan	< 0.07	0.22	Increase	Y
ChicagoRiv_N	< 0.07	<0.06	Stable	Y
ChicagoRiv_NB	< 0.07	<0.06	Stable	Y

Chloride (500.0 mg/L)				
Site	Test Results		Change	Within Range
	2012	2013		
Half Day_N	283.0	329.0	Increase	Y
Duffy	424.0	382.0	Decrease	Y
Chicago_S	248.0	326.0	Increase	Y
Waukegan	338.0	298.0	Decrease	Y
ChicagoRiv_N	308.0	317.0	Increase	Y
ChicagoRiv_NB	202.0	287.0	Increase	Y

Fluoride (1.4 mg/L)				
Site	Test Results		Change	Within Range
	2012	2013		
Half Day_N	<0.5	0.14	Stable	Y
Duffy	<0.5	0.26	Stable	Y
Chicago_S	<0.5	0.29	Stable	Y
Waukegan	<0.5	0.22	Stable	Y
ChicagoRiv_N	<0.5	0.49	Stable	Y
ChicagoRiv_NB	<0.5	0.53	Increase	Y

Biochemical Oxygen Demand (< 8.0mg/L)				
Site	Test Results		Change	Within Range
	2012	2013		
Half Day_N	<5.0	2.9	Stable	Y
Duffy	<5.0	3.3	Stable	Y
Chicago_S	6.0	8.1	Increase	N
Waukegan	<5.0	6.25	Increase	Y
ChicagoRiv_N	<4.0	<5.0	Stable	Y
ChicagoRiv_NB	<3.0	<3.0	Stable	Y

Phenolics (0.100 mg/L)				
Site	Test Results		Change	Within Range
	2012	2013		
Half Day_N	<0.005	<0.01	Increase	Y
Duffy	<0.005	<0.01	Increase	Y
Chicago_S	0.006	<0.01	Increase	Y
Waukegan	<0.005	0.016	Increase	Y
ChicagoRiv_N	<0.005	<0.01	Increase	Y
ChicagoRiv_NB	<0.005	<0.01	Increase	Y

Total Phosphorous (0.05 mg/L)				
Site	Test Results		Change	Within Range
	2012	2013		
Half Day_N	0.11	0.082	Decrease	N
Duffy	0.07	<0.05	Decrease	Y
Chicago_S	0.30	0.315	Increase	N
Waukegan	0.09	0.207	Increase	N
ChicagoRiv_N	0.12	0.289	Increase	N
ChicagoRiv_NB	0.10	0.208	Increase	N

Total Suspended Solids (15.0-30.0 mg/L)				
Site	Test Results		Change	Within Range
	2012	2013		
Half Day_N	7.0	2.0	Decrease	Y
Duffy	6.0	5.0	Decrease	Y
Chicago_S	52.0	108.0	Increase	N
Waukegan	32.0	100.0	Increase	N
ChicagoRiv_N	<3.36	194.0	Increase	N
ChicagoRiv_NB	<3.36	5.5	Increase	Y

Total Kjeldahl Nitrogen (< 20.0 mg/L)				
Site	Test Results		Change	Within Range
	2012	2013		
Half Day_N	0.6	0.98	Increase	Y
Duffy	0.7	0.35	Decrease	Y
Chicago_S	1.1	2.23	Increase	Y
Waukegan	0.7	2.1	Increase	Y
ChicagoRiv_N	0.6	1.25	Increase	Y
ChicagoRiv_NB	0.8	1.53	Increase	Y

Potassium (20.0 mg/L)				
Site	Test Results		Change	Within Range
	2012	2013		
Half Day_N	2.6	1.46	Decrease	Y
Duffy	4.6	4.68	Increase	Y
Chicago_S	7.2	4.4	Decrease	Y
Waukegan	5.7	6.13	Increase	Y
ChicagoRiv_N	4.9	5.07	Increase	Y
ChicagoRiv_NB	5.3	4.43	Decrease	Y

Temperature (≤ 60.0°F Dec-Mar, ≤ 90.0°F Apr-Nov) *Samples collected on September 26, 2013*				
Site	**Test Results**		**Change**	**Within Range**
	2012	**2013**		
Half Day_N	45.9	77.8	Increase	Y
Duffy	47.5	69.6	Increase	Y
Chicago_S	44.6	61.5	Increase	Y
Waukegan	46.0	75.5	Increase	Y
ChicagoRiv_N	42.4	62.9	Increase	Y
ChicagoRiv_NB	58.6	61.8	Increase	Y

pH (6.5 - 9.0)				
Site	**Test Results**		**Change**	**Within Range**
	2012	**2013**		
Half Day_N	8.1	9.6	Increase	N
Duffy	8.6	8.2	Decrease	Y
Chicago_S	8.0	7.6	Decrease	Y
Waukegan	8.1	7.1	Decrease	Y
ChicagoRiv_N	7.8	7.7	Decrease	Y
ChicagoRiv_NB	8.0	8.3	Increase	Y

Graphs depicting annual results for each parameter by site are included in the Appendix.

RECOMMENDATIONS

The Village should continue to compare test results each year to determine if the BMPs performed by the Village are improving water quality in the receiving waters within the Village of Bannockburn. We recommend using stormwater Best Management Practices (BMPs) as outlined in the Village's Stormwater Management Master Program in order to reduce adverse effects of stormwater runoff on water quality

The Village should also make an effort to cooperate with upstream neighbors with the purpose of improving upstream water quality. Additional educational material should be provided to the residents by the Village.

The table below summarizes the results of the Village of Bannockburn that were above the Water Quality Standards (WQS) limit.

Site	Parameter of Concern	WQS Limit	Test Results	
			2012	2013
Half Day_N	Total Phosphorus	0.05 mg/L	0.11 mg/L	0.08 mg/L
	pH	6.5 - 9.0	8.1	9.6
Chicago_S	BOD	<8.0 mg/L	6.0 mg/L	8.1 mg/L
	Total Phosphorus	0.05 mg/L	0.30 mg/L	0.32 mg/L
	TSS	15.0 – 30.0 mg/L	52.0 mg/L	108 mg/L
Waukegan	Total Phosphorus	0.05 mg/L	0.09 mg/L	0.21 mg/L
	TSS	15.0 – 30.0 mg/L	32.0 mg/L	100 mg/L
ChicagoRiv_N	Total Phosphorus	0.05 mg/L	0.12 mg/L	0.3 mg/L
	TSS	15.0 – 30.0 mg/L	<3.36 mg/L	194 mg/L
ChicagoRiv_NB	Total Phosphorus	0.05 mg/L	0.10 mg/L	0.21 mg/L
*Grey highlight indicates results not within the WQS Limits				

Half Day_N: The level of total phosphorus at the Half Day_N site decreased slightky from 0.11 mg/L in 2012 to 0.08 mg/L in 2013. Though the level decreased, it is still above the WQS limit. The pH of this site is relatively high, increasing from 8.1 to 9.6. This site is not a concern, but should continue to be monitored yearly to ensure that the level reaches the standard limit.

Chicago_S: This site had increased levels of biochemical oxygen demand (BOD), total phosphorus, and total suspended solids (TSS). BOD and total phosphorus increased slightly over the past year; however, the level of TSS increased dramatically, from 52.0 mg/L in 2012 to 108 mg/L in 2013. **We would recommend additional testing at this site for TSS.**

Waukegan: The levels of total phosphorus and TSS increased at the Waukegan site from 2012 to 2013. TSS is of greater concern, having increased from 32.0 mg/L to 100 mg/L over the past year. **We would recommend additional testing at this site for TSS.**

ChicagoRiv_N: The levels of total phosphorus and TSS increased at the ChicagoRiv_N site from 2012 to 2013. TSS is of greater concern, having increased from <3.360 mg/L to 194 mg/L over the past year. **We would recommend additional testing at this site for TSS.**

ChicagoRiv_NB: The level of total phosphorus increase at the ChicagoRiv_NB site from 0.10 mg/L in 2012 to 0.21 mg/L in 2013. Additional testing is not recommended at this time, however the site should continue to be monitored on a yearly basis.

