

Library Reference 3.1

EcoLogic Memorandum

TO: Onondaga County Department of Water Environment Protection
FROM: Liz Moran and Kerry Thurston
RE: Data quality review, 2010 AMP Data
DATE: *revised* June 15, 2011

Summary

We completed our review of the 2010 analytical data, using the Onondaga database (Onondaga.mdb) obtained from the County on February 22, 2011, and submitted a draft data quality review memorandum on March 17, 2011. The County responded on April 6 to the issues highlighted in the draft memorandum. Subsequently, we clarified how data flagged by OCDWEP laboratory for various reasons would be handled. This final version of the memorandum incorporates discussion at a meeting with the laboratory on June 15, 2011. Major findings are as follows.

1. Rinsate and field blanks

Qualify samples (Table 4) for possible blank contamination:

- *Nine samples for possible SRP blank contamination*
- *Thirteen samples for possible TDP blank contamination*
- *Eight samples for possible TP blank contamination*
- *One sample for possible TSS blank contamination*

2. Field duplicates

Thirty-nine field duplicate RPDs exceeded 20% and the absolute difference between the sample and duplicate results exceeded 2x the MRL (Attachment 2).

3. Charge Balance summary

The laboratory verified the major cations and anions results for five samples where charge balance exceeded 20% (Table 5).

4. Database non-detects check

The laboratory reviewed and verified – or corrected as needed – the data reported as less than the MRL where the MRL did not match the published values (Tables 6, 7 and 8).

5. Verify parameters for limnological reasonableness

The laboratory created a new flag “x” in 2010 to indicate, “Sample result failed the criteria for limnological reasonableness”. Flag with “x” sample results that did not meet limnological reasonableness criteria (Table 9):

- *Reject three TDP results and one SRP result*
- *Flag 1 TP result, 8 SRP results, and 5 TDP results*

6. Review for outliers

- *Tributary outliers overall seem associated with high flow events.*

- *No unusual outliers noted in the lake.*
- *Correction of transposition error on fecal coliform result.*

7. Ultra low-level mercury results

No data usability issues identified.

1. Rinsate and field blanks

The AMP calls for preparing rinsate blanks of the cleaned sampling equipment prior to its use. Results of these samples are used to infer whether any field samples are potentially compromised by the presence of contaminants in the sampling equipment.

Screen for analytes of interest

The blanks in the database were screened for detectable concentrations. Fifteen parameters were detected in the blanks (excluding Organic Nitrogen, which is a calculated value):

Alkalinity (ALK-T)	Total Dissolved Solids (TDS)
Chloride (Cl)	Total Kjeldahl Nitrogen (TKN)
Cyanide (CN-T)	Total Inorganic Carbon (TIC)
Iron (Fe)	Total Phosphorus (TP)
Potassium (K)	Total Solids (TS)
Silica (SiO ₂ -diss)	Total Suspended Solids (TSS)
Soluble Reactive Phosphorus (SRP)	Zinc (Zn)
Total Dissolved Phosphorus (TDP)	

Compare results of rinsate blanks to MRL by parameter

Measured concentrations were compared to the Method Reportable Limit (MRL) as listed in Attachment 1. Seven parameters were measured in rinsate blanks at concentrations less than or equal to twice the MRL, but not more than twice the MRL:

Alkalinity (ALK-T)	Silica (SiO ₂ -diss)
Cyanide (CN-T)	Total Kjeldahl Nitrogen (TKN)
Iron (Fe)	Zinc (Zn)
Potassium (K)	

These parameters were considered present at “trace” concentrations; where blank concentrations were less than two times the MRL, no further action was required.

Actions taken by the County to reduce detectable alkalinity concentrations in blanks have continued to meet with success in 2010. None of the rinsate blanks had alkalinity results greater than two times the MRL. Detectable concentrations of total alkalinity in the rinsate

blanks were first identified in 2005; the laboratory switched from dishwasher to hand-rinsing of the sample bottles to address the issue. In addition, new sampling bottles are now purchased annually.

Three other parameters were detected in blanks at concentrations ranging from less than two times the MRL to less than five times the MRL, but not more than five times the MRL:

- Total Dissolved Phosphorus (TDP)
- TDS
- Total Phosphorus (TP)

The rinsate blank results were also screened against a criterion of 5x the MRL. Five of the 15 parameters had blank concentrations ranging from less than 2x MRL to more than 5x the MRL:

- Chloride (Cl)
- Total Solids (TS)
- Soluble Reactive Phosphorus (SRP)
- Total Suspended Solids (TSS)
- Total Inorganic Carbon (TIC)

The laboratory noted in the database that, for the Lake Equipment Blank collected on 5/18: “Blank concentration of SRP, TDP, TP, SiO2, TDS, TS exceeds acceptable limits. Contamination found at collection source.” (Table 1). According to OCDWEP, water from the DI tap in the sample staging area (Room #172) had elevated background levels of these analytes.

Table 1. Summary of Parameters in Lake Equip Blank (5/18) for which the result exceeded 5x the MRL.

Parameter	Sample Number	Source	Date 2010	Result (mg/l)	5xMRL (mg/l)
SRP*	2010005091	Lake Equip. Blk (Pump)	5/18	0.009	0.005
TIC	2010005091	Lake Equip. Blk (Pump)	5/18	5.47	2.5
TS	2010005091	Lake Equip. Blk (Pump)	5/18	51	50

*Laboratory verified SRP result; identified contamination found at collection source.

There were no notations in the database regarding the following concentrations of Chloride and TSS in blanks that exceeded 5x the MRL (Table 2).

Table 2. Summary of blanks with Chloride and TSS concentrations exceeding 5x the MRL.

Parameter	Sample Number	Source	Date 2010	Result (mg/l)	5xMRL (mg/l)
Chloride	2010008656	River Blank Dunker (Crew B)	8/17	105	5
	2010011090	River Blank Dunker (Crew B)	9/21	101	5
	2010007606	River Blank Dunker (Crew B)	7/29	88	5
TSS	2010013631	Crk-Blank SS Pail (Crew A)	11/9	19	5

Upon request, the laboratory reviewed the water quality database for the chloride concentrations reported in the River Blanks. There appears to have been a data entry error in the water quality database, as the results reported in the laboratory LIMS database were non-detect (<1 mg/l) for chloride in these River Blanks. The results in the water quality database were corrected.

Compare results of rinsate blanks to field sample results

The rinsate blank results that were more than 2x the MRL (SRP, TIC, TS, TSS, TDS, TDP, and TP) were compared with the concentrations in the associated samples. Where samples results were more than 5x the blank concentrations, no further qualification is necessary (Table 3). The detected levels of TDS, TIC and TS in the blanks do not affect data usability because ambient concentrations in the Onondaga watershed are substantially higher. Where sample results were less than 5x the concentration in the associated blank, qualification for possible blank contamination is recommended (Table 4).

Table 3. Parameters for which field sample concentrations are more than 5x the associated blank concentration – no further qualification required.

Parameter	Blank ID	Source	Date 2010	Conc. (mg/l)	Assoc Sample(s) Conc. Range (mg/l)	Qualifier
TDS	2010000490	Crk-Blank Churn (Crew A)	1/19	32	605 – 2108	--
	2010005091	Lake Equip. Blk (Pump)	5/18	61	1077 - 1105	*
TIC	2010005091	Lake Equip. Blk (Pump)	5/18	5.47	44 – 45.1	--
TS	2010005091	Lake Equip. Blk (Pump)	5/18	51	1149 - 1221	*

*Laboratory noted that blank concentrations of SRP, TDP, TP, SiO₂, TDS, and TS exceeds acceptable limits for the blank collected 5/18. Contamination was found at collection source (DI Tap in staging area (Room #172)).

Table 4. Parameters for which field sample concentrations are less than 5x the associated blank concentration. The laboratory added comments to qualify the results for possible blank contamination as noted below.

Parameter	Blank ID	Source	Date 2010	Conc. (mg/l)	Sample No.	Sample Conc (mg/l)				
SRP	2010005091	Lake Equip. Blk (Pump) ^c <i>(Note: Sample concentrations were reported as non-detect, and are unlikely to be affected by blank contamination).</i>	5/18	0.009	2010005092 ^b	<0.001				
					2010005093 ^a	<0.001				
					2010005095 ^b	<0.001				
					2010005096 ^a	<0.001				
					2010005097 ^b	<0.001				
					2010005098 ^a	<0.001				
					2010005099 ^b	<0.001				
					2010005100 ^b	<0.001				
					2010013631	Crk-Blank SS Pail (Crew A)	11/9	0.003	2010013638 ^d	0.008
					TDP	2010002581	Crk-Blank Dunker Churn (Crew B)	3/15	0.003	2010002585
2010002586	0.008									
2010002587	0.01									
2010002591	0.01									
2010005091	Lake Equip. Blk (Pump) ^c	5/18	0.009	2010005092 ^b		0.006				
				2010005093 ^a		0.006				
				2010005095 ^b		0.006				
				2010005096 ^a		0.005				
				2010005097 ^b		0.005				
				2010005098 ^a		0.005				
2010005099 ^b	0.005									
2010005100 ^b	0.006									
2010013631	Crk-Blank SS Pail (Crew A)	11/9	0.005	2010013638 ^d	0.014					
2010014152	Crk-Blank SS Pail (Crew A)	11/18	0.005	n/a	--					
TP	2010005091	Lake Equip. Blk (Pump) ^c	5/18	0.011	2010005092 ^b	0.021				
					2010005093 ^a	0.019				
					2010005095 ^b	0.015				
					2010005096 ^a	0.014				
					2010005097 ^b	0.014				
					2010005098 ^a	0.015				
					2010005099 ^b	0.015				
					2010005100 ^b	0.014				
TSS	2010013631	Crk-Blank SS Pail (Crew A)	11/9	19	2010013638 ^d	59				

a - Comment added by laboratory to sample result: "Blank concentration of SRP, TDP, TP exceeds acceptable limits. Associated sample results < 5 x blank concentration."

b - Comment added by laboratory to sample result: "Blank concentration of SRP, TDP, TP, SiO2 exceeds acceptable limits. Associated sample results < 5 x blank concentration."

c - Comment added by laboratory to sample result: "Blank concentration of SRP, TDP, TP, SiO2, TDS, TSS, TIC exceeds acceptable limits. Contamination found at collection source (DI Tap in staging room). Refer"

d - Comment added to the Sample Remarks field of the water quality database: "Blank concentration of SRP & TSS exceeds acceptable limits. Associated sample results <5x the blank concentration."

n/a – indicates that, although this equipment blank exhibited detectable concentrations of TDP, the associated sample (2010014082) was not analyzed for TDP. Therefore, there are no sample results to qualify.

2. Field duplicates

As outlined in the SOP for the completing the data quality review, field blanks are screened using a two-step process.

- (1) identify all with Relative Percent Difference (RPD) greater than 20%
- (2) Calculate: is the absolute value of the difference greater than 2x the MRL? If so, investigate. If not, no further action.

Field duplicates were evaluated using RPD of the results and the absolute difference of the sample and duplicate results. RPD greater than 20% are considered outside of quality control limits. In some cases, the RPD are greater than 20% because concentrations are at or near the detection level for some parameters; therefore, field duplicates with RPD greater than 20% were also evaluated for absolute difference greater than 2x the MRL. Where the absolute difference was less than 2x the MRL, no further action was required; where the absolute difference was greater than 2x the MRL, additional investigation was warranted.

For 2010, 114 duplicate results had RPDs greater than 20%; of those, 46 also had absolute difference values greater than 2x MRL. Of these 46, seven were subsequently identified by the County as having MRLs adjusted upward for sample dilution reasons, and therefore met the criteria for absolute difference values relative to 2x MRL. For the remaining 39 samples, the analytes (with number of samples in parentheses) exceeding the field duplicate criteria are listed below.

Fe (1)	TP (2)
Na (2)	TSS (1)
NH3-N (2)	Turbidity (2)
SRP (1)	Phaeophytin-a (13)*
TKN (2)	Chlorophyll-a (12)*
TKN-F (1)	

**These parameters exhibit high natural variability.*

Organic nitrogen (ORG-N) results exhibited RPDs >20% (9 occurrences), of which all 9 also exhibited absolute differences more than twice the MRL. Since this parameter is a calculated value, it was not included in further analysis. A list of the field duplicate RPDs exceeding 20% where the absolute difference was also greater than 2x the MRL is included as Attachment 2. Comments from the County are also included in Attachment 2, where provided.

