

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 ($\leq 60.0^{\circ}\text{F}$ Dec-Mar, $\leq 90.0^{\circ}\text{F}$ Apr-Nov)				
<i>Samples collected on September 26, 2013</i>				
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 slightly 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).

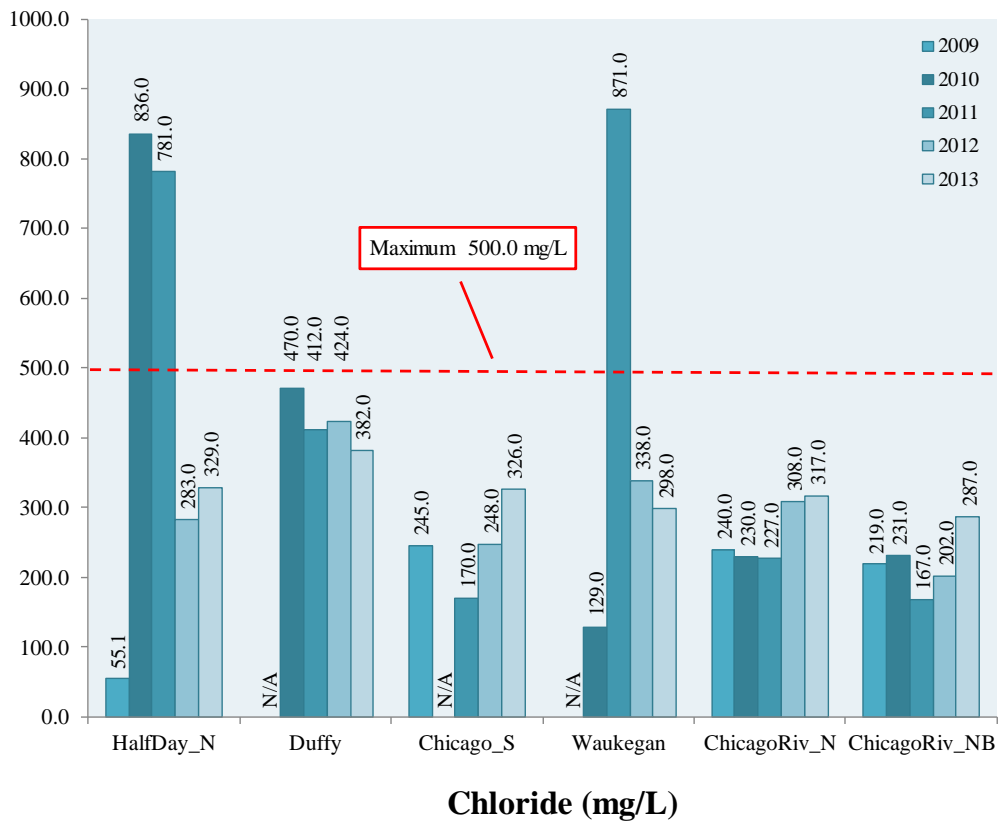
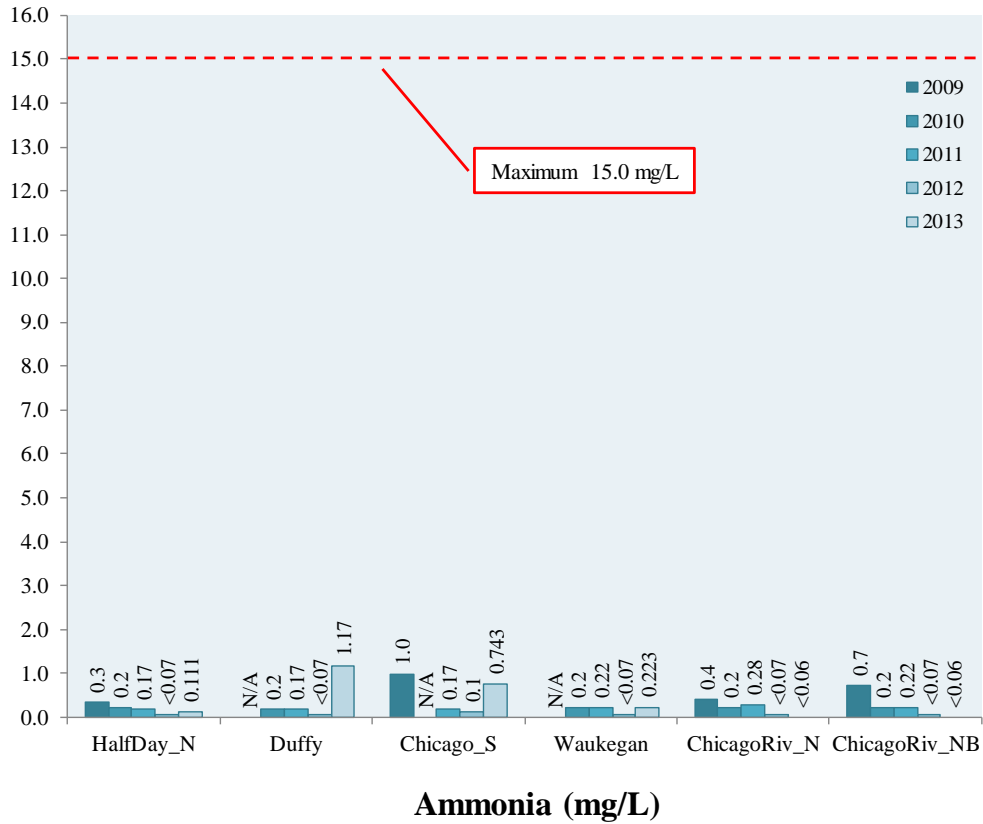
The accepted limit for **TSS** is **15.0-30.0 mg/L**. High levels of TSS can be caused by fast running water carrying more particles and sediment, not allowing them to settle. This increase could be attributed to increased frequency and intensity of rainstorms and flooding events prior to when the sample 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.