The accepted limit for **Total Phosphorus** is **0.05 mg/L**. High levels of phosphorus can be caused by farm soils and certain pesticides washing into waterways in the form of run-off. Excess phosphates may cause disproportionate growth in algae and aquatic plants.

The accepted range for **pH** is **6.5 – 9.** pH is a reasonably good indicator for liquid wastes from industries, which can have very high or low pH (ranging from 3.0 to 12.0). The pH of residential wash water tends to be rather basic (pH of 8.0 or 9.0).

The accepted limit for **TSS** is **15.0-30.0 mg/L**. High levels of TSS can be caused by fast running water carrying more particles and sediment, not allowing them to settle. This increase could be attributed to increased frequency and intensity of rainstorms and flooding events prior to when the sample was taken. During a storm event, soil and debris from streets and industrial, commercial and residential areas are washed into the sewer, draining directly to creeks and rivers.

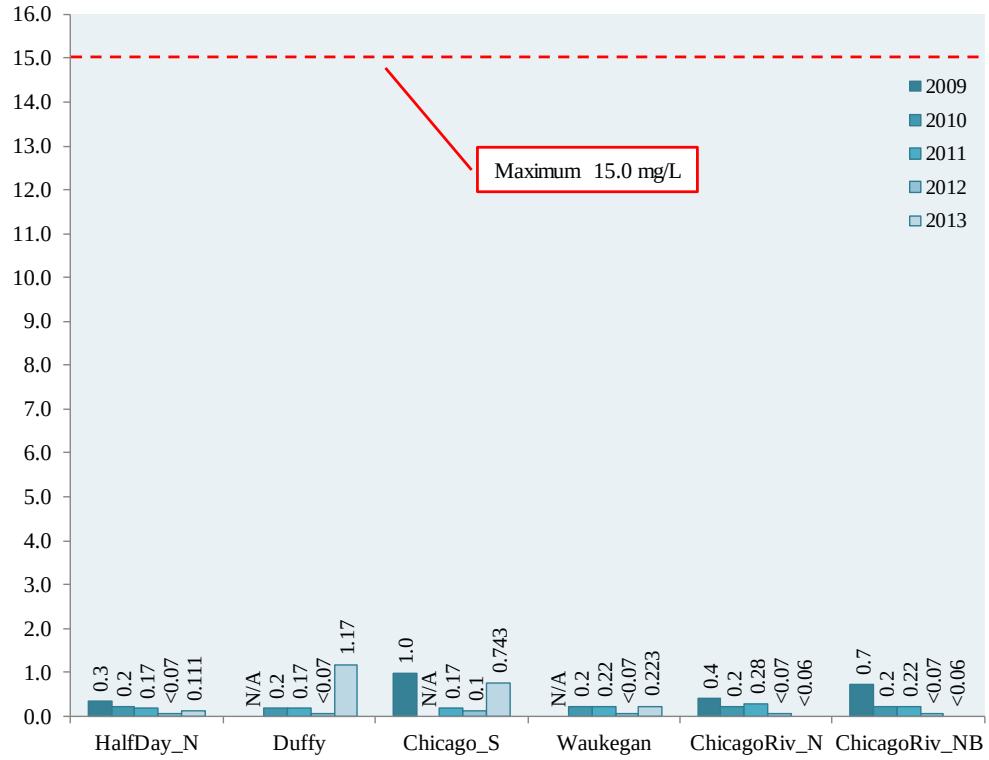
The accepted limit for **BOD** is **<8.0 mg/L**. BOD is the amount of oxygen consumed by microorganisms in decomposing organic matter in stream water. Sources of BOD include leaves, wood debris, decaying plants and animals, effluent form wastewater treatment plants, food processing plants, septic systems, and stormwater runoff. Some or all of these factors can cause an increase in BOD concentrations.

Section 5

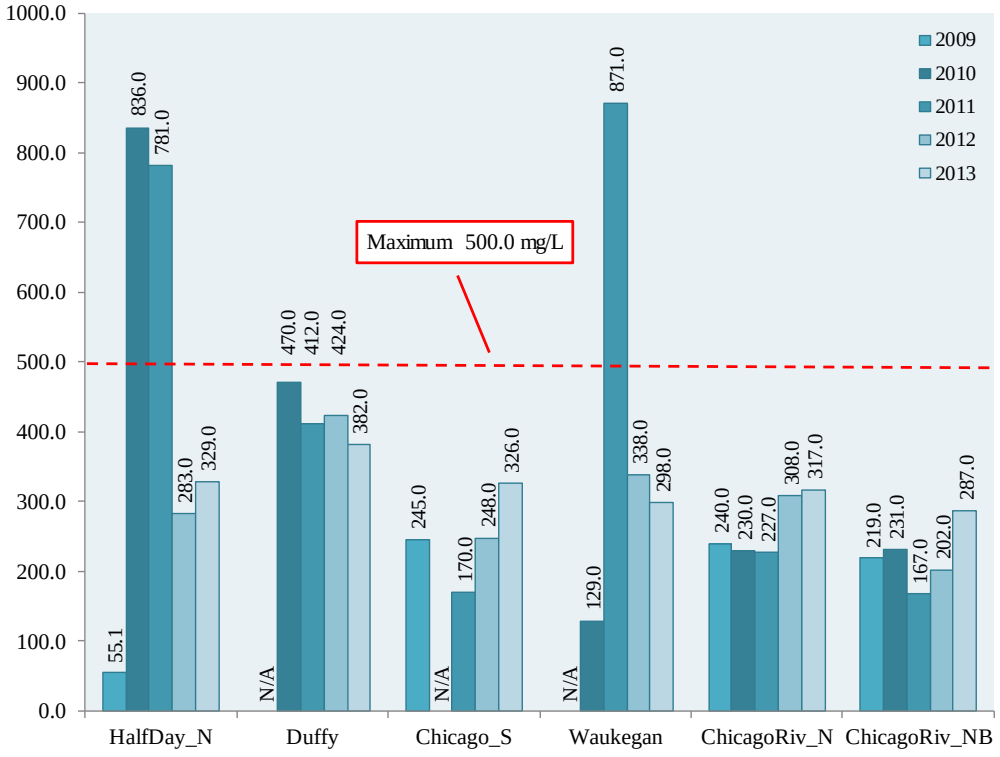
Appendix

Graphs for each parameter are included on the following pages, identifying the results for each site by year.