3. Charge Balance Summary

The charge balance results were evaluated against an upper limit of 20% for field samples and duplicates from the lake and the tributaries.

	<u>Tributaries</u>	<u>Lake</u>
Average	6.47%	4.25%
Median	5.33%	4.42%
N Exceeds 20%	5	0

The laboratory verified the major cations and anions results for five samples where charge balance exceeded 20% (Table 5). The laboratory noted that several samples had unusually high solids which will interfere with the analytical measurements.

Table 5. 2010 samples where charge balance exceeded 20%.

Sample No.	Source	Date 2010	Charge Balance (%)	TSS (mg/l)
2010000504	Crk-Onondaga Creek @ Spencer St	1/19	21.4 ^a	n/a
2010000801	Crk-Onondaga Creek @ Adams Street	1/26	26 ^b	283
2010000798	Crk-Onondaga Creek @ Dorwin Ave.	1/26	30.4 ^b	251
2010000802	Crk-Onondaga Creek @ Water Street	1/26	21.8 ^c	220
2010000800	Crk-Onondaga Creek @ Spencer St	1/26	40.6 ^d	n/a

n/a – TSS was not analyzed for this location
a - SS pail used due to snow bank on bridge. All the analysis used for the charge balance calculation have been verified.
b - SS pail used due to heavy flow. Charge Balance was verified, sample had unusually high solids.
c - Charge Balance was verified, sample had unusually high solids.
d – SS pail used due to heavy flow. Charge Balance was verified, sample had unusually high solids, based on visual observation of the sample.

4. Database non-detects check

Non-detect data in the database are reported as less than the MRL. As a QC check to identify possible typographic errors, the “less than MRL” values were compared against the published MRL list for the 2010 AMP. The result of this evaluation is reported with respect to three categories: metals, solids, and other parameters.

As noted in previous quality reviews, in some instances where the MRL did not match the published values, analysis was completed by the contract laboratory. MRLs from the contract lab may vary from the County’s published MRL’s; however, reporting limits are within SPDES limits as established by the County.

The incidents of MRLs not matching the published values are summarized below (Tables 6, 7 and 8); the associated sample numbers are provided in Attachment 3. Comments provided by the laboratory to address the discrepancies are also summarized below.

- **Metals** – These metals were reported at levels less than the MRL, but the MRL does not match with the published values (Table 6). The MRLs for metals varies depending on whether concentration procedures were used. When there are relatively few samples for which the MRL does not match the reported value, this may be an indicator of a data entry error.

Table 6. Comparison of 2010 Metals MRLs with reported non-detects.

Parameter (units)	Reported Result	N Samples	Published MRL	Lab	Resolution of Discrepancies
Ag (mg/l)	<0.002	1	0.01	LSL	Contract lab result has different reported MRL
As (mg/l)	<0.01	3	0.002	LSL	Contract lab result has different reported MRL
Ca (mg/l)	<1.25	99	1	ELS	MRL changed due to sample dilution required to add matrix modifier
Cd (mg/l)	<0.005	9	0.0008	ELS	All samples were "Treatment Plant" category samples, and parameter was not considered to be an ambient sample at the time of analysis- consequently, the concentration procedure was not used.
	<0.002	4	0.0008	LSL	Contract lab result has different reported MRL
Cr (mg/l)	<0.01	3	0.008 (0.002)*	LSL	Contract lab result has different reported MRL
Hg (mg/l)	<0.000001	33	0.00002	ELS	Used the OCDWEP lab ultra-low level method for analysis, MRL = 0.0000015 mg/l (EPA 1631E). Metro Effluent and By-pass samples were not AMP, and therefore the MRL used was 0.000020 mg/l.
	<0.0002	4	0.00002	LSL	Contract lab result has different reported MRL
Mg (mg/l)	<0.125	100	0.1	ELS	MRL changed due to sample dilution required to add matrix modifier
Ni (mg/l)	<0.0038	81	0.015 (0.00375)*	ELS	Rounding error
	<0.01	3	0.015	LSL	Contract lab result has different reported MRL
Pb (mg/l)	<0.02	9	0.002	ELS	ICP method used, not Furnace; MRL = 0.020 mg/l. All samples were "Treatment Plant" category samples and parameter was not considered to be an ambient sample at the time of analysis.
	<0.003	4	0.002	LSL	Contract lab result has different reported MRL

Table 6. Comparison of 2010 Metals MRLs with reported non-detects.

Parameter (units)	Reported Result	N Samples	Published MRL	Lab	Resolution of Discrepancies
Se (mg/l)	<0.01	3	0.002	LSL	Contract lab result has different reported MRL

Parameters: Ag = silver; As = arsenic; Ca = calcium; Cd = cadmium; Cr = chromium; Hg = mercury; Mg = magnesium; Ni = nickel; Pb = lead; Se = selenium

Laboratory: ELS = Onondaga County; LSL = Life Sciences Laboratory

* = Value in parentheses represents the MRL when concentration procedures are used.

- **Solids** – The MRL for solids is 1 mg/l. Numerous results were reported ranging from <2 to <5 (Table 7). Given the high number of sample results with elevated detection levels, it is likely these are not data entry errors.

Table 7. Comparison of 2010 Solids MRLs with reported non-detects.

Parameter (units)	Reported Result	N Samples	Published MRL	Resolution of Discrepancies
TS (mg/l)	<20	1	10	MRL changes based on sample volume at time of analysis.
TSS (mg/l)	<2	104	1	
	<4	255	1	
	<5	1	1	

TS = total solids; TSS = Total suspended solids

- **Other parameters** – Nine other parameters were reported in the database with “less than MRL” values that did not match the published MRLs (Table 8). The number of these samples was generally low, raising the possibility of data entry error.

Table 8. Comparison of 2010 parameters’ MRLs - other than metals and solids - with reported non-detects. (CN-T = total cyanide; FCOLI-MF = fecal coliforms; K = potassium; Na = sodium; NH3-N = Ammonia-N)

Parameter (units)	Reported Result	N Samples	Published MRL	Laboratory	Resolution of Discrepancies
CN-T	<0.005	1	0.003	LSL	Contract lab result has different reported MRL
	<0.01	1	0.003	LSL	
FCOLI-MF	<3	2	1	ELS	MRL changes based on sample volume at time of analysis.
	<4	21	1	ELS	
	<5	70	1	ELS	
	<9	63	1	ELS	
	<10	26	1	ELS	

Table 8. Comparison of 2010 parameters' MRLs - other than metals and solids - with reported non-detects. (CN-T = total cyanide; FCOLI-MF = fecal coliforms; K = potassium; Na = sodium; NH3-N = Ammonia-N)

Parameter (units)	Reported Result	N Samples	Published MRL	Laboratory	Resolution of Discrepancies
K	<0.025	14	0.02	ELS	MRL changed due to sample dilution required to add matrix modifier.
Na	<4	100	3	ELS	MRL changed due to sample dilution required to add matrix modifier.
NH3-N	<0.12	1	0.01	ELS	Elevated MRL due to sample dilution
Turbidity	<0.01	1	0.1	ELS	Typographical error; sample result will be corrected from <0.01 to <0.10 in water quality database.

5. Verify parameters for limnological reasonableness

Several parameters were evaluated for limnological reasonableness for each sample, using the data from tributaries and the lakes. These evaluations were:

- Phosphorus (Table 9)
 - $SRP \leq TP$: Soluble reactive phosphorus (SRP) should be less than or equal to total phosphorus (TP)
 - $TDP \geq SRP$: Total dissolved phosphorus (TDP) should be greater than or equal to SRP
 - $TDP \leq TP$: TDP should be less than or equal to TP
- Nitrogen
 - $NH_3-N \leq TKN$: Ammonia as nitrogen (NH3-N) should be less than or equal to total Kjeldahl nitrogen (TKN)
 - $NH_3-N \leq TKN-F$: NH3-N should be less than or equal to filtered TKN
- BOD₅ and CBOD₅
 - $BOD_5 \geq CBOD_5$: Biochemical oxygen demand (BOD₅) should be greater than or equal to carbonaceous biochemical oxygen demand (CBOD₅)
- Parameter Correlations
 - TP versus TSS in Onondaga Lake and tributaries
 - TP versus chlorophyll- α in Onondaga Lake

During the course of this evaluation, it was noted that 17 samples with analytical results for one parameter did not have a corresponding result for another parameter (Attachment 4). The laboratory verified that 13 unpaired sample results for the Metro Final Effluent and Metro By-Pass were not indicative of a database error or missing data, as no TDP analyses were conducted for these samples. Four samples collected at Onondaga Creek (Route 20 and Spencer) appeared to be “missing” TDP and SRP data associated with TP results. Closer inspection revealed that the sample numbers were different for TP and TDP/SRP samples; therefore, while pairing the TP and TDP results using the sample number as a join, the TDP results were not properly matched. The laboratory was asked to verify that the sample numbers were correct:

Date (2010)	Site	TP sample number	SRP/TDP Sample number	Response
3/31	Onondaga Crk at Spencer	2010003182	2010003114	Sample numbers were verified. TP samples are composites; SRP & TDP samples are Grab
	Onondaga Crk at Rt. 20	2010003183	2010003113	
9/29	Onondaga Crk at Spencer	2010011729	2010011595	
	Onondaga Crk at Rt. 20	2010011730	2010011594	

Overall, the parameter comparisons for phosphorus, nitrogen and BOD₅/COD₅ were reasonable, with the failures noted in Table 9. By notation in the water quality database, the laboratory verified all but two of the results; however, only one sample was flagged in the database REMARK_CODE field with the flag “X” (created in 2009) to indicate: “Sample result failed the criteria for limnological reasonableness”.

Table 9. Limnological reasonableness tests failures, 2010. Rejection of the sample results is recommended where the application of the “X” qualifier is not approved.

Test	Result	Recommended	Sample Numbers	Laboratory Response
SRP ≤ TP	Two results where SRP ≥ TP. Laboratory verified in database	Report TP and SRP as <0.007 mg/l and qualify as “estimated”	2010010814	SRP flagged X
		Reject	2010011247	SRP flagged X
TDP ≥ SRP	Seven results where TDP ≤ SRP. Laboratory verified in database	Reject	2010007623	SRP & TDP flagged X
			2010007624	REJECT
			2010011247	SRP flagged X
			2010014340	SRP & TDP flagged X
		Report both results as 0.04 mg/l and quality as estimated	2010005924	SRP & TDP flagged X
	2010013632	SRP & TDP flagged X		
	Report TDP and SRP as <0.007 mg/l and qualify as “estimated”	2010010814	SRP flagged X	

Table 9. Limnological reasonableness tests failures, 2010. Rejection of the sample results is recommended where the application of the “X” qualifier is not approved.

Test	Result	Recommended	Sample Numbers	Laboratory Response
TDP ≤ TP	Four results where TDP ≥ TP. <i>Laboratory verified in database</i>	Reject	2010001759 2010011247 2010014152	REJECT TDP SRP flagged X REJECT TDP
		Report TP and TDP results as 0.01 mg/l and qualify as estimated	2010005926	TP, SRP & TDP flagged X

* equipment blank

Comparison of TP versus TSS in the lake and tributaries highlighted a few outlier sample results in the tributaries (Table 10; Attachment 5) that appear to be associated with relatively high flow.

Table 10. Comparison of TP vs TSS, Onondaga Lake tributaries 2010.

Tributary	Site	Date 2010	TP (mg/l)	TSS (mg/l)	Comments
Onondaga Crk	Dorwin	1/26	0.113	251	High flow 832 cfs at Spencer St (USGS provisional) 1/26
	Kirkpatrick	1/26	0.511	234	
Harbor Brk	Velasko	3/11	0.136	90	Elevated flow 34 cfs at Hiawatha (USGS provisional estimated)
	Hiawatha	8/24	0.161	35	Elevated flow 20 cfs at Hiawatha (USGS provisional) following peak of 185 cfs 8/23
Ninemile Crk	Rt. 48	1/26	0.171	47	High flow 718 cfs at Lakeland (USGS provisional)
		3/31	0.097	42	High flow 478 cfs at Lakeland (USGS provisional)
		8/24	0.120	44	High flow 258 cfs at Lakeland (USGS provisional)

6. Review for Outliers

The 2010 AMP data were reviewed for outliers in the tributaries and in the lake. Due to the nature of the data set, this review for outliers was conducted using different methods for tributaries and the lake:

Tributaries: The tributary data are influenced in large part by stream flow. Therefore, the 2010 concentration data for the monitored parameters were compared to the

10-year average (2000-2009) plus two standard deviations. Measurements outside the two standard deviation range were considered outliers. Data from the following sample locations were evaluated:

Tributary	Monitoring Station(s)
Onondaga Creek	Dorwin, Kirkpatrick and Spencer*
Harbor Brook	Velasko and Hiawatha
Ley Creek	Park St.
Ninemile Creek	Rt. 48
Tributary 5A	Trib5A
East Flume	EFlume

*Spencer station has 10 years of data for some parameters; less than 10 years for other parameters.