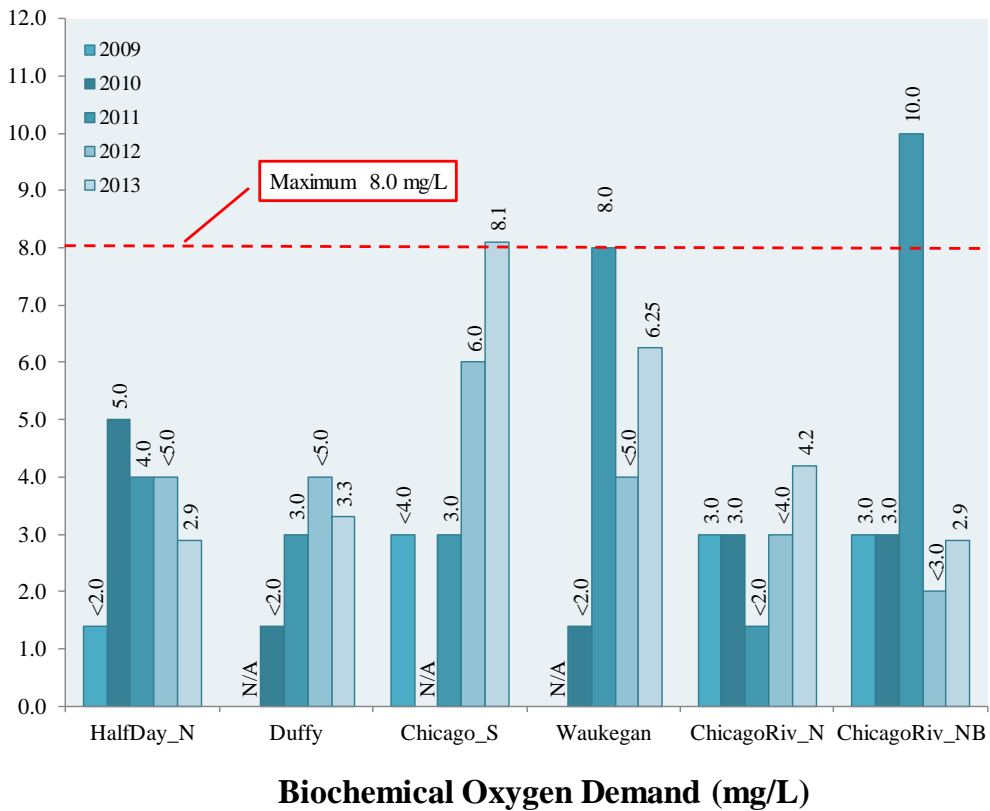
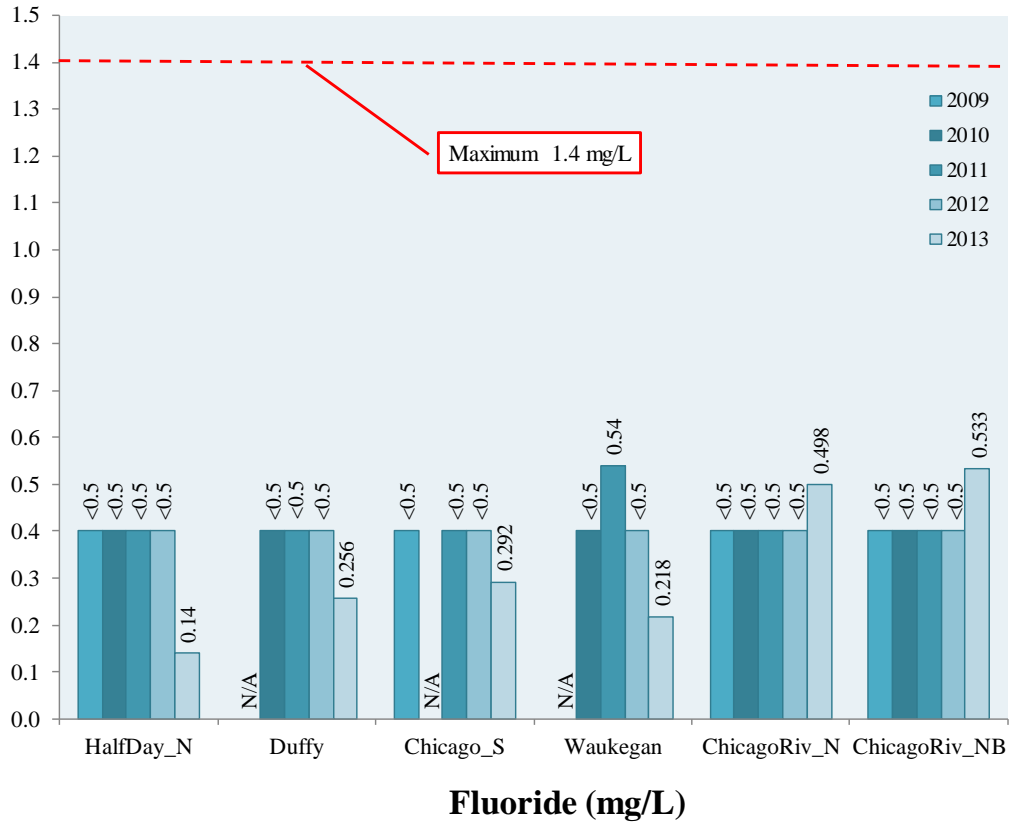
The accepted limit for **BOD** is **<8.0 mg/L**. BOD is the amount of oxygen consumed by microorganisms in decomposing organic matter in stream water. Sources of BOD include leaves, wood debris, decaying plants and animals, effluent from wastewater treatment plants, food processing plants, septic systems,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