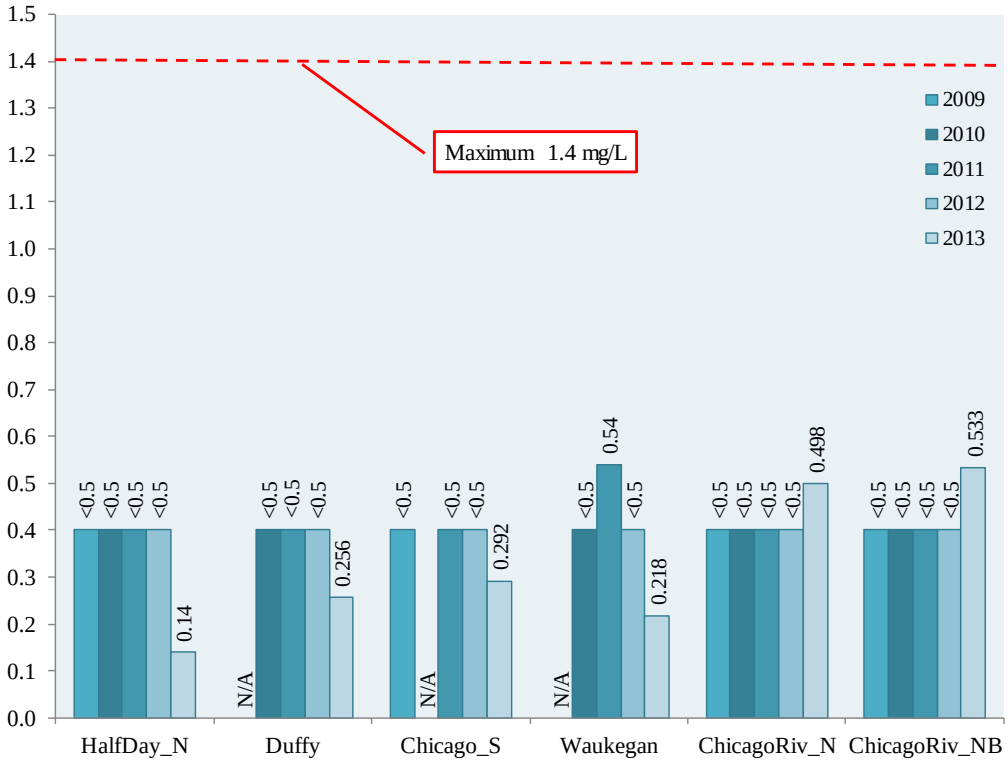
The report conducted by Environmental Monitoring and Technologies, Inc. is also included.



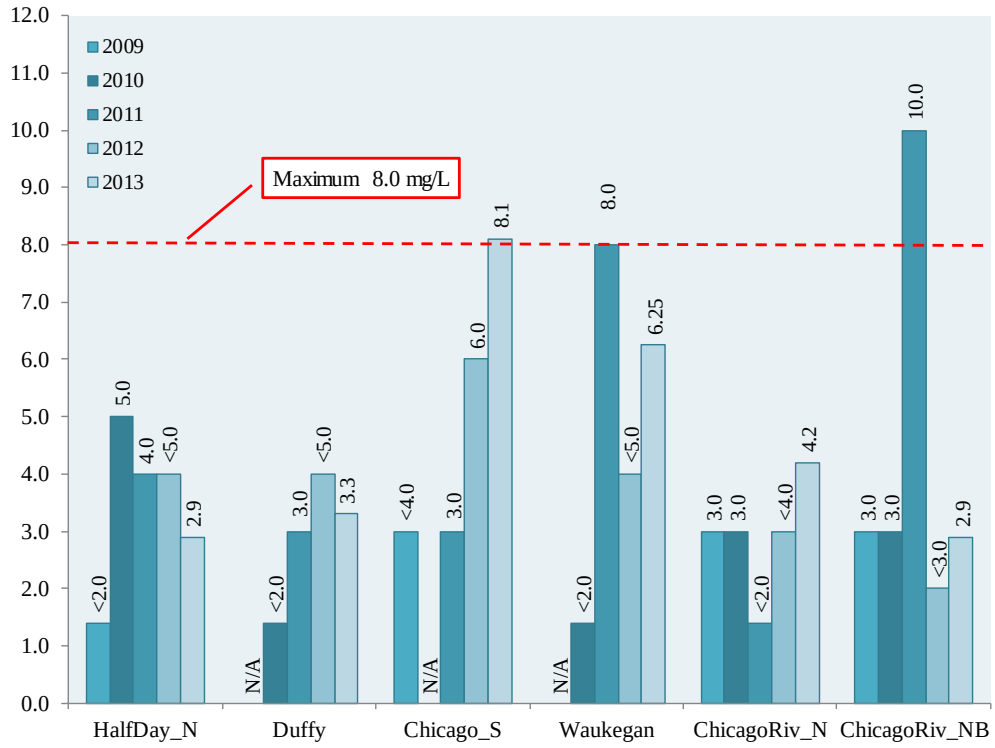
Ammonia (mg/L)



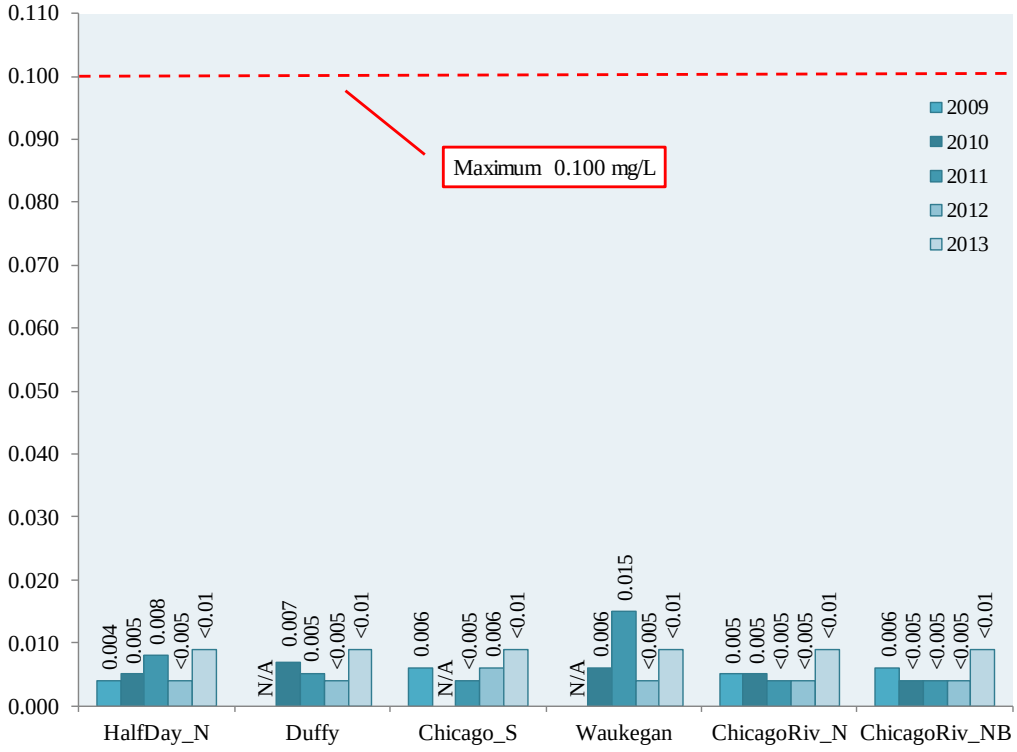
Chloride (mg/L)



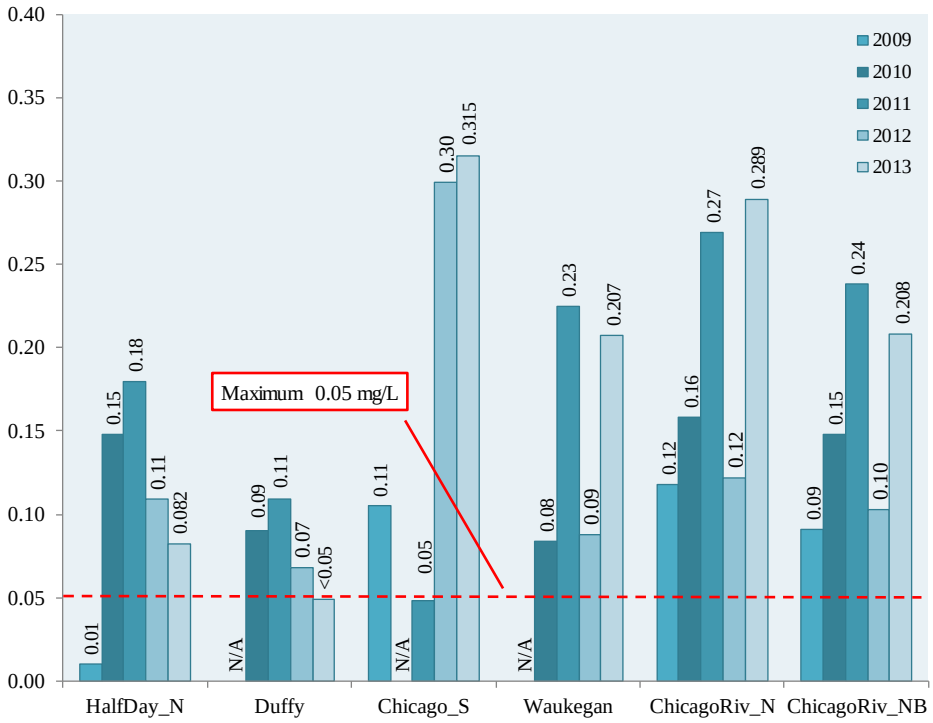
Fluoride (mg/L)