Other tributary sampling locations in 2010, which were not compared to 10-year averages due to shorter periods of record, were:

Tributary	Station	Period of record
Onondaga Creek	Adams St.	2006-2010
	Rt. 20	2006-2010
	Spencer St.*	>2000-2010
	Water St.	2007-2010
Harbor Brook	Onondaga Rd.	2008-2010
Sawmill Creek	Onondaga Lake Park	2003-2010
Bloody Brook	Onondaga Lake Park	2003-2009
	Old Liverpool Road	'02-'03; '09-'10

*Spencer St location has 10 years of data for some parameters; less than 10 years for other parameters.

Onondaga Lake: Histograms and temporal plots were constructed for analytical parameters of greatest interest:

- dissolved oxygen (DO)
- chlorophyll- α
- Phaeophytin- α
- Secchi depth
- fecal coliforms (FCOLI)
- E. coli (ECOLI)
- phosphorus (TP, SRP and TDP)
- nitrogen (NH₃-N, nitrate NO₃ and nitrite NO₂).

These parameters were evaluated separately for depths 0-3 meters, 6 meters, and 9-18 meters at both North and South Deep. Data outliers were identified through visual assessment of the plots.

The results of the outlier reviews are discussed below. In addition to the analyses described above, the County utilized Bill Walker’s outlier screening tool and provided the results in their comments on the draft of this memorandum.

a. *Tributaries- Annual*

Several parameters were identified with results greater than the defined screening values (10-year average plus two standard deviations). Many of these were found to occur on sample dates with high flow (based on provisional USGS flow data). Five sample dates were outstanding in terms of the number of exceedances – January 26, February 23, August 24, and December 2. Other exceedances are shown in Attachment 6.

- **January 26** was a relatively high daily average flow date for Onondaga Creek and Ninemile Creek, based on provisional USGS discharge data. There was 0.6 inches of precipitation measured at Syracuse Hancock Airport on January 25, with temperatures above freezing, suggesting high flows on January 26 were likely influenced by rainfall and snowmelt¹. Exceedances occurred predominantly in Onondaga Creek (Kirkpatrick and Dorwin) and Ninemile Creek. Parameters that exceeded the screening values on this date are listed in Table 11.

Table 11. Parameter concentrations exceeding 10-year average plus two standard deviations on January 26, 2010.

Parameter	KIRKPAT	DORWIN	VELASKO	HIAWATHA	RT48	PARK	TRIB5A	EFLUME
DO (mg/l)							13.07	
Fe (mg/l)		16.2						
Mn (mg/l)	0.295	0.296						
ORG-N (mg/l)		1.46						
SRP (mg/l)	0.044	0.027			0.046			
TDP (mg/l)					0.057			
TKN (mg/l)		1.55						
TP (mg/l)	0.511				0.171			
TSS (mg/l)	234							

Highlighted values exceeded the 10-year average plus 2 std deviations by a subjectively significant amount.

- **February 23** had elevated flows at Ley Creek, and relatively average flows at Onondaga Creek, Ninemile Creek and Harbor Brook. Although precipitation measured at Syracuse Hancock Airport for the February 22-23 time period

¹ NOWData - NOAA Online Weather Data (<http://www.nws.noaa.gov/climate/xmacis.php?wfo=bgm>)

totaled 0.4 inches, the precipitation did not consistently increase discharge throughout the watershed. Most of the exceedances occurred at the Ley Creek and Tributary 5A sampling stations. Parameters that exceeded the screening values on this date are listed in Table 12.

Table 12. Parameter concentrations exceeding 10-year average plus two standard deviations on February 23, 2010.

Parameter	KIRKPAT	DORWIN	VELASKO	HIAWATHA	RT48	PARK	TRIB5A	EFLUME
BOD5 (mg/l)		4						
Chloride (mg/l)			473			1260		1070
Fe (mg/l)							6.32	
Na (mg/l)			278			747		
NH3-N (mg/l)								2.12
NO2 (mg/l)							0.121	
TDS (mg/l)						2643		
TSS (mg/l)							120	

Highlighted values exceeded the 10-year average plus 2 std deviations by a subjectively significant amount.

- **August 24** was a high flow date for Onondaga Creek, Ninemile Creek, and Ley Creek; and an elevated flow date for Harbor Brook (which was 20 cfs coming off a high peak on August 23 of 185 cfs). No precipitation measured at Syracuse Hancock Airport on August 24, although a rainfall of 4.21 inches was measured for August 22. Exceedances were predominantly at the Onondaga Creek Dorwin station. Parameters that exceeded the screening values on this date are listed in Table 13.

Table 13. Parameter concentrations exceeding 10-year average plus two standard deviations on August 24, 2010. Highlighted values exceeded the 10-year average plus 2 std deviations by a subjectively significant amount.

Parameter	KIRKPAT	DORWIN	VELASKO	HIAWATHA	RT48	PARK	TRIB5A	EFLUME
BOD5 (mg/l)		5						
FColi-MF (mg/l)		4900						
ORG-N (mg/l)		1.06						
SRP (mg/l)		0.02			0.032			
TP (mg/l)				0.161				

Table 13. Parameter concentrations exceeding 10-year average plus two standard deviations on August 24, 2010. Highlighted values exceeded the 10-year average plus 2 std deviations by a subjectively significant amount.

Parameter	KIRKPAT	DORWIN	VELASKO	HIAWATHA	RT48	PARK	TRIB5A	EFLUME
TDP (mg/l)					0.048			
TKN (mg/l)		1.13						
TOC (mg/l)	6.65	8.62						
TOC-F (mg/l)	5.97	7.76			6.06			

- **December 2** was a high flow date for Onondaga Creek, Ninemile Creek, Ley Creek, and Harbor Brook; both Ley Creek (237 cfs) and Harbor Brook (29 cfs) were coming off of higher flow peaks (310 cfs and 80 cfs, respectively) which occurred on December 1. There was no precipitation reported at Syracuse Hancock Airport for December 2, while 1.36 inches were measured on December 1. Exceedances were predominantly measured at the Onondaga Creek Dorwin station. Parameters that exceeded the screening values on this date are listed in Table 14.

Table 14. Parameter concentrations exceeding 10-year average plus two standard deviations on December 2, 2010.

Parameter	KIRKPAT	DORWIN	VELASKO	HIAWATHA	RT48	PARK	TRIB5A	EFLUME
Ca (mg/l)							178	
NO2 (mg/l)	0.096	0.123						
SRP (mg/l)		0.043			0.035			
TDP (mg/l)		0.047			0.046			
TP (mg/l)	0.199							

Highlighted values exceeded the 10-year average plus 2 std deviations by a subjectively significant amount.

On one occasion, high fecal coliform bacteria exceeding screening values were measured at four of the eight tributary sampling stations. This occurred on June 28, which was a relatively high flow date for Onondaga Creek, and an elevated flow date for Ninemile Creek, Ley Creek, and Harbor Brook. Precipitation for this date was measured at 0.75 inches at Syracuse Hancock Airport. For this date, fecal coliform was the only parameter that exceeded the screening values (Table 15).

Table 15. Parameter concentrations exceeding 10-year average plus two standard deviations on June 28, 2010.

Parameter	KIRKPAT	DORWIN	VELASKO	HIAWATHA	RT48	PARK	TRIB5A	EFLUME
FCOLI-MF (count/100)		5100	6000			6000		2700

Highlighted values exceeded the 10-year average plus 2 std deviations by a subjectively significant amount.

Some parameters exceeded the screening values multiple times during 2010. Parameters with more than 3 exceedances during 2010 are shown in Table 16.

Table 16. Number of tributary samples exceeding screening values by parameter and percent by sample location.

Parameter	Total N of Exceedances	Percent of Exceedances							
		KIRKPAT	DORWIN	VELASKO	HIAWATHA	RT48	PARK	TRIB5A	EFLUME
DO	13			15%	15%		15%	46%	8%
BOD5	11		46%	9%					46%
SRP	11	9%	55%		9%	27%			
FCOLI-MF	9		22%	22%			22%		33%
NH3-N	8						12%		88%
TKN	8		38%			12%	12%		38%
Chloride	7			14%			14%	14%	57%
Na	6		50%	17%	17%		17%		
ORG-N	5		60%			40%			
TP	5	40%		20%	20%	20%			
NO2	4	25%	25%				25%	25%	
TDP	4		25%			75%			

Highlighted values are the maximum number of exceedances by sample location.

Values with bold red text indicate more than half of the exceedances for that parameter occurred at one location.

For 6 of the 12 parameters shown in Table 16, more than half of the exceedances occurred at one sampling station:

- More than half of the exceedances for SRP, Na and ORG-N occurred at the Onondaga Creek Dorwin station.
- More than half of the exceedances for NH3-N and Chloride occurred at the East Flume station.
- More than half of the TDP exceedances occurred at the Ninemile Creek Route 48 sampling station.

b. *Onondaga Lake North and South basins*

As described above, to identify possible outliers in Onondaga Lake data for 2010, histograms and temporal plots were constructed for analytical parameters of greatest interest. The results are detailed below, and in Attachment 7:

- Bacteria: relatively high concentrations for routine samples as noted in Table 17. These higher concentrations occurred coincident with high-flow events on Onondaga Creek. The elevated bacteria results are presumably a consequence of storm water and/or CSO runoff.

Table 17. Bacteria outliers, Onondaga Lake 2010.

Date	Site	Sample Number	Fecal Coliform (count/100 ml)	<i>E. Coli</i> (count/100 ml)
3/23	0m South	2010002865	84	178
4/1	0m South	2010003236	308	365
6/7	0m South	2010005881	600	770
10/26	0m South	2010012981	5700	866

- Chlorophyll- α and Phaeophytin- α : No outliers were identified.
- Secchi disk: No outliers were identified.
- Dissolved Oxygen: One measurement in South Deep (0m) was 13.31 mg/l on August 31, as compared to measurements taken August 10 (8 mg/l) and September 8 (7.93 mg/l). The following notation was found in the water quality database for this August 31 measurement: “*Actual field measurement taken at depth of 0.2 meter*”. The County verified this measurement with the buoy 2-m data from South Deep on the same date. Otherwise, nothing unusual was noted for the 2010 field DO measurements. Based on DO field measurements, fall turnover occurred between October 5 and October 21.
- Phosphorus (TP, SRP, TDP): Typical annual pattern.
- Nitrogen (NH3-N, NO2, NO3, TKN): One NO₂ result (6/29 at 0.198 mg/l) from South LWL appears elevated relative to other data (sample number 2010006879).

c. *Outliers identified using Bill Walker’s tool*

As described above, the County screened the database to identify possible outliers using the tool developed by Bill Walker. As a result of this analysis, the County made the following adjustments to the water quality database:

Sample #	Location	Parameter	Result
2010005721	OUTLET2	Fecal Coliforms	Reported result of 5200 was a transposition error; actual sample result was 24. Database corrected.
2010011276	BYPASS	Cr, Ni, Fe	Results were flagged "X", and a sample remark added: "Cr, Fe, and Ni results fail analytical reasonableness. Result cannot be confirmed and appear to be outliers due to possible analytical error".

7. Ultra low-level mercury results

The County subcontracts ultra-low-level mercury and methyl mercury analyses. In 2010, samples were collected on three dates – April 20, August 31, and October 26 - and analyzed by Frontier Global Sciences, Inc. (FGS). (Table 18).