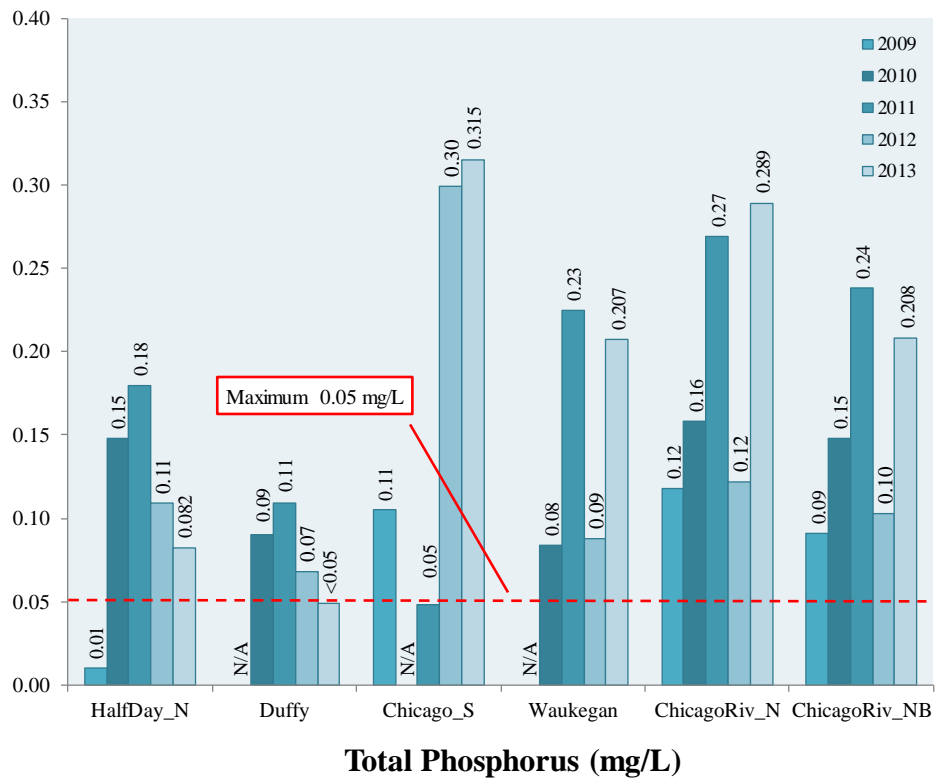
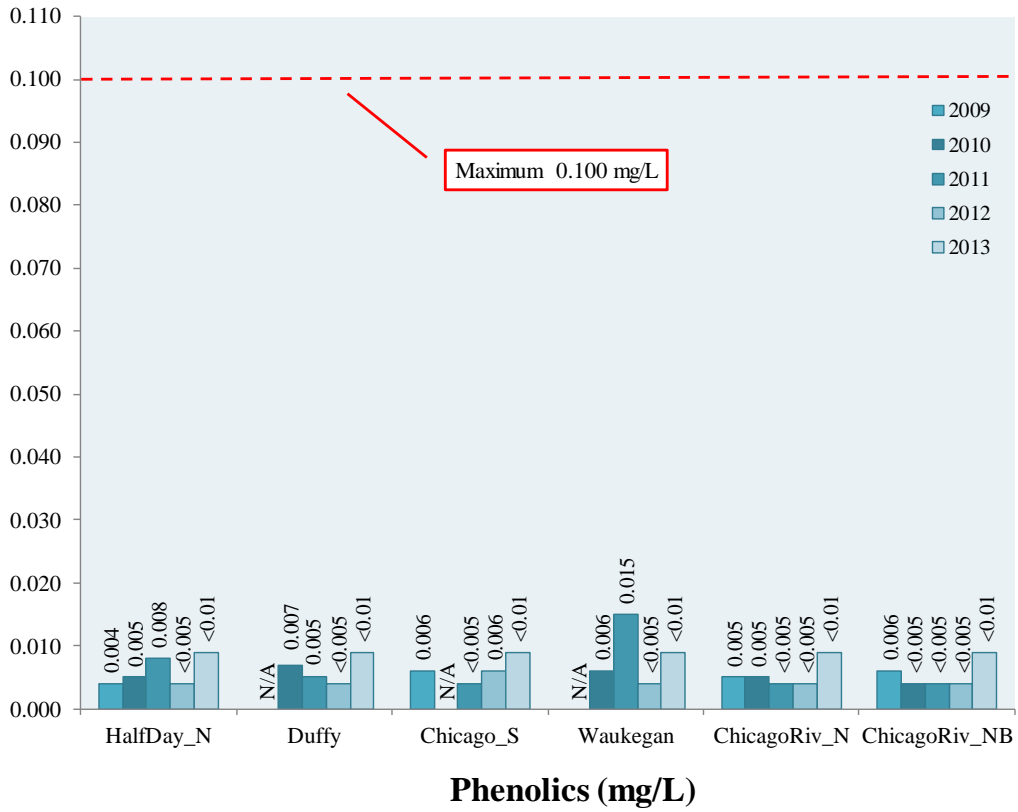
Section 5
Appendix