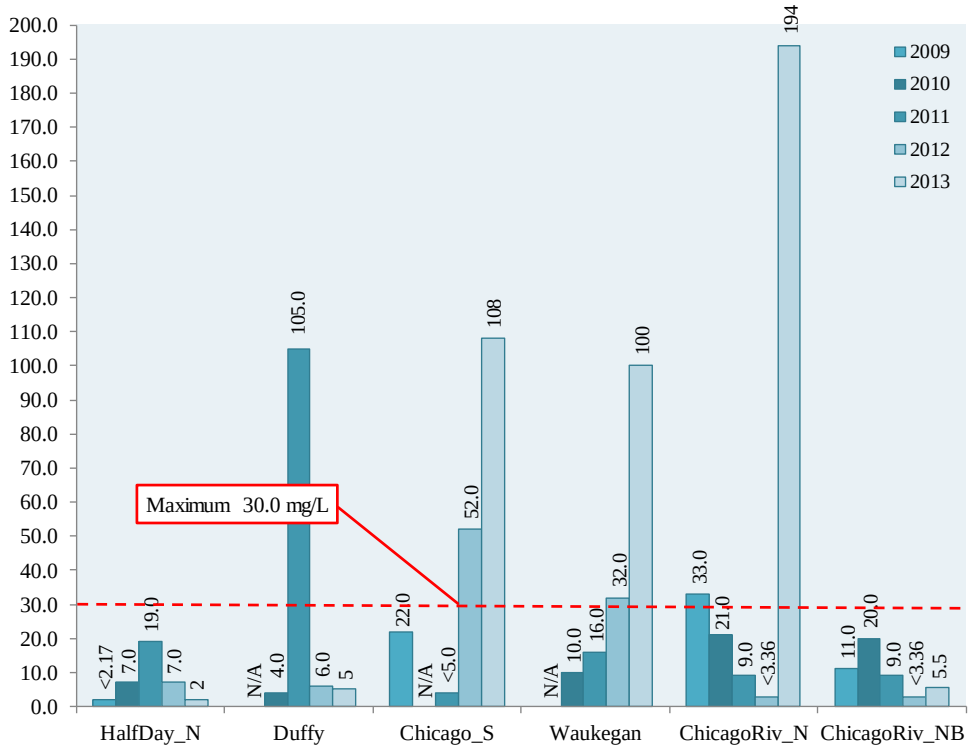
Biochemical Oxygen Demand (mg/L)



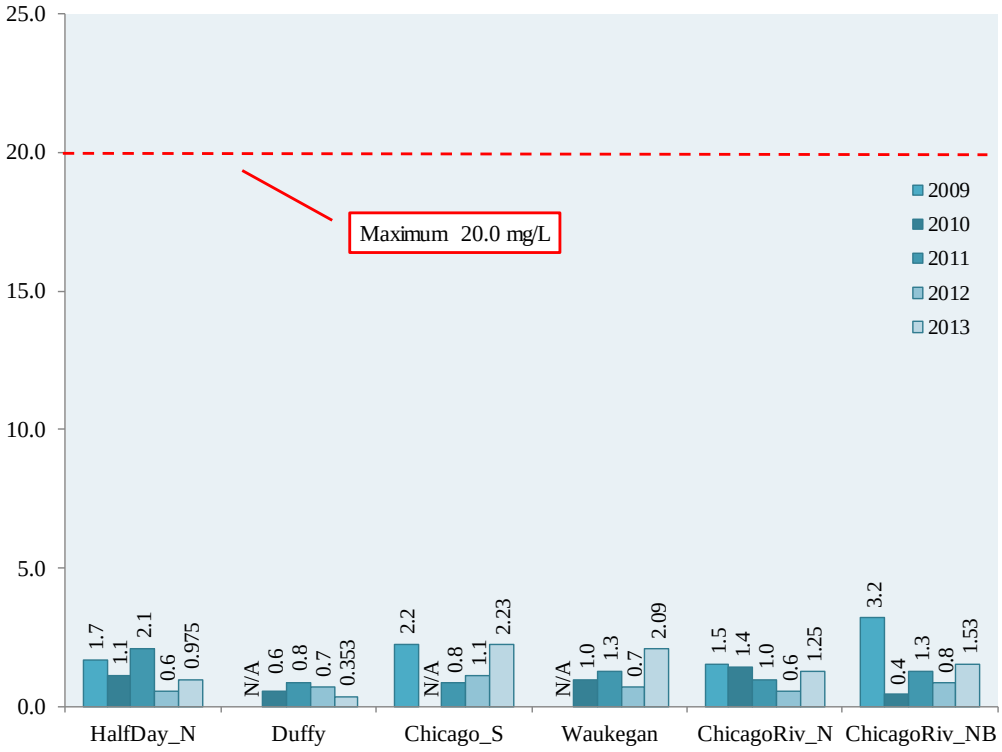
Phenolics (mg/L)



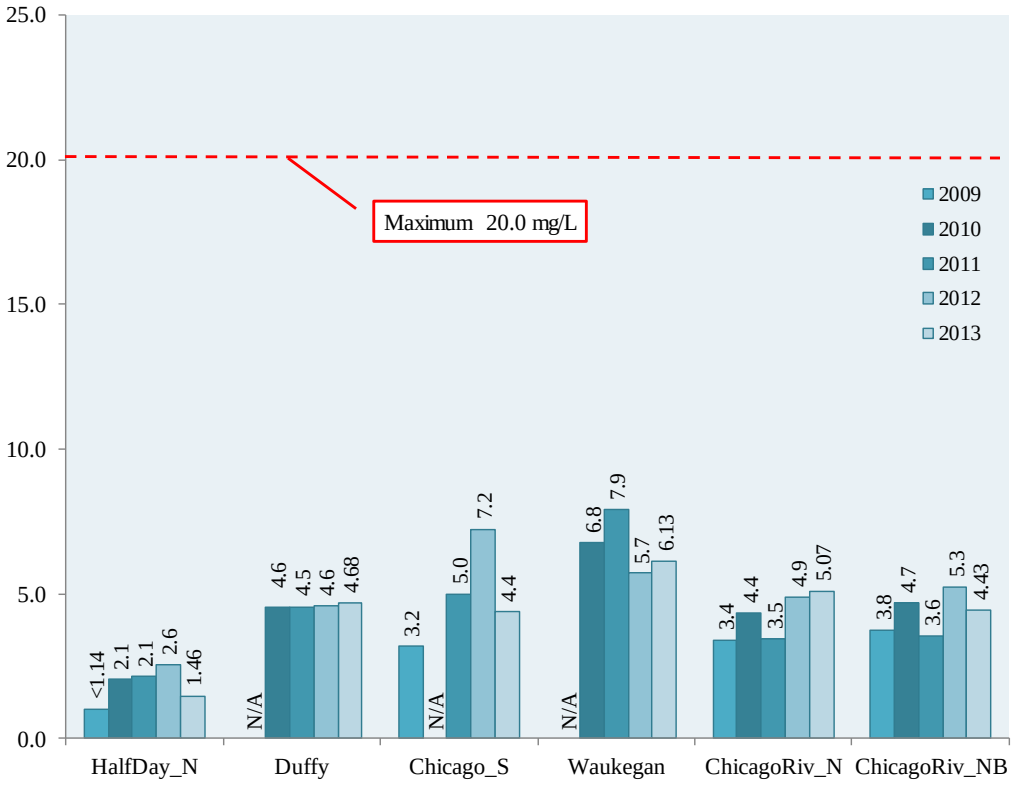
Total Phosphorus (mg/L)