Table 18. Summary of analytical results for ultra-low-level mercury in Onondaga Lake, 2010 (units in ng/L)

SOURCE	4/20		8/31		10/26	
	Hg	Hg (methyl)	Hg	Hg (methyl)	Hg	Hg (methyl)
Lake South Station:						
3m	2.93	<0.050	2.32	0.205	1.12	0.131
18m	1.85	<0.050	1.97	0.207	2.21	0.112
18m Duplicate	1.68	<0.050	1.45	0.240	2.12	0.101
Lake North Station:						
3m	1.31	0.050	1.09	0.158	1.41	0.136
18m	1.23	0.058	1.56	0.268	7.8	0.132
Equipment/Field Blanks:						
Teflon Dunker-Glass	<0.50	<0.050	<0.50	<0.050	<0.50	<0.050
Teflon Dunker	<0.50	<0.050	<0.50	<0.050	<0.50	<0.050

During initial data quality review, the data for the blank "Teflon Dunker-Glass" (sample 2010012737 collected 10/26) was missing from the water quality database. The County corrected this omission on 3/18/2011.

Unlike the other analytical data in the database, ultra low-level mercury data reports from FGS were received and reviewed for data usability for:

- Complete and accurate Chains of Custody
- Holding times
- Instrument calibration (blanks, spikes, and duplicates)

Review of the ultra-low-level total and methyl mercury analytical data identified several areas where quality control criteria were not met (Table 19). Detailed discussion of these quality control issues is provided in the sections following.

Table 19. Summary of quality control issues identified with 2009 ultra low-level total mercury and methyl mercury analyses.

Data Review Elements	Sample Date		
	04/20	08/31	10/26
Sample Receipt	✓	✓	✓
Holding Time	✓	✓	✓
Matrix Duplicates/Triplicates	▲	▲	✓
Matrix Spike/Matrix Spike Duplicate Recovery and RPD	✓	✓	✓
Laboratory Control Sample/Laboratory Control Sample Duplicate Recovery and RPD	✓	✓	✓
Preparation Blanks	▲	▲	▲
Initial and Continuing Calibration Blanks	▲	▲	▲
Initial and Continuing Calibration Verification	✓	✓	✓
Method Detection Limits (MDLs) and Practical Quantitation Limits (PQLs)	✓	✓	✓
Equipment and Field Blanks	✓	✓	▲
Field Duplicate RPDs	✓	▲	✓

✓ - Quality control criteria met
 ▲ - Possible issue identified; no action required.
 ✗ - Quality control criteria not met; action required.

a. *Matrix Duplicates/Triplicates*

April 26 data set - The matrix duplicate for total mercury was within RPD limits, using one of the Onondaga Lake samples. The matrix duplicate for methyl mercury, performed on a sample that was not collected in Onondaga Lake, did not meet the RPD limits and was flagged “QR-04”, which indicates:

RPD and/or RSD value exceeded control limit. Sample concentrations less than 10 times the reporting limit and the difference between the QC values was less than 2 times the reporting limit.

This excursion from data quality control limits was not referenced in the Case Narrative of the laboratory report.

August 31 data set – In the Case Narrative, the laboratory states: “The Relative Percent Difference (RPD) for the duplicate for total mercury in batch F009143 (DUP1) was above the control limit of 24%, at 35.8%. Sample concentrations are less than 10 times the reporting limit and the difference between the QC values is less than 2 times the reporting limit. The duplicate was reported with a QR-04 qualifier.” This was verified on the matrix duplicate results page of the report. The matrix duplicate of methyl mercury was reported as nondetect (ND), therefore, there was no RPD calculated.

October 26 data set – no quality control issues noted for matrix duplicates.

b. *Preparation Blanks*

While generally reported as non-detect, the laboratory did provide some qualifiers to the total mercury preparation blanks (Table 20). These do not affect the usability of the data.

Table 20. Preparation Blanks qualifier summary for total mercury.

Sample Date	Qualifier	Definitions
4/20	One of four qualified QB-04	<i>QB-04: "The blank was preserved to 2% BrCl rather than 1%. The control limit for blanks preserved to greater than 1% BrCl is the preservation percentage multiplied by the MRL."</i>
8/31	One of four qualified QB-04	
10/26	One of four qualified QB-04	

c. *Calibration Blanks*

In a few cases, calibration blanks were reported with values less than the MRL but were not flagged "U" to indicate "Analyte included in the analysis, but not detected". These do not affect the usability of the data (Table 21).

Table 21. Initial and Continuing Calibration blanks summary.

Sample Date	Total Hg			Methyl Hg		
	Blank ID	Found (ng/l)	MRL (ng/l)	Blank ID	Found (ng/l)	MRL (ng/l)
4/20	CCB1	0.01	0.50	ICB1	0.0009	0.045
	CCB2	0.02	0.50			
	CCB3	0.02	0.50			
8/31	CCB1	0.03	0.50	ICB1	0.004	0.045
	CCB2	0.01	0.50			
	CCB3	0.05	0.50			
	CCB4	0.23	0.50			
10/26	CCB2	0.12	0.50	CCB3	0.007	0.045
	CCB3	0.09	0.50			
	CCB4	0.17	0.50			
	CCB5	0.06	0.50			

d. *Field/Equipment Blanks*

The field/equipment blanks were reported as non-detect; there were no issues with blank contamination.

However, one of the blank results presented in the laboratory report is missing from the water quality database. The blank is the Teflon Dunker-Glass collected on 10/26 (sample number 2010012737).

e. *Field Duplicates*

Field duplicate RPDs were within 20%, with the exception of the field duplicate for total mercury collected on 8/31. The RPD was calculated at 30%. Discussion with the field sampling team is warranted.

8. Data Flags

Since 2004, the laboratory has annotated AMP analytical results with standard data flags as defined by NELAC (Table 22). The laboratory provides comments in the database to clarify the rationale for the data flags assigned to the sample results.

Table 22. Summary of data flags applied by the laboratory to the 2010 data.

Lab Flag	Definition	2010 Occurrence	AMP Water Quality Database Implications
P	Unacceptable for quality assurance criteria	0 records	No results with a "P" flag will be included in the AMP water quality database
V	Reported value is considered estimated due to variance from quality control or assurance criteria	107 records, (see att 8): <ul style="list-style-type: none"> • 50 records were flagged for not meeting sample acceptance criteria • 55 records were flagged for other failures to meet QC criteria • 2 records were flagged but no Laboratory Comment was provided. 	No results with a "V" flag will be included in the AMP water quality database
N	Variance from quality control or assurance criteria, however result is considered acceptable under established NELAC guidelines	264 records	Included in water quality database
J	Indicates that the reported value is greater than MRL but below PQLs - result is considered an estimate	0 records	Included in water quality database
U	Indicates that the measured value is below the MRL. Possible MRL/PQL elevation dependent upon analyzed mass, volumes, and/or dilutions. Reported value is the <MRL	4 records (Specifically, the field blanks for the ultra-low level Hg and Methyl-Hg results from the lake)	Included in water quality database
X	Reported value fails limnological reasonableness	22 records	Results reviewed individually for decision regarding database inclusion

9. Summary of Recommended Data Actions

Based on the results of this evaluation, EcoLogic recommends that the following sample results with the X flag be qualified or rejected for the reasons noted below:

Sample Number	Sample Date 2010	Description	Parameter	Result (mg/l)	Reason
2010001759	2/23	Harbor Brook - Hiawatha	TDP TP	0.062 0.053	Does not meet limnological reasonableness criteria TDP ≤ TP ACTION: REJECT TDP
2010002585 2010002586 2010002587 2010002591	3/15	Ley Creek - Park Street Onondaga Lake Outlet 2 ft. Onondaga Lake Outlet 12 ft. Harbor Brook - Velasko Road	TDP	0.012 0.008 0.01 0.01	Crk-Blank Dunker Churn (Crew B) blank contamination of 0.003 mg/l (5x blank = 0.015) ACTION: QUALIFY ALL
2010005092 2010005093 2010005095 2010005096 2010005097 2010005098 2010005099 2010005100	5/18	Lake 0m South Lake 3m South Lake 6m South Lake 9m South Lake 12m South Lake 15m South Lake 18m South Lake 6m South Duplicate	TP	0.021 0.019 0.015 0.014 0.014 0.015 0.015 0.014	Lake Equip. Blank (Pump) contamination of 0.011 mg/l (5x blank = 0.055) ACTION: QUALIFY ALL
2010005092 2010005093 2010005095 2010005096 2010005097 2010005098 2010005099 2010005100	5/18	Lake 0m South Lake 3m South Lake 6m South Lake 9m South Lake 12m South Lake 15m South Lake 18m South Lake 6m South Duplicate	TDP	0.006 0.006 0.006 0.005 0.005 0.005 0.005 0.006	Lake Equip. Blank (Pump) contamination of 0.009 mg/l (5x blank = 0.045) ACTION: QUALIFY ALL
2010005926	6/8	Harbor Brk - Velasko	TDP TP	0.011 0.010	Does not meet limnological reasonableness criteria TDP ≤ TP, considered to be within method precision ACTION: Report both results as 0.01 mg/l in water quality database and qualify as estimated
2010005924	6/8	Tributary 5a – State Fair Blvd	SRP TDP	0.039 0.037	Does not meet limnological reasonableness criteria TDP ≥ SRP ACTION: Report both results as 0.04 mg/l in water quality database and qualify as estimated

Sample Number	Sample Date 2010	Description	Parameter	Result (mg/l)	Reason
2010007623	7/29	River Buoy #269 Top	SRP TDP	0.045 0.036	Does not meet limnological reasonableness criteria TDP ≥ SRP ACTION: REJECT ALL
2010007624	7/29	River Buoy #269 Mid	SRP TDP	0.043 0.020	Does not meet limnological reasonableness criteria TDP ≥ SRP ACTION: REJECT ALL
2010010814	9/14	Crk-Harbor Brook @ Velasko Road	SRP TP TDP	0.007 0.005 0.004	Does not meet limnological reasonableness criteria SRP ≤ TP or TDP ≥ SRP; likely to be result of method precision ACTION: report all as < 0.007 mg/l in the water quality database and qualify as estimated
2010011247	9/23	Lake 18m North	SRP TP TDP	0.067 0.042 0.057	Does not meet limnological reasonableness criteria SRP ≤ TP or TDP ≥ SRP or TDP ≤ TP ACTION: REJECT ALL
2010013638	11/9	Crk-Tributary 5a @ State Fair Blvd	SRP	0.008	Crk-Blank SS Pail (Crew A) blank contamination of 0.003 mg/l (5x blank = 0.015) ACTION: QUALIFY
2010013638	11/9	Crk-Tributary 5a @ State Fair Blvd	TDP	0.014	Crk-Blank SS Pail (Crew A) blank contamination of 0.005 mg/l (5x blank = 0.025) ACTION: QUALIFY
2010013638	11/9	Crk-Tributary 5a @ State Fair Blvd	TSS	59	Crk-Blank SS Pail (Crew A) blank contamination of 19 mg/l (5x blank = 95) ACTION: QUALIFY
2010013632	11/9	Harbor Brk - Hiawatha	SRP TDP	0.041 0.038	Does not meet limnological reasonableness criteria TDP ≥ SRP ACTION: Report both results as 0.04 mg/l in the water quality database and qualify as estimated
2010014152	11/18	Crk-Blank SS Pail (Crew A)	TDP TP	0.005 <0.003	Does not meet limnological reasonableness criteria TDP ≤ TP ACTION: REJECT TDP

Sample Number	Sample Date 2010	Description	Parameter	Result (mg/l)	Reason
2010014340	11/24	Onondaga Crk - Dorwin	SRP TDP	0.02 0.009	Does not meet limnological reasonableness criteria TDP ≥ SRP ACTION: REJECT ALL

Attachment 1. Ambient Monitoring Program 2010 - Parameter Method Reportable Limits Summary