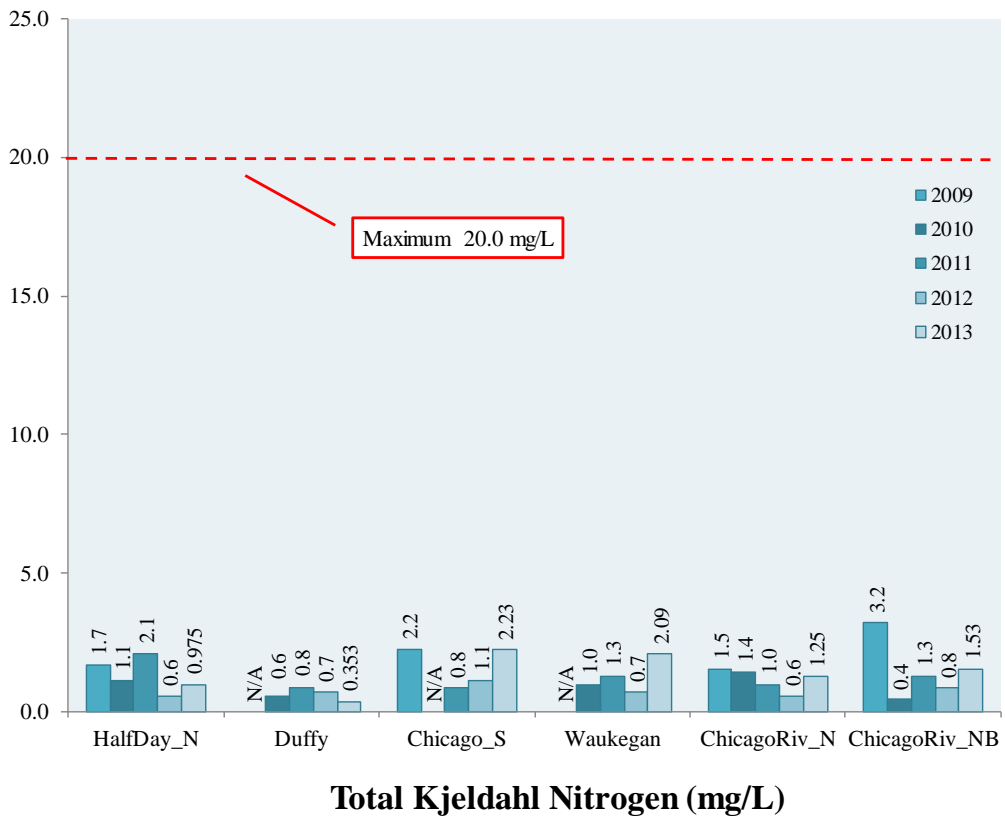
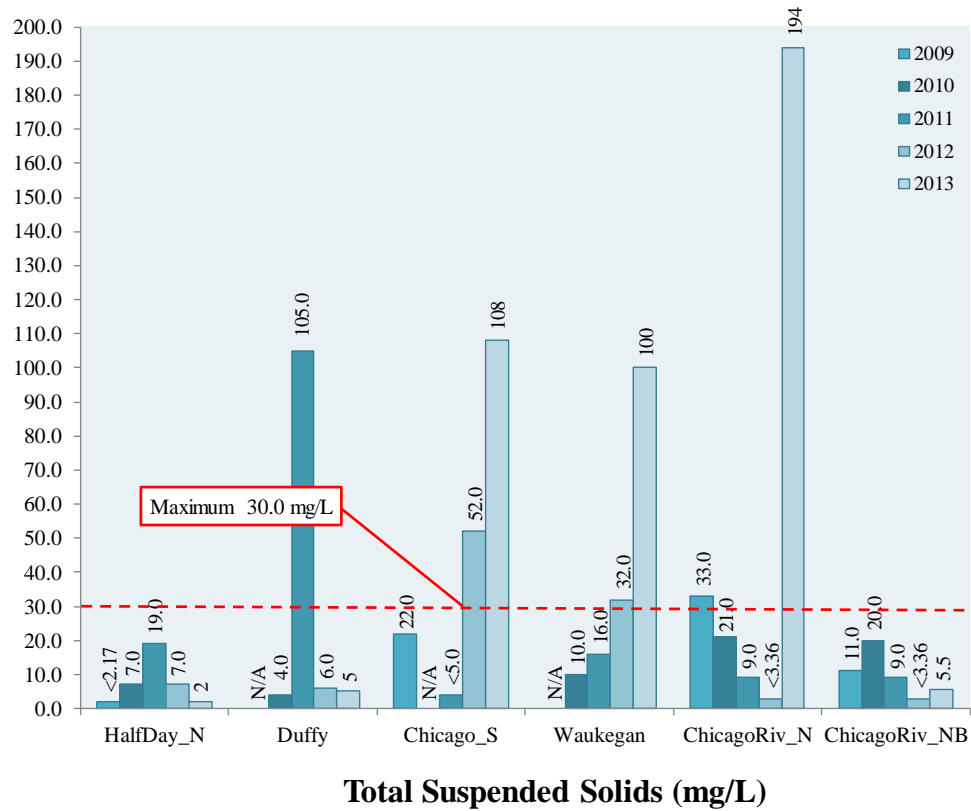
Graphs for each parameter are included on the following pages, identifying the results for each site by year.