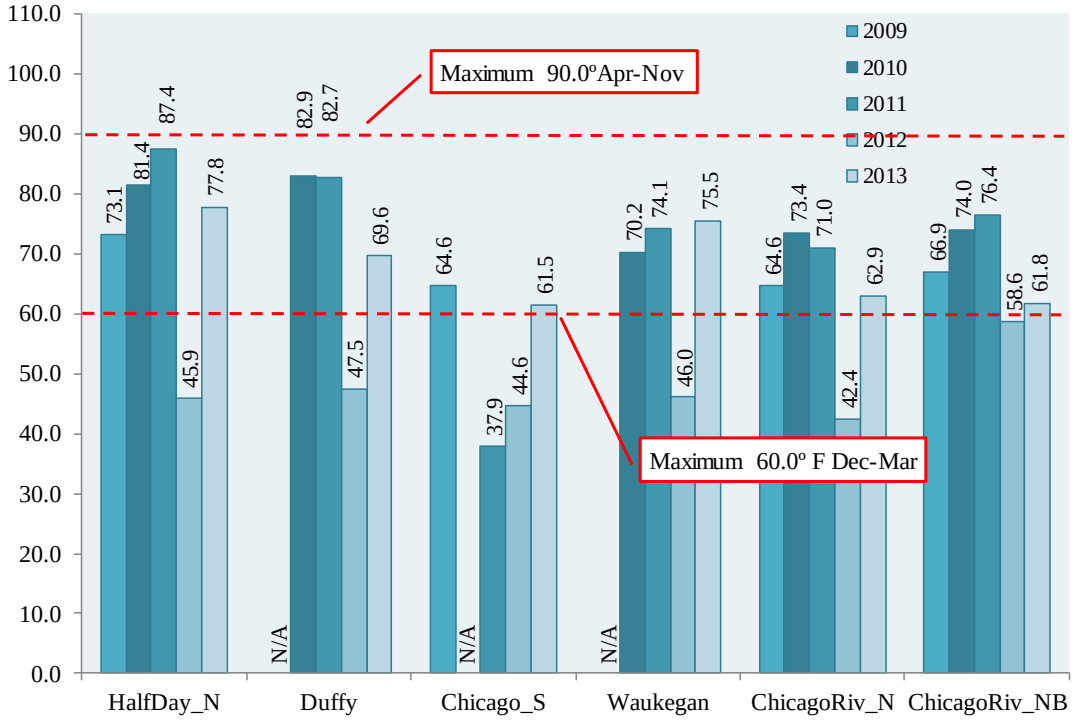
Total Suspended Solids (mg/L)



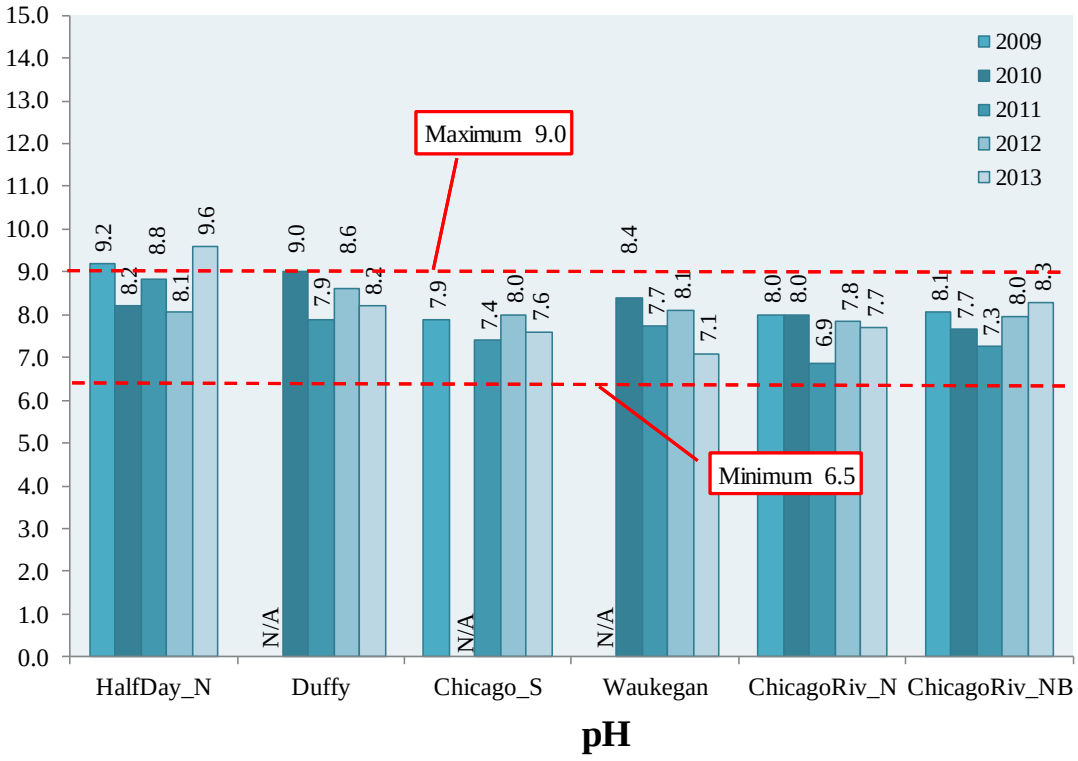
Total Kjeldahl Nitrogen (mg/L)



Potassium (mg/L)



Temperature (ºF)


15.0
14.0
13.0
12.0
11.0
10.0
9.0
8.0
7.0
6.0
5.0
4.0
3.0
2.0
1.0
0.0
2009
2010
2011
2012
2013
Maximum 9.0
Minimum 6.5
9.2
8.2
8.8
8.1
9.6
N/A
9.0
7.9
8.6
8.2
7.9
N/A
7.4
8.0
7.6
N/A
8.4
7.7
8.1
7.1
8.0
8.0
6.9
7.8
7.7
8.1
7.7
7.3
8.0
8.3
HalfDay_N
Duffy
Chicago_S
Waukegan
ChicagoRiv_N
ChicagoRiv_NB
pH

ENVIRONMENTAL MONITORING AND TECHNOLOGIES, INC.

8100 North Austin • Morton Grove, IL 60053-3203
847.967.6666 • 800.246.0663 • fax: 847.967.6735 • www.emt.com

Irma Terry
Gewalt Hamilton Associates
850 Forest Edge Drive
Vernon Hills, IL 60060

October 08, 2013

RE Village of Bannokburn

Lab Orders:
13090843

Dear Mrs. Irma Terry:

Enclosed are the analytical reports for the EMT Lab Order listed. Also included with this analytical report is a copy of the chain of custody associated with these samples. If you have any questions, please contact me at 847-967-6666.

Sincerely,

Judy Gucius
Project Manager

Approved by,

Marilyn Krueding
Laboratory Director

This Report Contains 11 pages

State of Illinois, NELAC Accredited Lab. No. 100256
State of Wisconsin, WDNR Accredited Lab No. 999888890

ENVIRONMENTAL MONITORING AND TECHNOLOGIES, INC.

8100 North Austin • Morton Grove, IL 60053-3203
847.967.6666 • 800.246.0663 • fax: 847.967.6735 • www.emt.com

CLIENT: Gewalt Hamilton Associates

Date: *10/8/2013*

Project: Village of Bannokburn

Lab Order: 13090843

CASE NARRATIVE

Unless otherwise noted, samples were analyzed using the methods outlined in the following references:
Test Methods for Evaluating Solid Waste, Physical/Chemical Methods, SW846, 3rd Edition

Unless otherwise noted, all method blanks, laboratory spikes, and/or matrix spikes met quality assurance objectives.