Parameter	Code	Methods *	Method Reportable	Accuracy	Precision
			Limit (mg/l)	(%)	(%)
Bio Oxy Demand 5-day	BOD5	2:(5210 B)	2.0	104	15.0
Carbon. Bio Oxy Demand 5-day	CBOD5	2:(5210 B)	2.0	92.0	16.0
Total Alk as CaCO3	ALK-T	2:(2320 B)	1.0	97.2	3.2
Total Organic Carbon	TOC	2:(5310B)	0.5	100.4	1.0
Total Organic Carbon - Filtered	TOC-F	2:(5301B)	0.5		
Total Inorganic Carbon	TIC	2:(5301B)	0.5	97.9	0.7
Total Kjeldahl Nitrogen as N	TKN	3:(10-107-06-2-D)	0.15	101.5	7.8
Low Ammonia Nitrogen as N	NH3-N	2:(4500-NH3-H)	0.01	95.8	4.3
Organic Nitrogen as N	ORG-N	3:(10-107-06-2-D)	0.01		
Nitrate as N	NO3	3:(10-107-04-1-C)	0.01	100.6	2.6
Nitrite as N	NO2	3:(10-107-04-1-C)	0.01	99.9	1.7
Total Phosphorus (Manual)**	TP	2:(4500-P E)	0.003	101.2	4.0
Total Dissolved Phosphorus	TDP	2:(4500-P E)	0.003	101.2	4.0
Soluble Reactive Phosphorus	SRP (OP)	2:(4500-P E)	0.001	100.6	4.8
Silica	SiO2	2:(4500-Si-D)	0.5	103.0	7.0
Sulfates	SO4	6:(426 C)	10.0	98.0	4.0
Total Sulfides	S=	1:(376.1)	0.2		
Total Solids	TS	2:(2540 B)	10.0		
Total Volatile Solids	TVS	2:(2540 E)	10.0		
Total Suspended Solids	TSS	2:(2540 D)	1.0		
Total Volatile Suspended Solids	VSS	2:(2540 E)	1.0		
Total Dissolved Solids	TDS	2:(2540 C)	20.0	99.3	14.0
Arsenic - furnace	As - GFA	4:(200.9)	0.002	101.9	4.0
Total Cadmium-furnace	Cd - GFA	4:(200.9)	0.0008	104.4	3.2
Total Cadmium	Cd	4:(200.7)	0.005		
Total Calcium	Ca	2:(3111B)	1.0	100.8	2.2
Total Chromium	Cr	4:(200.7)	0.008(0.002)*	102.6	2.2
Chloride- Lachat	Cl	3:(10-117-07-1-B)	1.0		
Residual Chlorine	CL2 RES	1:(330.4)	0.1		
Total Copper	Cu	4:(200.7)	0.01(0.0025)*	102.4	2.4
Total Cyanide	CN-T	3:(10-204-00-1-A)	0.003		
Total Iron	Fe	4:(200.7)	0.04	104.7	3
Total Lead - furnace	Pb - GFA	4:(200.9)	0.002	99.1	4.2
Total Lead	Pb	4:(200.7)	0.02		
Total Magnesium	Mg	2:(3111B)	0.1	101.1	1.1
Total Manganese	Mn	4:(200.7)	0.02	102.2	2.3
Total Low-Level Mercury	Hg	7:(1631E)	0.0000015	101.5	4.6
Total Mercury (Cold Vapor)	Hg	1:(245.2)	0.00002	100.6	4.4
Selenium - furnace	Se - GFA	4:(200.9)	0.002	98.0	4.0
Total Sodium	Na	2:(3111B)	3.0	102.4	1.9
Total Nickel	Ni	4:(200.7)	0.015(0.00375)*	101	1.9
Potassium	K	2:(3111B)	0.020	101.2	2.4
Total Silver	Ag	4:(200.7)	0.01	101.5	2.7
Total Zinc	Zn	4:(200.7)	0.02(0.005)*	103.1	2.4
Turbidity		2:(2130B)	0.1	94.9	3.6

Attachment 1. Ambient Monitoring Program 2010 - Parameter Method Reportable Limits Summary

Parameter	Code	Methods *	Method Reportable Limit (mg/l)	Accuracy (%)	Precision (%)
Conductivity	COND	2:(2510B)	-		
Dissolved Oxygen - Field	DO - Field	1:(360.1)	0.1		
Dissolved Oxygen - Lab	DO - Lab	1:(360.1)	-		
Dissolved Oxygen - Winkler	DO - Winkler	1:(360.2)	-		
pH	pH	1:(150.1)	-		
Temperature	TEMP	1:(170.1)	-		
Phaeophytin <i>a</i>	PHEO-A	2:(10200 H.2)	0.2 (mg/m3)		
Chlorophyll <i>a</i>	CHLOR-A	2:(10200 H.2)	0.2 (mg/m3)		
Enterococci	ECOCCI	5:(1600)	1.0 (cells/100mL) MPN		
E. Coliform	ECOLI-Colilert	2:(9223 B)	1.0 (cells/100mL) MPN		
Fecal Coliform	FCOLI-MF	2:(9222 D)	1.0 (cells/100 mL)		

Methods listed are applicable for all matrices of water, wastewater, and surface waters.

* Indicates method has a lower level of detection due to sample concentration

**Started in August 2000 for all AMP samples.

1: Indicates USEPA Methods for Chemical Analysis of Water and Waste 1979

2: Indicates Standard Methods (18th Edition)

3: Indicates Lachat Instruments QuickChem Methods: Approved for use by USEPA - NYSDOH - ELAP

4: Indicates USEPA "Methods for the Determination of Metals in Environmental Samples" Supplement 1, May 1994

5: Enterolert EPA 1997

6: Indicates Standard Methods (15th Edition)

7: Indicates USEPA Method 1631, Revision E, August 202

Attachment 2. List of 2010 samples and field duplicates with Relative Percent Difference (RPD) exceeding 20% and absolute difference is greater than 2x the MRL. *Recommended Action:* Discuss with sampling team.

Source	Date (2010)	Sample No.	Duplicate No.	Parameter	Units	Sample Conc.	Dup Conc	RPD %	Abs. Diff.	2xMRL	Laboratory response
Effluent											
Metro Final Effluent	3/29	2010003040	2010003041	TP	mg/L	0.056	0.039	36	0.017	0.006	Temporal discrepancy of grab samples.
Metro Final Effluent	3/10	2010002381	2010002411	TKN	mg/L	1.25	2.37	62	1.12	0.300	
Metro Final Effluent	5/3	2010004472	2010004410	TP	mg/L	0.074	0.05	39	0.024	0.006	Sample = composite; Duplicate = grab.
Metro Final Effluent	9/1	2010010218	2010010252	NH3-N	mg/L	0.234	0.319	31	0.085	0.020	
Lake South											
Lake 6m South	4/20	2010003951	2010003956	TKN	mg/L	0.483	0.995	69	0.512	0.300	Low-level contam. suspected in dup.
Lake 6m South	4/20	2010003951	2010003956	TKN-F	mg/L	0.411	0.967	81	0.556	0.300	Low-level contam. suspected in dup.
Seneca River											
River Buoy #316 Top	7/29	2010007615	2010007617	SRP	mg/L	0.023	0.03	26	0.007	0.002	
Harbor Brook											
Crk-Harbor Brook @ Hiawatha	1/5	2010000084	2010000100	Turbidity	NTU	4.74	6.04	24	1.3	0.200	
Onondaga Creek											
Crk-Onondaga Creek @ Kirkpatrick	8/24	2010009731	2010009743	Na	mg/L	73.3	91.4	22	18.1	6	
Tributary 5a											
Crk-Tributary 5a @ State Fair Blvd	1/26	2010000795	2010000805	Turbidity	NTU	8.01	20.2	86	12.19	0.20	Differences could be "high flow" related.
Ninemile Creek											
Crk-Nine Mile Creek @ Lakeland Rt 48	3/31	2010003103	2010003112	Na	mg/L	56.9	86.1	41	29.2	6	Sample dilution; 2x MRL revised to 20.
Crk-Nine Mile Creek @ Lakeland Rt 48	3/31	2010003103	2010003112	NH3-N	mg/L	0.111	0.09	21	0.021	0.020	
Crk-Nine Mile Creek @ Lakeland Rt 48	3/31	2010003103	2010003112	TSS	mg/L	33	42	24	9	2	Sample dilution; 2x MRL revised to 8. Temporal discrepancy of grab samples.
Creek Metro Effluent											
Crk-Metro Effluent	11/9	2010013642	2010013628	Fe	mg/L	1.15	1.6	33	0.45	0.080	

Attachment 2. List of 2010 samples and field duplicates with Relative Percent Difference (RPD) exceeding 20% and absolute difference is greater than 2x the MRL (continued). *Recommended Action:* Discuss with sampling team.

Source	Date (2010)	Sample No.	Duplicate No.	Parameter	Units	Sample Conc.	Dup Conc	RPD %	Abs. Diff.	2xMRL	Laboratory response
Lake South											
Lake Tube Composite (South)	4/7	2010003412	2010003413	Phaeophytin-a	mg/m3	1.12	0.21	137	0.91	0.4	Sampling variability is naturally high for these two parameters - Phaeophytin-a and Chlorophyll-a - which contributes to the high occurrence of field duplicate quality control exceedences.
Lake Tube Composite (South)	5/4	2010004523	2010004524	Chlorophyll-a	mg/m3	9.08	6.94	27	2.14	0.4	
Lake Tube Composite (South)	6/2	2010005614	2010005615	Chlorophyll-a	mg/m3	5.34	7.48	33	2.14	0.4	
Lake Tube Composite (South)	6/29	2010006881	2010006882	Phaeophytin-a	mg/m3	2.19	1.07	69	1.12	0.4	
Lake Tube Composite (South)	7/13	2010007511	2010007512	Chlorophyll-a	mg/m3	10.68	8.54	22	2.14	0.4	
Lake Tube Composite (South)	7/13	2010007511	2010007512	Phaeophytin-a	mg/m3	1.66	1.17	35	0.49	0.4	
Lake Tube Composite (South)	7/27	2010008243	2010008258	Phaeophytin-a	mg/m3	1.23	0.64	63	0.59	0.4	
Lake Tube Composite (South)	8/10	2010008967	2010008968	Chlorophyll-a	mg/m3	6.94	5.34	26	1.6	0.4	
Lake Tube Composite (South)	8/10	2010008967	2010008968	Phaeophytin-a	mg/m3	2.4	0.27	160	2.13	0.4	
Lake Tube Composite (South)	9/8	2010010488	2010010489	Chlorophyll-a	mg/m3	8.01	6.41	22	1.6	0.4	
Lake Tube Composite (South)	10/5	2010011974	2010011975	Phaeophytin-a	mg/m3	<0.2	0.69	110	0.49	0.4	
Lake Tube Composite (South)	10/21	2010012687	2010012688	Chlorophyll-a	mg/m3	2.14	2.67	22	0.53	0.4	
Lake Tube Composite (South)	10/21	2010012687	2010012688	Phaeophytin-a	mg/m3	0.85	<0.2	124	0.65	0.4	
Lake Tube Composite (South)	10/26	2010012992	2010012993	Chlorophyll-a	mg/m3	1.6	2.14	29	0.54	0.4	
Lake Tube Composite (South)	10/26	2010012992	2010012993	Phaeophytin-a	mg/m3	1.01	<0.2	134	0.81	0.4	
Lake Tube Composite (South)	11/2	2010013383	2010013384	Chlorophyll-a	mg/m3	2.14	2.67	22	0.53	0.4	
Lake Tube Composite (South)	11/16	2010013881	2010013882	Chlorophyll-a	mg/m3	3.74	7.48	67	3.74	0.4	
Seneca River											
River Buoy #316 Bottom	7/29	2010007616	2010007618	Chlorophyll-a	mg/m3	4.81	2.67	57	2.14	0.4	
River Buoy #316 Bottom	7/29	2010007616	2010007618	Phaeophytin-a	mg/m3	<0.2	1.44	151	1.24	0.4	
River Buoy #316 Top	8/17	2010008665	2010008667	Chlorophyll-a	mg/m3	4.27	3.2	29	1.07	0.4	
River Buoy #316 Bottom	8/17	2010008666	2010008668	Chlorophyll-a	mg/m3	2.14	3.2	40	1.06	0.4	
River Buoy #316 Top	8/17	2010008665	2010008667	Phaeophytin-a	mg/m3	3.2	1.28	86	1.92	0.4	
River Buoy #316 Bottom	8/17	2010008666	2010008668	Phaeophytin-a	mg/m3	2.35	1.28	59	1.07	0.4	
River Buoy #316 Top	9/21	2010011099	2010011101	Phaeophytin-a	mg/m3	0.96	0.53	58	0.43	0.4	
River Buoy #316 Bottom	9/21	2010011100	2010011102	Phaeophytin-a	mg/m3	0.53	3.84	151	3.31	0.4	

Note: Yellow highlighting indicates RPD > 100%

Attachment 3. These metals were reported at levels less than the MRL, but the MRL doesn't match with the published values. The MRLs for metals varies depending on whether concentration procedures were used. When there are relatively few samples for which the MRL does not match the reported value, this may be an indicator of data entry error.

Since there are many records for these three analytes that do not match the MRL, it is assumed that these reported values are correct:

Calcium (99 records, reported SRESULT <1.25, MRL = 1)

Magnesium (100 records, reported SRESULT <0.125, MRL = 0.1)

Nickle (81 records, reported SRESULT <0.0038, MRL = 0.00375 (presumably rounding error)

Recommended ACTION: Review the following data records and verify that the reported RESULT is correct.