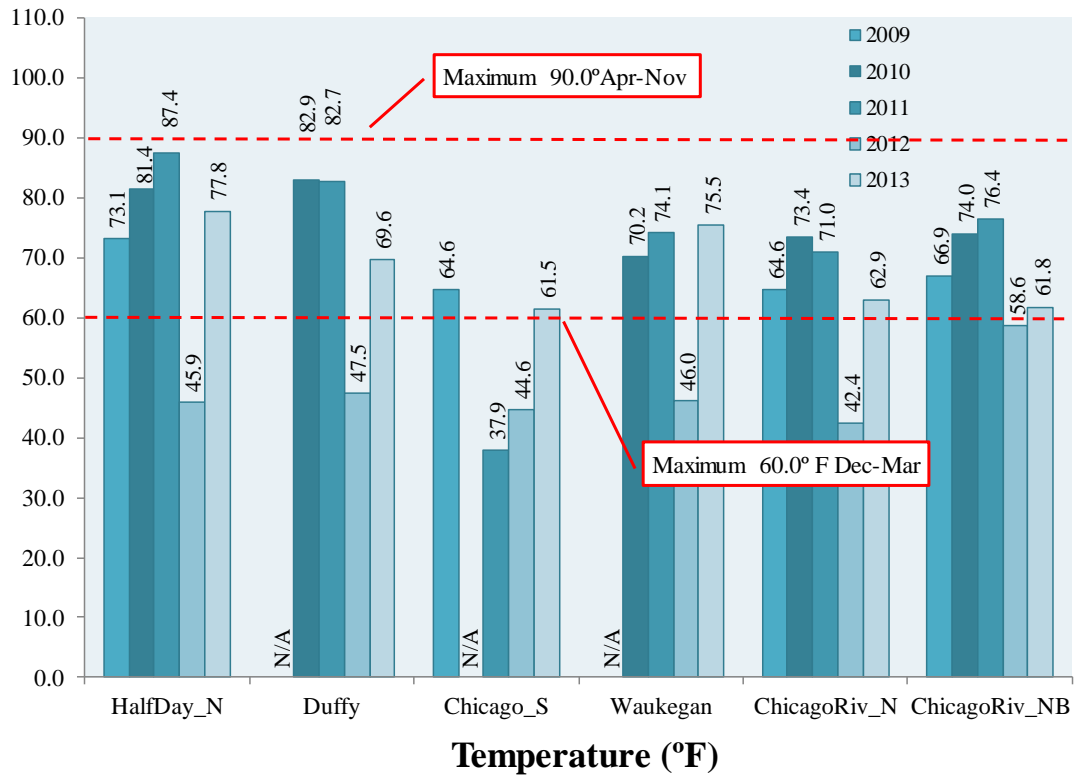
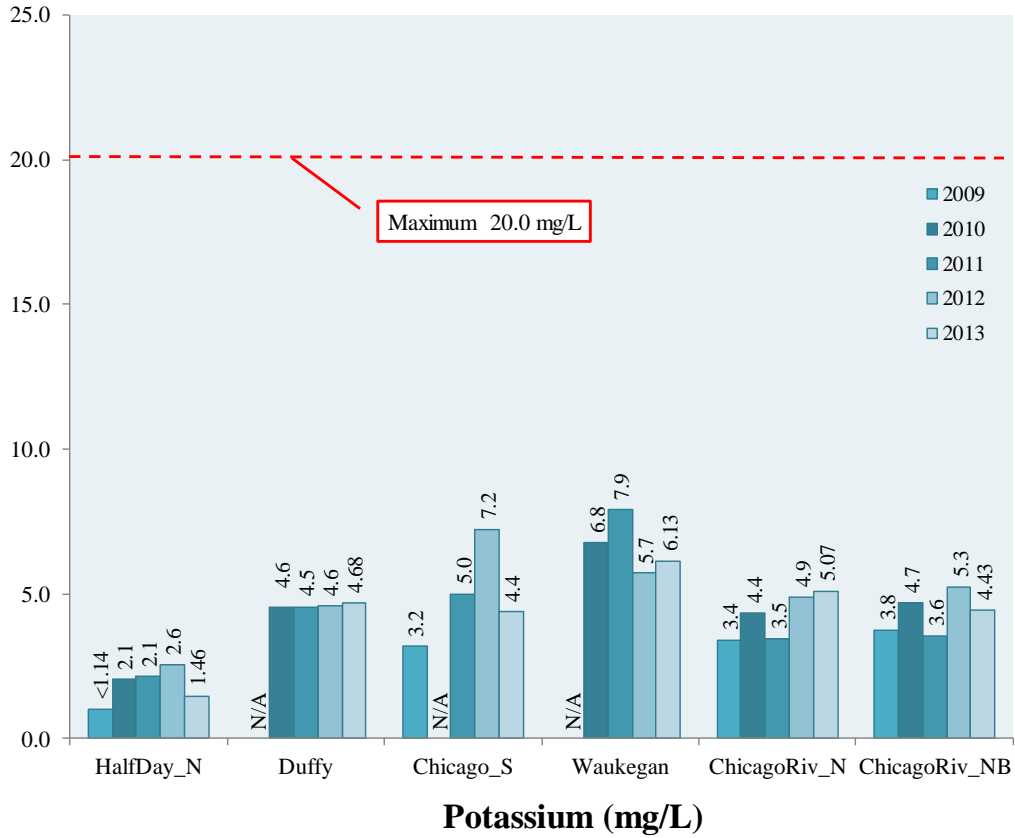
The report conducted by Environmental Monitoring and Technologies, Inc. is also included.