Sample results relate only to the analytes of interest tested and to the sample received at the laboratory.

All results are reported on a wet weight basis, unless otherwise noted. Dry weight adjusted results, reporting limits, method detection limits and dilution factors are indicated by the notation "dry" in the Units column. If present, a dilution factor will adjust the method detection limits and reporting limits.

The test results contained in this report meet all of the requirements of NELAC. Accreditation by the State of Illinois or Wisconsin is not an endorsement or a guarantee of the validity of data generated. For specific information regarding EMT's scope of accreditation , please contact your EMT project manager.

The Reporting Limit listed on the Report of Laboratory Analysis is EMT's reporting limit for the analyte reported. For most test methods this reporting limit is primarily based upon the lowest point in the calibration curve.

Analyst's initials of "OUT" indicate that the analyte was analyzed by a subcontracted laboratory.

Method References:
SW=USEPA, Test Methods for Evaluating Solid Waste, SW-846.
E=USEPA Methods for the Determination of Inorganic Substances in Environmental Samples; Methods for Chemical Analysis of Water and Wastes; Methods for Organic Chemical Analysis of Municipal and Industrial Wastewater, 40 CFR Part 136, App A; methods for the Determination of Metals in Environmental Samples; Methods for the Determination of Organic Compounds in Drinking Water.
SM= APHA, Standard Methods for the Examination of Water and Wastewater.
D=ASTM, Annual Book of Standards

Batch numbers starting with a letter indicate an analytical batch while those that are exculsively numerals indicate a preparation batch.

ENVIRONMENTAL MONITORING AND TECHNOLOGIES, INC.

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847.967.6666 • 800.246.0663 • fax: 847.967.6735 • www.emt.com

CLIENT: Gewalt Hamilton Associates

Date: *10/8/2013*

Project: Village of Bannokburn

Lab Order: 13090843

CASE NARRATIVE

Analytical Comments for METHOD 5210_BOD_W, MB-R192329: The average blank recovery of 0.230 is above the laboratory control limit of 0.20. The seed correction value of 0.570 is outside the lab control range of 0.6 to 1.0.

ENVIRONMENTAL MONITORING AND TECHNOLOGIES, INC.

8100 North Austin • Morton Grove, IL 60053-3203
847.967.6666 • 800.246.0663 • fax: 847.967.6735 • www.emt.com

Report of Laboratory Analysis

CLIENT: Gewalt Hamilton Associates
Lab Order: 13090843
Project: Village of Bannokburn
Lab ID: 13090843-01

Client Sample ID: CHICAGO RIVER NB
Report Date: 10/8/2013
Collection Date: 9/26/2013 3:00:00 PM
Matrix: Wastewater

Analyses	Result	EMT Reporting Limit		Units	Date Analyzed	Batch	Analyst
Ammonia as N		**Method:**	**SM4500-NH3-B-C**				
Nitrogen, Ammonia (As N)	< 0.0600	0.0600		mg/L	10/5/13 11:00	85149	TTT
Anions by Ion Chromatography		**Method:**	**E300**				
Chloride	287	20.0		mg/L	9/30/13	R192322	GSB
Fluoride	0.533	0.500		mg/L	9/30/13	R192322	GSB
BOD, 5 Day, 20°C		**Method:**	**SM5210 B**				
Biochemical Oxygen Demand	2.90	2.00		mg/L	9/27/13 12:39	R192329	KK1
Phenolics		**Method:**	**E420.1 REV.1978 BY AQUACHEM**				
Phenolics, Total Recoverable	< 0.01	0.01		mg/L	10/2/13 12:02	85065	JZ1
Phosphorous, Total		**Method:**	**SM4500-P F / SW846 3015 / SW-846 3015**				
Phosphorus, Total (As P)	0.208	0.0500		mg/L	10/4/13 14:49	85141	TTT
Total Kjeldahl Nitrogen		**Method:**	**SM4500-NORG B / SM4500-NH3 BC / SM 4500-NORG B**				
Nitrogen, Kjeldahl, Total	1.53	0.500		mg/L	10/3/13 13:00	85089	TTT
Total Suspended Solids		**Method:**	**SM2540D**				
Suspended Solids (Residue, Non-Filterable)	5.50	2.83		mg/L	9/27/13 11:10	R192191	TB2
Metals by ICP MS		**Method:**	**E200.8 / SW3015**				
Potassium	4.43	0.500	C	mg/L	10/3/13 14:00	85087	AG

Qualifiers:

B - Analyte detected in the associated Method Blank
E - Estimated
H - Holding Time Exceeded
C - Laboratory not accredited for this parameter
S - Spike Recovery outside accepted recovery limits
R - RPD outside accepted recovery limits
J - Analyte detected below quanititation limits

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Report of Laboratory Analysis

CLIENT: Gewalt Hamilton Associates
Lab Order: 13090843
Project: Village of Bannokburn
Lab ID: 13090843-02

Client Sample ID: CHICAGORIV_N
Report Date: 10/8/2013
Collection Date: 9/26/2013 3:39:00 PM
Matrix: Wastewater

Analyses	Result	EMT Reporting Limit		Units	Date Analyzed	Batch	Analyst
Ammonia as N		**Method:**	**SM4500-NH3-B-C**				
Nitrogen, Ammonia (As N)	< 0.0600	0.0600		mg/L	10/5/13 11:00	85149	TTT
Anions by Ion Chromatography		**Method:**	**E300**				
Chloride	317	20.0		mg/L	9/30/13	R192322	GSB
Fluoride	0.498	0.0500		mg/L	9/30/13	R192322	GSB
BOD, 5 Day, 20°C		**Method:**	**SM5210 B**				
Biochemical Oxygen Demand	4.20	2.00		mg/L	9/27/13 12:39	R192329	KK1
Phenolics		**Method:**	**E420.1 REV.1978 BY AQUACHEM**				
Phenolics, Total Recoverable	< 0.01	0.01		mg/L	10/2/13 12:02	85065	JZ1
Phosphorous, Total		**Method:**	**SM4500-P F / SW846 3015 / SW-846 3015**				
Phosphorus, Total (As P)	0.289	0.0500		mg/L	10/4/13 14:49	85141	TTT
Total Kjeldahl Nitrogen		**Method:**	**SM4500-NORG B / SM4500-NH3 BC / SM 4500-NORG B**				
Nitrogen, Kjeldahl, Total	1.25	0.500		mg/L	10/3/13 13:00	85089	TTT
Total Suspended Solids		**Method:**	**SM2540D**				
Suspended Solids (Residue, Non-Filterable)	194	15.0		mg/L	9/27/13 11:10	R192191	TB2
Metals by ICP MS		**Method:**	**E200.8 / SW3015**				
Potassium	5.07	0.500	C	mg/L	10/3/13 14:00	85087	AG

Qualifiers:

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Report of Laboratory Analysis

CLIENT: Gewalt Hamilton Associates
Lab Order: 13090843
Project: Village of Bannokburn
Lab ID: 13090843-03

Client Sample ID: CHICAGO S
Report Date: 10/8/2013
Collection Date: 9/26/2013 12:07:00 PM
Matrix: Wastewater