SAMPLE_NO	LAB_	SRESULT	MRL_	MRL_	MRL_Conc	MRL_Conc	Laboratory Responses
	METHOD_NO		Jan-May	May-Dec	Proc_JanMay	Proc_MayDec	
Ag (mg/l) - 1 record							
2010003665	710	<0.002	0.01	0.01	-	-	Contract Lab
As (mg/l) - 3 records							
2010001295	710	<0.01	0.002	0.002	-	-	Contract Lab
2010007479	710	<0.01	0.002	0.002	-	-	Contract Lab
2010012444	710	<0.01	0.002	0.002	-	-	Contract Lab
Cd (mg/l) - 13 records							
2010000101	161	<0.005	0.0008	0.0008	-	-	Conc Proc not used.
2010002973	161	<0.005	0.0008	0.0008	-	-	Conc Proc not used.
2010003344	161	<0.005	0.0008	0.0008	-	-	Conc Proc not used.
2010005970	161	<0.005	0.0008	0.0008	-	-	Conc Proc not used.
2010006897	161	<0.005	0.0008	0.0008	-	-	Conc Proc not used.
2010008392	161	<0.005	0.0008	0.0008	-	-	Conc Proc not used.
2010011157	161	<0.005	0.0008	0.0008	-	-	Conc Proc not used.
2010011276	161	<0.005	0.0008	0.0008	-	-	Conc Proc not used.
2010013202	161	<0.005	0.0008	0.0008	-	-	Conc Proc not used.
2010001295	710	<0.002	0.0008	0.0008	-	-	Contract Lab
2010003665	710	<0.002	0.0008	0.0008	-	-	Contract Lab
2010007479	710	<0.002	0.0008	0.0008	-	-	Contract Lab
2010012444	710	<0.002	0.0008	0.0008	-	-	Contract Lab
Cr (mg/l) - 3 records							
2010001295	710	<0.01	0.008	0.008	0.002	0.002	Contract Lab
2010003665	710	<0.01	0.008	0.008	0.002	0.002	Contract Lab
2010007479	710	<0.01	0.008	0.008	0.002	0.002	Contract Lab
Hg (mg/l) - 37 records							
2010004924	543	<0.000001	0.00002	0.00002	-	-	Ultra-low level MRL
2010004925	543	<0.000001	0.00002	0.00002	-	-	Ultra-low level MRL
2010004926	543	<0.000001	0.00002	0.00002	-	-	Ultra-low level MRL
2010004927	543	<0.000001	0.00002	0.00002	-	-	Ultra-low level MRL
2010004928	543	<0.000001	0.00002	0.00002	-	-	Ultra-low level MRL
2010004929	543	<0.000001	0.00002	0.00002	-	-	Ultra-low level MRL
2010004932	543	<0.000001	0.00002	0.00002	-	-	Ultra-low level MRL
2010004934	543	<0.000001	0.00002	0.00002	-	-	Ultra-low level MRL
2010004935	543	<0.000001	0.00002	0.00002	-	-	Ultra-low level MRL
2010004936	543	<0.000001	0.00002	0.00002	-	-	Ultra-low level MRL
2010004937	543	<0.000001	0.00002	0.00002	-	-	Ultra-low level MRL
2010005977	543	<0.000001	0.00002	0.00002	-	-	Ultra-low level MRL
2010005978	543	<0.000001	0.00002	0.00002	-	-	Ultra-low level MRL
2010005979	543	<0.000001	0.00002	0.00002	-	-	Ultra-low level MRL
2010005980	543	<0.000001	0.00002	0.00002	-	-	Ultra-low level MRL
2010005981	543	<0.000001	0.00002	0.00002	-	-	Ultra-low level MRL
2010005982	543	<0.000001	0.00002	0.00002	-	-	Ultra-low level MRL
2010005985	543	<0.000001	0.00002	0.00002	-	-	Ultra-low level MRL

SAMPLE_NO	LAB_	SRESULT	MRL_	MRL_	MRL_Conc	MRL_Conc	Laboratory Responses
	METHOD_NO		Jan-May	May-Dec	Proc_JanMay	Proc_MayDec	
Hg (mg/l) - 37 records (continued)							
2010005987	543	<0.000001	0.00002	0.00002	-	-	Ultra-low level MRL
2010005988	543	<0.000001	0.00002	0.00002	-	-	Ultra-low level MRL
2010005989	543	<0.000001	0.00002	0.00002	-	-	Ultra-low level MRL
2010005990	543	<0.000001	0.00002	0.00002	-	-	Ultra-low level MRL
2010006060	543	<0.000001	0.00002	0.00002	-	-	Ultra-low level MRL
2010011577	543	<0.000001	0.00002	0.00002	-	-	Ultra-low level MRL
2010011578	543	<0.000001	0.00002	0.00002	-	-	Ultra-low level MRL
2010011579	543	<0.000001	0.00002	0.00002	-	-	Ultra-low level MRL
2010011580	543	<0.000001	0.00002	0.00002	-	-	Ultra-low level MRL
2010011581	543	<0.000001	0.00002	0.00002	-	-	Ultra-low level MRL
2010011583	543	<0.000001	0.00002	0.00002	-	-	Ultra-low level MRL
2010011584	543	<0.000001	0.00002	0.00002	-	-	Ultra-low level MRL
2010011588	543	<0.000001	0.00002	0.00002	-	-	Ultra-low level MRL
2010011589	543	<0.000001	0.00002	0.00002	-	-	Ultra-low level MRL
2010011593	543	<0.000001	0.00002	0.00002	-	-	Ultra-low level MRL
2010001295	710	<0.0002	0.00002	0.00002	-	-	Contract Lab
2010003665	710	<0.0002	0.00002	0.00002	-	-	Contract Lab
2010007479	710	<0.0002	0.00002	0.00002	-	-	Contract Lab
2010012444	710	<0.0002	0.00002	0.00002	-	-	Contract Lab
Ni (mg/l) - 3 records							
2010001295	710	<0.01	0.015	0.015	0.00375	0.00375	Contract Lab
2010003665	710	<0.01	0.015	0.015	0.00375	0.00375	Contract Lab
2010007479	710	<0.01	0.015	0.015	0.00375	0.00375	Contract Lab
Pb (mg/l) - 13 records							
2010000101	161	<0.02	0.002	0.002	-	-	ICP method not furnace
2010002973	161	<0.02	0.002	0.002	-	-	ICP method not furnace
2010003344	161	<0.02	0.002	0.002	-	-	ICP method not furnace
2010005970	161	<0.02	0.002	0.002	-	-	ICP method not furnace
2010006897	161	<0.02	0.002	0.002	-	-	ICP method not furnace
2010008392	161	<0.02	0.002	0.002	-	-	ICP method not furnace
2010011157	161	<0.02	0.002	0.002	-	-	ICP method not furnace
2010011276	161	<0.02	0.002	0.002	-	-	ICP method not furnace
2010013202	161	<0.02	0.002	0.002	-	-	ICP method not furnace
2010001295	710	<0.003	0.002	0.002	-	-	Contract Lab
2010003665	710	<0.003	0.002	0.002	-	-	Contract Lab
2010007479	710	<0.003	0.002	0.002	-	-	Contract Lab
2010012444	710	<0.003	0.002	0.002	-	-	Contract Lab
Se (mg/l) - 3 records							
2010001295	710	<0.01	0.002	0.002	-	-	Contract Lab
2010007479	710	<0.01	0.002	0.002	-	-	Contract Lab
2010012444	710	<0.01	0.002	0.002	-	-	Contract Lab

Attachment 3 (continued). These solids were reported at levels less than the MRL, but the MRL doesn't match with the published values. When there are relatively few samples for which the MRL does not match the reported value, this may be an indicator of data entry error.

Since there are many records for TSS analytes that do not match the MRL as shown below, it is assumed that these reported values are correct:

TSS (104 records, reported SRESULT <2, MRL = 1)

TSS (255 records, reported SRESULT <4, MRL = 1)

Recommended ACTION: Review the following data records and verify that the reported RESULT is correct.

Laboratory response: MRL will change based on sample volume.

SAMPLE_NO	LAB_	SRESULT	MRL_	MRL_
	METHOD_NO		Jan-May	May-Dec
<i>TSS (mg/l) - 1 record</i>				
2010011962	143	<20	10	10
<i>TSS (mg/l) - 1 record</i>				
2010005369	4	<5	1	1

Attachment 3 (continued). These other parameters were reported at levels less than the MRL, but the MRL doesn't match with the published values. When there are relatively few samples for which the MRL does not match the reported value, this may be an indicator of data entry error.

Since there are many records for these two analytes that do not match the MRL as shown below, it is assumed that these reported values are correct:

- FCOLI (70 records, reported SRESULT <5, MRL = 1)
- FCOLI (63 records, reported SRESULT <9, MRL = 1)
- Na (100 records, reported SRESULT <4, MRL = 3)

Recommended ACTION: Review the following data records and verify that the reported RESULT is correct.

SAMPLE_NO	LAB_	SRESULT	MRL_	MRL_	Laboratory Responses
	METHOD_NO		Jan-May	May-Dec	
CN-T (mg/l) - 2 records					
2010001295	665	<0.01	0.003	0.003	Contract Lab
2010003665	665	<0.005	0.003	0.003	Contract Lab
FCOLI-MF (count/100) - 49 records					
2010000805	80	<10	1	1	MRL based on sample volume used
2010001507	80	<10	1	1	MRL based on sample volume used
2010002061	80	<10	1	1	MRL based on sample volume used
2010003104	80	<10	1	1	MRL based on sample volume used
2010003229	80	<10	1	1	MRL based on sample volume used
2010004171	80	<3	1	1	MRL based on sample volume used
2010004588	80	<10	1	1	MRL based on sample volume used
2010004870	80	<3	1	1	MRL based on sample volume used
2010006031	80	<10	1	1	MRL based on sample volume used
2010006346	80	<10	1	1	MRL based on sample volume used
2010006349	80	<10	1	1	MRL based on sample volume used
2010006351	80	<10	1	1	MRL based on sample volume used
2010006352	80	<10	1	1	MRL based on sample volume used
2010006353	80	<10	1	1	MRL based on sample volume used
2010006545	80	<10	1	1	MRL based on sample volume used
2010006546	80	<10	1	1	MRL based on sample volume used
2010006566	80	<10	1	1	MRL based on sample volume used
2010006890	80	<10	1	1	MRL based on sample volume used
2010006892	80	<10	1	1	MRL based on sample volume used
2010006894	80	<10	1	1	MRL based on sample volume used
2010007166	80	<10	1	1	MRL based on sample volume used
2010007169	80	<10	1	1	MRL based on sample volume used
2010007173	80	<10	1	1	MRL based on sample volume used
2010007174	80	<10	1	1	MRL based on sample volume used
2010007515	80	<10	1	1	MRL based on sample volume used
2010007519	80	<10	1	1	MRL based on sample volume used
2010007521	80	<10	1	1	MRL based on sample volume used
2010007523	80	<10	1	1	MRL based on sample volume used
2010007819	80	<4	1	1	MRL based on sample volume used
2010007970	80	<4	1	1	MRL based on sample volume used
2010007977	80	<4	1	1	MRL based on sample volume used
2010008614	80	<4	1	1	MRL based on sample volume used
2010008956	80	<4	1	1	MRL based on sample volume used
2010008974	80	<4	1	1	MRL based on sample volume used
2010010259	80	<4	1	1	MRL based on sample volume used
2010010499	80	<4	1	1	MRL based on sample volume used
2010010502	80	<4	1	1	MRL based on sample volume used
2010011261	80	<4	1	1	MRL based on sample volume used
2010011262	80	<4	1	1	MRL based on sample volume used
2010011263	80	<4	1	1	MRL based on sample volume used