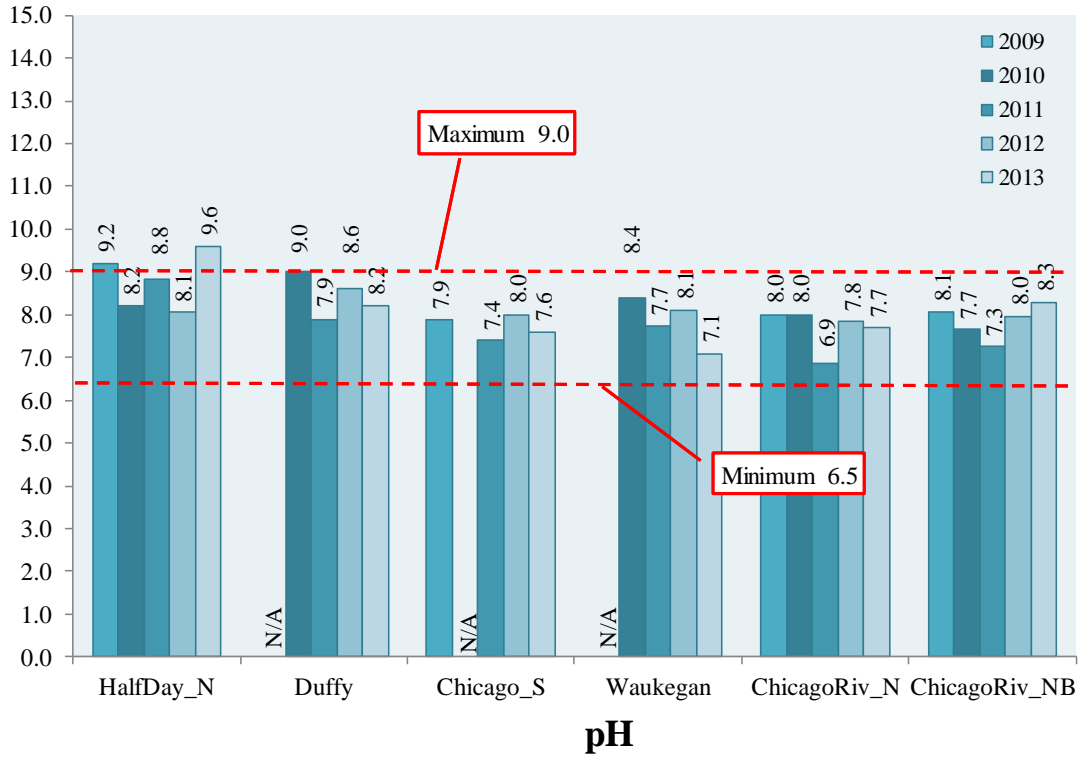












ENVIRONMENTAL MONITORING AND TECHNOLOGIES, INC.



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

October 08, 2013

RE Village of Bannokburn

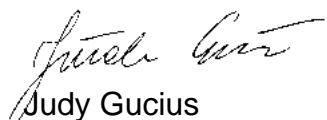
Lab Orders:
13090843

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,

Approved by,


Judy Gucius
Project Manager


Marilyn Krueding
Laboratory Director

This Report Contains 11 pages

The Contents of this report apply to the sample(s) analyzed. No duplication is allowed except in its entirety.

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

environmental laboratory and testing services
| water | soil | air | product | waste |



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CLIENT: Gewalt Hamilton Associates

Date: 10/8/2013

Project: Village of Bannokburn

CASE NARRATIVE

Lab Order: 13090843

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 exclusively numerals indicate a preparation batch.



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CLIENT: Gewalt Hamilton Associates

Date: 10/8/2013

Project: Village of Bannokburn

CASE NARRATIVE

Lab Order: 13090843

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.



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Report of Laboratory Analysis

CLIENT: Gewalt Hamilton Associates	Client Sample ID: CHICAGO RIVER NB
Lab Order: 13090843	Report Date: 10/8/2013
Project: Village of Bannokburn	Collection Date: 9/26/2013 3:00:00 PM
Lab ID: 13090843-01	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 quantitation 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:

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 quantitation limits

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Report of Laboratory Analysis

CLIENT: Gewalt Hamilton Associates	Client Sample ID: CHICAGO S
Lab Order: 13090843	Report Date: 10/8/2013
Project: Village of Bannokburn	Collection Date: 9/26/2013 12:07:00 PM
Lab ID: 13090843-03	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:

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