Analyses	Result	EMT Reporting Limit		Units	Date Analyzed	Batch	Analyst
Ammonia as N		**Method:**	**SM4500-NH3-B-C**				
Nitrogen, Ammonia (As N)	0.743	0.444		mg/L	10/5/13 11:00	85149	TTT
Anions by Ion Chromatography		**Method:**	**E300**				
Chloride	326	20.0		mg/L	9/30/13	R192322	GSB
Fluoride	0.292	0.0500		mg/L	9/30/13	R192322	GSB
BOD, 5 Day, 20°C		**Method:**	**SM5210 B**				
Biochemical Oxygen Demand	8.10	2.00		mg/L	9/27/13 12:39	R192329	KK1
Phenolics		**Method:**	**E420.1 REV.1978 BY AQUACHEM**				
Phenolics, Total Recoverable	< 0.01	0.01		mg/L	10/2/13 14:43	85077	JZ1
Phosphorous, Total		**Method:**	**SM4500-P F / SW846 3015 / SW-846 3015**				
Phosphorus, Total (As P)	0.315	0.0500		mg/L	10/7/13 11:09	85169	TTT
Total Kjeldahl Nitrogen		**Method:**	**SM4500-NORG B / SM4500-NH3 BC / SM 4500-NORG B**				
Nitrogen, Kjeldahl, Total	2.23	0.500		mg/L	10/3/13 13:00	85089	TTT
Total Suspended Solids		**Method:**	**SM2540D**				
Suspended Solids (Residue, Non-Filterable)	108	15.0		mg/L	9/30/13 13:45	R192240	TB2
Metals by ICP MS		**Method:**	**E200.8 / SW3015**				
Potassium	4.40	0.500	C	mg/L	10/3/13 14:00	85087	AG

Qualifiers:

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Report of Laboratory Analysis

CLIENT: Gewalt Hamilton Associates
Lab Order: 13090843
Project: Village of Bannokburn
Lab ID: 13090843-04

Client Sample ID: DUFFY
Report Date: 10/8/2013
Collection Date: 9/26/2013 12:51:00 PM
Matrix: Wastewater

Analyses	Result	EMT Reporting Limit		Units	Date Analyzed	Batch	Analyst
Ammonia as N		**Method:**	**SM4500-NH3-B-C**				
Nitrogen, Ammonia (As N)	1.17	0.400		mg/L	10/5/13 11:00	85149	TTT
Anions by Ion Chromatography		**Method:**	**E300**				
Chloride	382	20.0		mg/L	9/30/13	R192322	GSB
Fluoride	0.256	0.0500		mg/L	9/30/13	R192322	GSB
BOD, 5 Day, 20°C		**Method:**	**SM5210 B**				
Biochemical Oxygen Demand	3.30	2.00		mg/L	9/27/13 12:39	R192329	KK1
Phenolics		**Method:**	**E420.1 REV.1978 BY AQUACHEM**				
Phenolics, Total Recoverable	< 0.01	0.01		mg/L	10/2/13 14:43	85077	JZ1
Phosphorous, Total		**Method:**	**SM4500-P F / SW846 3015 / SW-846 3015**				
Phosphorus, Total (As P)	< 0.0500	0.0500		mg/L	10/7/13 11:09	85169	TTT
Total Kjeldahl Nitrogen		**Method:**	**SM4500-NORG B / SM4500-NH3 BC / SM 4500-NORG B**				
Nitrogen, Kjeldahl, Total	0.353	0.250		mg/L	10/4/13 13:30	85138	TTT
Total Suspended Solids		**Method:**	**SM2540D**				
Suspended Solids (Residue, Non-Filterable)	5.00	2.00		mg/L	9/30/13 13:45	R192240	TB2
Metals by ICP MS		**Method:**	**E200.8 / SW3015**				
Potassium	4.68	0.500	C	mg/L	10/3/13 14:00	85087	AG

Qualifiers:

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R - RPD outside accepted recovery limits
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Report of Laboratory Analysis

CLIENT: Gewalt Hamilton Associates
Lab Order: 13090843
Project: Village of Bannokburn
Lab ID: 13090843-05

Client Sample ID: HALF DAY_N
Report Date: 10/8/2013
Collection Date: 9/26/2013 1:10:00 PM
Matrix: Wastewater

Analyses	Result	EMT Reporting Limit		Units	Date Analyzed	Batch	Analyst
Ammonia as N		**Method:**	**SM4500-NH3-B-C**				
Nitrogen, Ammonia (As N)	0.111	0.0600		mg/L	10/5/13 11:00	85149	TTT
Anions by Ion Chromatography		**Method:**	**E300**				
Chloride	329	20.0		mg/L	9/30/13	R192322	GSB
Fluoride	0.140	0.0500		mg/L	9/30/13	R192322	GSB
BOD, 5 Day, 20°C		**Method:**	**SM5210 B**				
Biochemical Oxygen Demand	2.90	2.00		mg/L	9/27/13 12:39	R192329	KK1
Phenolics		**Method:**	**E420.1 REV.1978 BY AQUACHEM**				
Phenolics, Total Recoverable	< 0.01	0.01		mg/L	10/2/13 14:43	85077	JZ1
Phosphorous, Total		**Method:**	**SM4500-P F / SW846 3015 / SW-846 3015**				
Phosphorus, Total (As P)	0.0820	0.0500		mg/L	10/7/13 11:09	85169	TTT
Total Kjeldahl Nitrogen		**Method:**	**SM4500-NORG B / SM4500-NH3 BC / SM 4500-NORG B**				
Nitrogen, Kjeldahl, Total	0.975	0.500		mg/L	10/4/13 13:30	85138	TTT
Total Suspended Solids		**Method:**	**SM2540D**				
Suspended Solids (Residue, Non-Filterable)	2.00	2.00		mg/L	9/30/13 13:45	R192240	TB2
Metals by ICP MS		**Method:**	**E200.8 / SW3015**				
Potassium	1.46	0.500	C	mg/L	10/3/13 14:00	85087	AG

Qualifiers:

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E - Estimated
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S - Spike Recovery outside accepted recovery limits
R - RPD outside accepted recovery limits
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Report of Laboratory Analysis

CLIENT: Gewalt Hamilton Associates
Lab Order: 13090843
Project: Village of Bannokburn
Lab ID: 13090843-06

Client Sample ID: WAUKEGAN
Report Date: 10/8/2013
Collection Date: 9/26/2013 1:15:00 PM
Matrix: Wastewater

Analyses	Result	EMT Reporting Limit		Units	Date Analyzed	Batch	Analyst
Ammonia as N		**Method:**	**SM4500-NH3-B-C**				
Nitrogen, Ammonia (As N)	0.223	0.0600		mg/L	10/5/13 11:00	85149	TTT
Anions by Ion Chromatography		**Method:**	**E300**				
Chloride	298	20.0		mg/L	9/30/13	R192322	GSB
Fluoride	0.218	0.0500		mg/L	9/30/13	R192322	GSB
BOD, 5 Day, 20°C		**Method:**	**SM5210 B**				
Biochemical Oxygen Demand	6.25	2.00		mg/L	9/27/13 12:39	R192329	KK1
Phenolics		**Method:**	**E420.1 REV.1978 BY AQUACHEM**				
Phenolics, Total Recoverable	0.016	0.01		mg/L	10/2/13 14:43	85077	JZ1
Phosphorous, Total		**Method:**	**SM4500-P F / SW846 3015 / SW-846 3015**				
Phosphorus, Total (As P)	0.207	0.0500		mg/L	10/7/13 11:09	85169	TTT
Total Kjeldahl Nitrogen		**Method:**	**SM4500-NORG B / SM4500-NH3 BC / SM 4500-NORG B**				
Nitrogen, Kjeldahl, Total	2.09	0.500		mg/L	10/4/13 13:30	85138	TTT
Total Suspended Solids		**Method:**	**SM2540D**				
Suspended Solids (Residue, Non-Filterable)	100	15.0		mg/L	9/30/13 13:45	R192240	TB2
Metals by ICP MS		**Method:**	**E200.8 / SW3015**				
Potassium	6.13	0.500	C	mg/L	10/3/13 14:00	85087	AG

Qualifiers:

B - Analyte detected in the associated Method Blank
E - Estimated
H - Holding Time Exceeded
C - Laboratory not accredited for this parameter
S - Spike Recovery outside accepted recovery limits
R - RPD outside accepted recovery limits
J - Analyte detected below quanititation limits