SAMPLE_NO	LAB_	SRESULT	MRL_	MRL_	Laboratory Responses
	METHOD_NO		Jan-May	May-Dec	
<i>FCOL-MF (count/100) - 49 records - continued</i>					
2010011264	80	<4	1	1	MRL based on sample volume used
2010011488	80	<4	1	1	MRL based on sample volume used
2010011496	80	<4	1	1	MRL based on sample volume used
2010012500	80	<4	1	1	MRL based on sample volume used
2010012614	80	<4	1	1	MRL based on sample volume used
2010013849	80	<4	1	1	MRL based on sample volume used
2010015115	80	<4	1	1	MRL based on sample volume used
2010015474	80	<4	1	1	MRL based on sample volume used
2010015484	80	<4	1	1	MRL based on sample volume used
<i>K (mg/l) - 14 records</i>					
2010003095	87	<0.025	0.02	0.02	Sample dilution required to add matrix modifier
2010003096	87	<0.025	0.02	0.02	Sample dilution required to add matrix modifier
2010005915	87	<0.025	0.02	0.02	Sample dilution required to add matrix modifier
2010005916	87	<0.025	0.02	0.02	Sample dilution required to add matrix modifier
2010005917	87	<0.025	0.02	0.02	Sample dilution required to add matrix modifier
2010006315	87	<0.025	0.02	0.02	Sample dilution required to add matrix modifier
2010011223	87	<0.025	0.02	0.02	Sample dilution required to add matrix modifier
2010011558	87	<0.025	0.02	0.02	Sample dilution required to add matrix modifier
2010011559	87	<0.025	0.02	0.02	Sample dilution required to add matrix modifier
2010011560	87	<0.025	0.02	0.02	Sample dilution required to add matrix modifier
2010013629	87	<0.025	0.02	0.02	Sample dilution required to add matrix modifier
2010013630	87	<0.025	0.02	0.02	Sample dilution required to add matrix modifier
2010013631	87	<0.025	0.02	0.02	Sample dilution required to add matrix modifier
2010013867	87	<0.025	0.02	0.02	Sample dilution required to add matrix modifier
<i>NH3-N (mg/l) - 1 record</i>					
2010012568	125	<0.12	0.01	0.01	Elevated MRL due to sample dilution
<i>Turbidity (NTU) - 1 record</i>					
2010000788	145	<0.01	0.1	0.1	Should be <0.1; corrected in LIMS

Attachment 4(a). Unpaired sample results from limnological reasonableness analysis (TDP-SRP comparison).

ACTION: The laboratory should verify whether TDP results should be present in the database for these samples.

Sample No.	Source	Category	Start Date	Issue	Lab Response
2010009824	Metro By-Pass Event #31	Treatment Plant	9/16/2010	missing TDP results	Verified that all unpaired sample results are not indicative of a database error or missing data; no TDP analysis included for these
2010011157	Metro By-Pass Event #33	Treatment Plant	9/30/2010	missing TDP results	
2010011162	Metro By-Pass Event #33	Treatment Plant	10/1/2010	missing TDP results	
2010011276	Metro By-Pass Event #34	Treatment Plant	10/1/2010	missing TDP results	
2010011894	Metro By-Pass Event #36	Treatment Plant	10/15/2010	missing TDP results	
2010011895	Metro By-Pass Event #36	Treatment Plant	10/15/2010	missing TDP results	
2010013201	Metro By-Pass Event #41	Treatment Plant	12/1/2010	missing TDP results	
2010013202	Metro By-Pass Event #41	Treatment Plant	12/1/2010	missing TDP results	
2010014578	Metro By-Pass Event #42	Treatment Plant	12/2/2010	missing TDP results	
2010014579	Metro By-Pass Event #42	Treatment Plant	12/2/2010	missing TDP results	
2010014026	Metro Final Effluent	Treatment Plant	11/22/2010	missing TDP results	
2010014816	Metro Final Effluent	Treatment Plant	12/7/2010	missing TDP results	
2010015196	Metro Final Effluent	Treatment Plant	12/14/2010	missing TDP results	

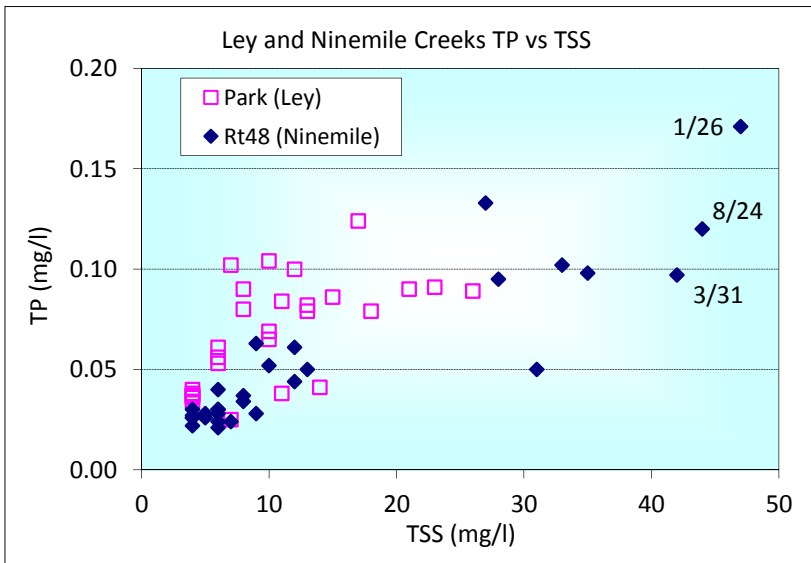
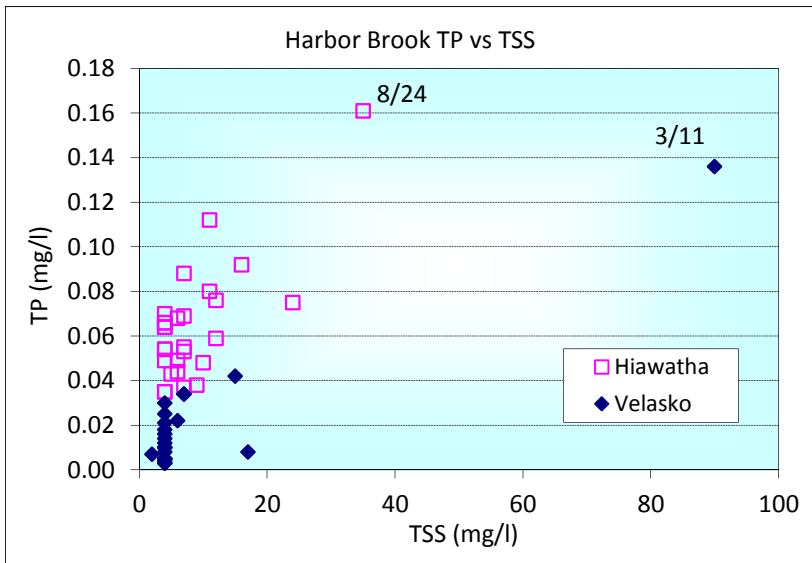
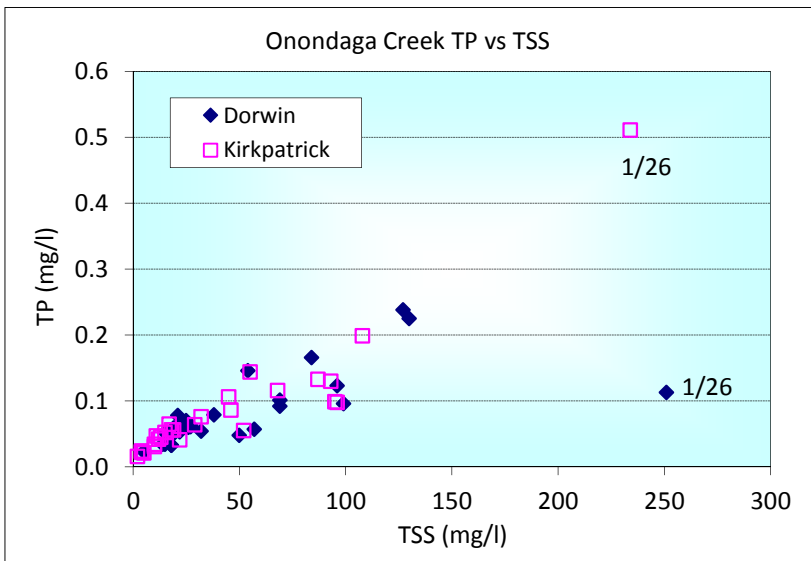
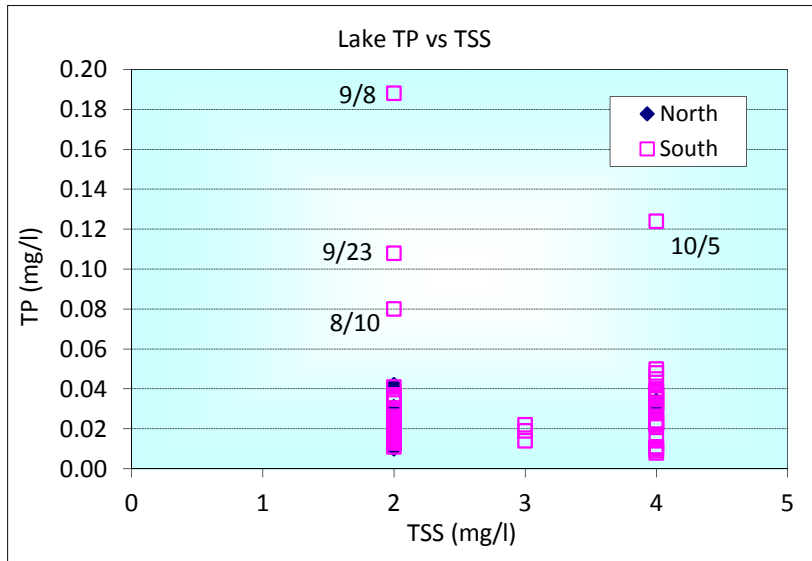
Attachment 4(b). Samples that appeared to be missing paired TDP data. The sample numbers for the TP and TDP results were different in the database, therefore the attempt to connect the two results using the sample ID failed.

ACTION: The laboratory should verify that the correct sample ID numbers are used for these sample results.

Sample Date	Source	Category	TP ID	TDP ID
3/31/2010	Crk-Onondaga Creek @ Spencer St	Onondaga Creeks	2010003182	2010003114
3/31/2010	Crk-Onondaga Creek @ Rt20	Onondaga Creeks	2010003183	2010003113
9/29/2010	Crk-Onondaga Creek @ Spencer St	Onondaga Creeks	2010011729	2010011595
9/29/2010	Crk-Onondaga Creek @ Rt20	Onondaga Creeks	2010011730	2010011594

Laboratory response: Verified that the sample numbers for TP and SRP/TDP are correct for these sample results. The samples for TP are collected as "Composites" and the SRP/TDP are collected as "Grab", as part of the Onondaga Creek Tributary Data Collection Enhancement Project.

Attachment 5. TP vs TSS in Onondaga Lake and tributaries, 2010.



Attachment 6. Analytical results from 2010 that were greater than the 10-year average (2000-2009) plus two standard deviations.