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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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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 quantitation 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:

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 quantitation 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 quantitation limits



Chain of Custody Record

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

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COC # 505216

Company: Gewalt Hamilton Associates	SAMPLE TYPE: 1. DI Water 4. Extract 7. Sludge 10. Chemical Waste 13. eProduct 15. Other	2. Drinking Water 5. Wastewater 8. Solid 11. Wipe 13. Solid	3. Soil 6. Oil 9. Air 12. Groundwater 14. Groundwater(Filter)
Contact: Marcy Knysz	CONTAINER TYPE: P - Plastic B - Tedlar Bag		
Address: 850 Forest Edge Drive Vernon Hills, IL 60060	V - VOC Vial O - Other		
Phone: (847) 478-9700	PRESERVATIVE: 1. None 4. NaOH 7. Zn Ace 10. Other		
P.O. #: _____ Proj. #: <u>Bannockburn</u>	2. H2SO4 5. HCL 8. Na2S2O3		
Project /Location: Gewalt Up and Downstream Analysis	3. HNO3 6. MeOH 9. Na2HSO4		

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			Sampling					Preservation		Analysis										Lab Sample I.D.				
		Size	Type	No.	By	Date	Time	pH	Field	Lab	1.	2.	3.	4.	5.	6.	7.	8.	9.	10.						
Chicago River NB	GRAB	1 liter	G	1	EP	9/24/13	1500	8.33	2		X	X	X	X											01A	
Chicago River NB	GRAB	500 ml	P	1	EP	9/26/13	1500	8.33	1					X	X	X	X								01B	
Chicago River NB	GRAB	500 ml	P	1	EP	9/26/13	1500	8.33	3											X					01C	
ChicagoRiv_N	GRAB	1 liter	G	1	EP	9/24/13	1539	7.65	2		X	X	X	X											02A	
ChicagoRiv_N	GRAB	500 ml	P	1	EP	9/26/13	1539	7.65	1					X	X	X	X								02B	
ChicagoRiv_N	GRAB	500 ml	P	1	EP	9/26/13	1539	7.65	3											X					02C	
ChicagoS	GRAB	1 liter	G	1	EP	9/26/13	1207	7.60	2		X	X	X	X											03A	
ChicagoS	GRAB	500 ml	P	1	EP	9/26/13	1207	7.60	1					X	X	X	X								03B	
ChicagoS	GRAB	500 ml	P	1	EP	9/26/13	1207	7.60	3											X					03C	
Duffy	GRAB	1 liter	G	1	EP	9/26/13	1257	8.21	2		X	X	X	X												04A