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Chain of Custody Record

Scheduled Sampling Date: 09/26/2013
Due Date: 10/06/2013

COC # 505216

Company: Gewalt Hamilton Associates
Contact: Marcy Knysz
Address: 850 Forest Edge Drive
Vernon Hills, IL 60060

Phone: (847) 478-9700
P.O. #: _____ **Proj. #:** Bannockburn
Project /Location: Gewalt Up and Downstream Analysis

SAMPLE TYPE:
1. DI Water 2. Drinking Water 3. Soil
4. Extract 5. Wastewater 6. Oil
7. Sludge 8. Solid 9. Air
10. Chemical Waste 11. Wipe 12. Groundwater
13. eProduct 13. Solid 14. Groundwater(Filter)
15. Other

CONTAINER TYPE:
P - Plastic V - VOC Vial G - Glass
B - Tedlar Bag O - Other

PRESERVATIVE:
1. None 2. H2SO4 3. HNO3
4. NaOH 5. HCL 6. MeOH
7. Zn Ace 8. Na2S2O3 9. Na2HSO4
10. Other

Analysis
1. Phenol, Total
2. Ammonia (NH3) as N, Total
3. Phosphorous, Total (Automated)
4. Nitrogen, Total Kjeldahl (TKN)
5. Solids, Total Suspended (TSS)
6. Anions by Ion Chromatography
7. Fluoride by Electrode (ISE)
8. Oxygen, Biological Demand (BOD)
9. ICP MS Metals, Total

EMT USE ONLY
EMT WORKORDER # 13090843

Sample I.D.		Sample Type	Container Size	Container Type	Container No.	Sampling By	Sampling Date	Sampling Time	Sampling pH	Preservation Field	Preservation Lab	1.	2.	3.	4.	5.	6.	7.	8.	9.	10.	Lab Sample I.D.
Chicago River NB	GRAB		1 liter	G	1	EG	9/26/13	1500	8.35	2		X	X	X	X							01A
Chicago River NB	GRAB		500 ml	P	1	EG	9/26/13	1500	8.33	1						X	X	X	X			01B
Chicago River NB	GRAB		500 ml	P	1	EG	9/26/13	1500	8.33	3										X		01C
ChicagoRiv_N	GRAB		1 liter	G	1	EG	9/26/13	1539	7.65	2		X	X	X	X							02A
ChicagoRiv_N	GRAB		500 ml	P	1	EG	9/26/13	1539	7.65	1						X	X	X	X			02B
ChicagoRiv_N	GRAB		500 ml	P	1	EG	9/26/13	1539	7.65	3										X		02C
ChicagoS	GRAB		1 liter	G	1	EG	9/26/13	1207	7.60	2		X	X	X	X							03A
ChicagoS	GRAB		500 ml	P	1	EG	9/26/13	1207	7.60	1						X	X	X	X			03B
ChicagoS	GRAB		500 ml	P	1	EG	9/26/13	1207	7.60	3										X		03C
Duffy	GRAB		1 liter	G	1	EG	9/26/13	1257	8.21	2		X	X	X	X							04A

Relinquished By:	Date: - -	Received By:	Date: - -
	Time: :		Time: :
Relinquished By:	Date: 9-26-13	Received By:	Date: - -
	Time: 16:30		Time: :
Relinquished By:	Date: - -	Received By: Sarah Stirle	Date: 9-26-13
	Time: :		Time: 16:30

EMT USE ONLY
ClientID: gewalt
Client Contact: Judy Gucius
EMT Project ID: Gewalt Up and Downstream Analysis
Jar Lot No.

☑ SAMPLE RECEIVED ON ICE
☐ TEMPERATURE
(Must be recorded if sampling was greater than 6 hrs.prior to sample receipt) 11

SPECIAL INSTRUCTIONS: Chicago S T° = 61.5, Duffy T° = 69.4, Chicago River NB T° = 61.8
Chicago N T° = 62.9 pH: 7.00 @ 0630

9/25/2013 4:04:02 PM
Page 1

ENVIRONMENTAL MONITORING & TECHNOLOGIES, INC.

Chain of Custody Record

Scheduled Sampling Date: 09/26/2013
Due Date: 10/06/2013

8100 North Austin Avenue Morton Grove, IL 60053-3203 (847) 967-6666 FAX:(847) 967-6735 www.emt.com

COC # 505216

Company: Gewalt Hamilton Associates
Contact: Marcy Knysz
Address: 850 Forest Edge Drive
Vernon Hills, IL 60060

Phone: (847) 478-9700
P.O. #: _____ Proj. #: Barnolburn
Project /Location: Gewalt Up and Downstream Analysis

SAMPLE TYPE:
1. DI Water 2. Drinking Water 3. Soil
4. Extract 5. Wastewater 6. Oil
7. Sludge 8. Solid 9. Air
10. Chemical Waste 11. Wipe 12. Groundwater
13. eProduct 13. Solid 14. Groundwater(Filter)
15. Other

CONTAINER TYPE:
P - Plastic V - VOC Vial G - Glass
B - Tedlar Bag O - Other

PRESERVATIVE:
1. None 2. H2SO4 3. HNO3
4. NaOH 5. HCL 6. MeOH
7. Zn Ace 8. Na2S2O3 9. Na2HSO4
10. Other

Analysis
1. Solids, Total Suspended (TSS)
2. Anions by Ion Chromatography
3. Fluoride by Electrode (ISE)
4. Oxygen, Biological Demand (BOD)
5. ICP MS Metals, Total
6. Phenol, Total
7. Ammonia (NH3) as N, Total
8. Phosphorous, Total (Automated)
9. Nitrogen, Total Kjeldahl (TKN)

EMT USE ONLY
EMT WORKORDER # 1309843

Sample I.D.	Sample Type	Container Size	Container Type	Container No.	Sampling By	Sampling Date	Sampling Time	Sampling pH	Preservation Field	Preservation Lab	1.	2.	3.	4.	5.	6.	7.	8.	9.	10.	Lab Sample I.D.
Duffy	GRAB	500 ml	P	1	EP	9/26/13	1251	8.21	1		X	X	X	X							04B
Duffy	GRAB	500 ml	P	1	EP	9/26/13	1251	8.21	3						X						04C
HalfDay_N	GRAB	500 ml	P	1	EP	9/26/13	1310	9.58	1		X	X	X	X							05A
HalfDay_N	GRAB	500 ml	P	1	EP	9/26/13	1310	9.58	3						X	X					05B
HalfDay_N	GRAB	1 liter	G	1	EP	9/26/13	1310	9.58	2							X	X	X	X		05C
Waukegan	GRAB	500 ml	P	1	EP	9/26/13	1515	7.09	1		X	X	X	X							06A
Waukegan	GRAB	500 ml	P	1	EP	9/26/13	1515	7.09	3						X						06B
Waukegan	GRAB	1 liter	G	1	EP	9/26/13	1515	7.09	2							X	X	X	X		06C

Relinquished By:	Date: - -	Received By:	Date: - -
	Time: :		Time: :
Relinquished By:	Date: 9-26-13	Received By:	Date: - -
	Time: 16:30		Time: :
Relinquished By:	Date: - -	Received By:	Date: 9 Sep-13
	Time: :		Time: 1630

EMT USE ONLY
ClientID: gewalt
Client Contact: Judy Gucius
EMT Project ID: Gewalt Up and Downstream Analysis
Jar Lot No.

☑ SAMPLE RECEIVED ON ICE
☐ TEMPERATURE
(Must be recorded if sampling was greater than 6 hrs.prior to sample receipt) 11

SPECIAL INSTRUCTIONS: Duffy T° = 65.4, HalfDay N T° = 77.8, Waukegan T° = 75.3
pH: 7.00 @ 0630

9/25/2013 4:04:02 PM