Relinquished By:	Date: - -	Received By:	Date: - -	EMT USE ONLY	<input checked="" type="checkbox"/> SAMPLE RECEIVED ON ICE <input type="checkbox"/> TEMPERATURE (Must be recorded if sampling was greater than 6 hrs. prior to sample receipt)
Time: : :	Time: : :	Client ID: Gewalt	Client Contact: Judy Gucius		
Relinquished By: <i>[Signature]</i>	Date: 9-26-13	Received By:	Time: : :		
Time: 10:30	Time: : :	Jar Lot No.	Time: : :		
Relinquished By:	Date: - -	Received By: Sarah Hale	Date: 9-26-13		
Time: : :	Time: : :	Time: 16:30	Time: 16:30		

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



Company: <u>Gewalt Hamilton Associates</u>	SAMPLE TYPE: 1. DI Water 4. Extract 7. Sludge 10. Chemical Waste 13. eProduct 15. Other	2. Drinking Water 5. Wastewater 8. Solid 11. Wipe 13. Solid	3. Soil 6. Oil 9. Air 12. Groundwater 14. Groundwater(Filter)
Contact: <u>Marcy Knysz</u>	CONTAINER TYPE: P - Plastic B - Tedlar Bag		
Address: <u>850 Forest Edge Drive</u> <u>Vernon Hills, IL 60060</u>	V - VOC Vial O - Other		
Phone: <u>(847) 478-9700</u>	PRESERVATIVE: 1. None 4. NaOH 7. Zn Ace 10. Other		
P.O. #: _____ Proj. #: <u>Barnokburn</u>	2. H2SO4 5. HCL 8. Na2S2O3		
Project /Location: <u>Gewalt Up and Downstream Analysis</u>	3. HNO3 6. MeOH 9. Na2HSO4		

Analysis											EMT USE ONLY									
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 WORKORDER # <u>13090843</u>											

Sample I.D.	Sample Type	Container			Sampling				Preservation		Analysis										Lab Sample I.D.			
		Size	Type	No.	By	Date	Time	pH	Field	Lab	1.	2.	3.	4.	5.	6.	7.	8.	9.	10.				
Duffy	GRAB	500 ml	P	1	sp	9/24/13	1251	8.21	1		X	X	X	X										04B
Duffy	GRAB	500 ml	P	1	sp	9/24/13	1251	8.21	3					X										04C
HalfDay_N	GRAB	500 ml	P	1	sp	9/24/13	1310	9.58	1		X	X	X	X										05A
HalfDay_N	GRAB	500 ml	P	1	sp	9/24/13	1310	9.58	3					X	X									05B
HalfDay_N	GRAB	1 liter	G	1	sp	9/24/13	1310	9.58	2						X	X	X	X						05C
Waukegan	GRAB	500 ml	P	1	sp	9/24/13	1515	7.09	1		X	X	X	X										06A
Waukegan	GRAB	500 ml	P	1	sp	9/24/13	1515	7.09	3					X										06B
Waukegan	GRAB	1 liter	G	1	sp	9/24/13	1515	7.09	2						X	X	X	X						06C

Relinquished By:	Date: - -	Received By:	Date: - -	EMT USE ONLY				<input checked="" type="checkbox"/> SAMPLE RECEIVED ON ICE	
	Time: : :		Time: : :	ClientID: <u>gewalt</u>	Client Contact: <u>Judy Gucius</u>			<input type="checkbox"/> TEMPERATURE	
Relinquished By:	Date: <u>9-26-13</u>	Received By:	Date: - -	EMT Project ID: <u>Gewalt Up and Downstream Analysis</u>				(Must be recorded if sampling was greater than 6 hrs. prior to sample receipt)	
	Time: <u>16:30</u>		Time: : :	Jar Lot No. _____				<u>11</u>	
Relinquished By:	Date: - -	Received By:	Date: <u>9 Dec-13</u>						
	Time: : :	<u>Sarah Skole</u>	Time: <u>16:30</u>						

SPECIAL INSTRUCTIONS: Duffy T° = 69.4, Half Day N T° = 77.8, Waukegan T° = 75.3
pH: 7.00 @ 09:30