Onondaga Creek Sites

SITE: DORWIN															
Average of VRESULT	START_DATE														
ConcatenateText	1/26	2/23	3/15	6/8	6/28	7/7	7/21	8/3	8/24	9/14	9/29	11/18	11/24	12/2	12/21
BOD5 (mg/L): 3.15		4		4		4			5			4			
Cu (mg/L): 0.0137											0.0144				
FCOLI-MF (count/100): 3636					5100				4900						
Fe (mg/L): 9.35	16.2														
Mn (mg/L): 0.288	0.296														
Na (mg/L): 170							172	195		172					
NO2 (mg/L): 0.102														0.123	
ORG-N (mg/L): 0.934	1.46			1.04					1.06						
SRP (mg/L): 0.0131	0.027		0.014						0.02			0.02	0.043	0.014	
TDP (mg/L): 0.0311														0.047	
TKN (mg/L): 0.997	1.55			1.11					1.13						
TOC (mg/L): 5.01									8.62						
TOC-F (mg/L): 4.58									7.76						

SITE: KIRKPAT				
Average of VRESULT	START_DATE			
ConcatenateText	1/26	8/24	9/29	12/2
K (mg/L): 5.42			5.46	
Mn (mg/L): 0.24	0.295			
NO2 (mg/L): 0.0823				0.096
SRP (mg/L): 0.0428	0.044			
TOC (mg/L): 6.17		6.65		
TOC-F (mg/L): 5.56		5.97		
TP (mg/L): 0.199	0.511			0.199
TSS (mg/L): 213	234			

Harbor Brook Sites

SITE: VELASKO						
Average of VRESULT	START_DATE					
ConcatenateText	2/23	3/11	5/11	6/1	6/28	12/16
BOD5 (mg/L): 3.94		4				
Chloride (mg/L): 425	473					
DO-field (mg/L): 15.2			16.33			15.16
FCOLI-MF (count/100): 2710				4300	6000	
Na (mg/L): 270	278					
TP (mg/L): 0.0859		0.136				

SITE: HIAWATHA						
Average of VRESULT	START_DATE					
ConcatenateText	1/19	3/31	8/19	8/24	12/8	12/16
DO-field (mg/L): 14.4					14.51	16.37
Na (mg/L): 289	296					
SO4 (mg/L): 666	674					
SRP (mg/L): 0.0658			0.066			
TP (mg/L): 0.153				0.161		
Zn (mg/L): 0.0288		0.0302				

Attachment 6. Analytical results from 2010 that were greater than the 10-year average (2000-2009) plus two standard deviations (continued)

Ley Creek

SITE: PARK								
Average of VRESULT	START_DATE							
ConcatenateText	2/23	3/31	5/25	6/1	6/28	8/19	12/8	12/16
Chloride (mg/L): 854	1260							
DO-field (mg/L): 14.3							15.52	15.96
FCOLI-MF (count/100): 4436				6000	6000			
Mn (mg/L): 0.19			0.202					
Na (mg/L): 514	747							
NH3-N (mg/L): 0.677						0.936		
NO2 (mg/L): 0.0473						0.0497		
TDS (mg/L): 1868	2643							
TKN (mg/L): 1.29						1.38		
Zn (mg/L): 0.0307		0.041						

Ninemile Creek

SITE: RT48					
Average of VRESULT	START_DATE				
ConcatenateText	1/26	3/15	6/8	8/24	12/2
NO3 (mg/L): 1.51			1.65		
ORG-N (mg/L): 0.813		0.904	1.36		
SRP (mg/L): 0.024	0.046			0.032	0.035
TDP (mg/L): 0.041	0.057			0.048	0.046
TKN (mg/L): 1.09			1.61		
TOC-F (mg/L): 4.85			5.16	6.06	
TP (mg/L): 0.138	0.171				
Zn (mg/L): 0.0362			0.0473		

East Flume

SITE: EFLUME													
Average of VRESULT	START_DATE												
ConcatenateText	1/5	2/16	2/23	4/27	5/3	5/11	5/25	6/1	6/8	6/22	6/28	7/7	9/29
BOD5 (mg/L): 8.32				9			9		10	10			11
Chloride (mg/L): 1048	1,130	1100	1070				1060						
DO-field (mg/L): 19.6												21.77	
FCOLI-MF (count/100): 2415						3700		6000			2700		
K (mg/L): 22.3									25.3				
NH3-N (mg/L): 1.49	1.74	2.27	2.12	2.52		1.59	1.76		1.7				
TKN (mg/L): 2.52	3.34	3.14		2.95									

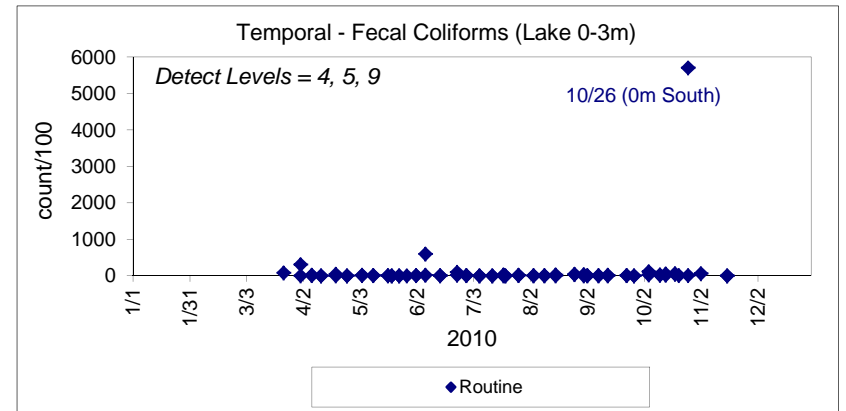
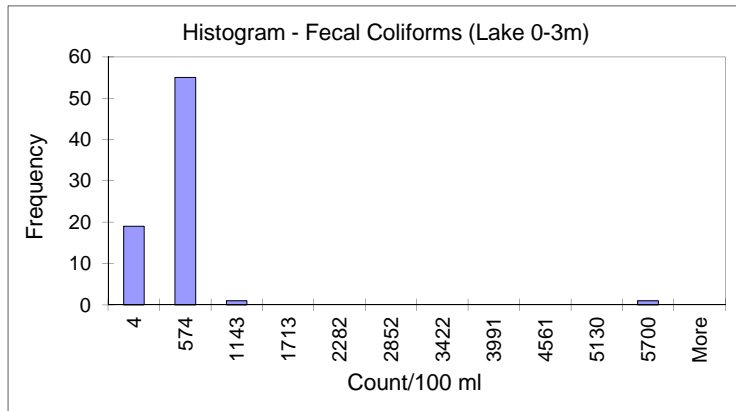
Attachment 6. Analytical results from 2010 that were greater than the 10-year average (2000-2009) plus two standard deviations (continued).

Tributary 5A

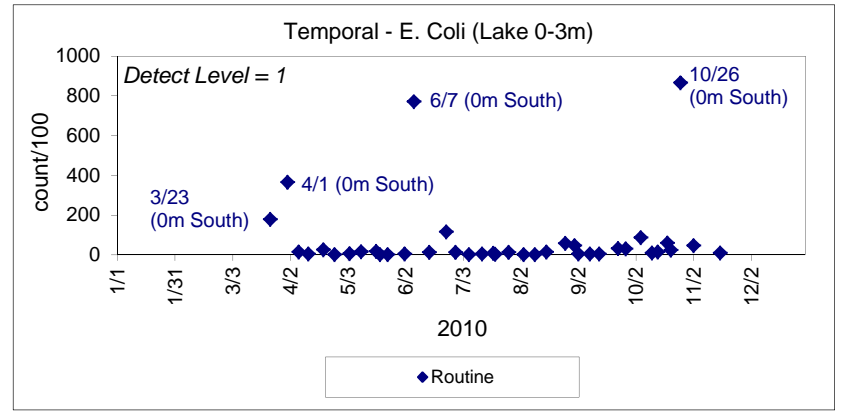
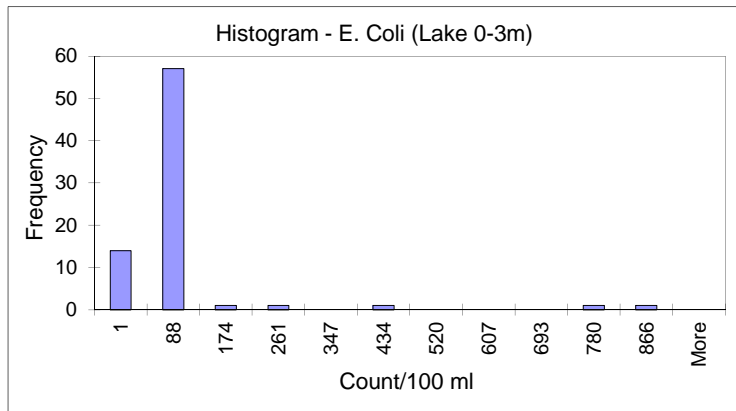
SITE: TRIB5A										
Average of VRESULT	START_DATE									
ConcatenateText	1/5	1/26	2/16	2/23	4/5	4/19	11/9	12/2	12/8	12/21
Ca (mg/L): 172							221	178		182
Chloride (mg/L): 537							590			
Cr (mg/L): 0.0978							0.131			
Cu (mg/L): 0.0544							0.063			
DO-field (mg/L): 10.5	10.72	13.07	10.98		11.12	10.9			13.75	
Fe (mg/L): 4.33				6.32			7.16			
Hardness (mg/L): 506							616			515
Ni (mg/L): 0.152							0.156			
NO2 (mg/L): 0.0861				0.121						
Pb (mg/L): 0.0113							0.0117			
TDS (mg/L): 1406							1526			
TSS (mg/L): 96.6				120						

Attachment 7(a). Outlier evaluation for bacteria in Onondaga Lake, 2010.

<i>Fcoliforms</i>	<i>Frequency</i>
4	19
574	55
1143	1
1713	0
2282	0
2852	0
3422	0
3991	0
4561	0
5130	0
5700	1
More	0

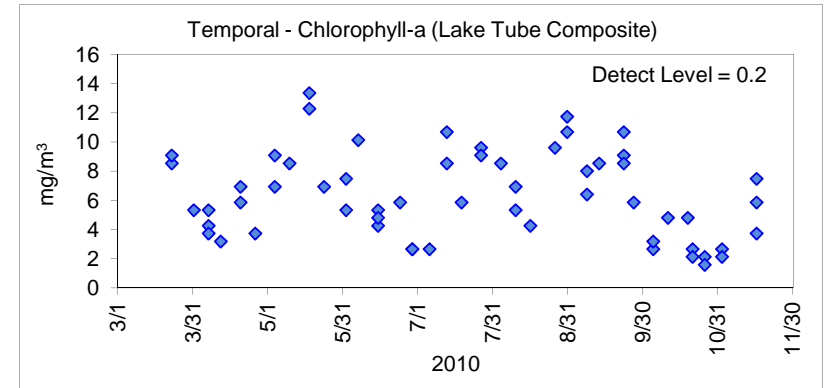
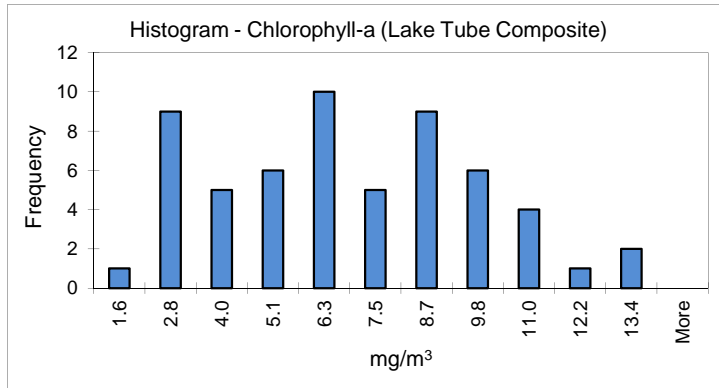


<i>E.Coli</i>	<i>Frequency</i>
1	14
88	57
174	1
261	1
347	0
434	1
520	0
607	0
693	0
780	1
866	1
More	0

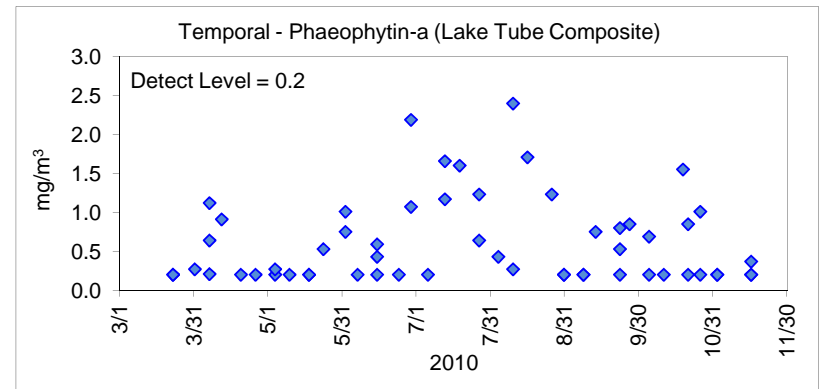
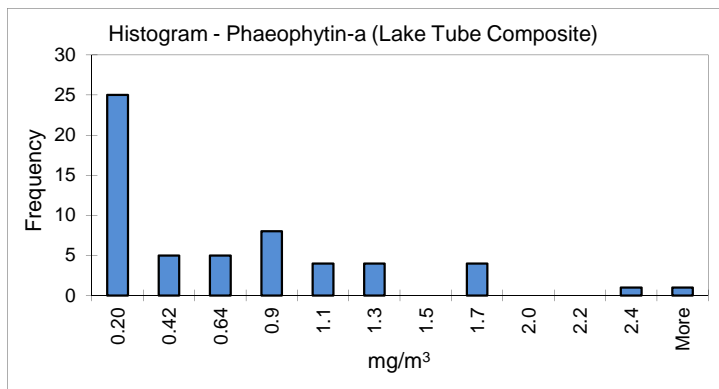


Attachment 7(b). Outlier evaluation for chlorophyll-a and phaeophytin-a in Onondaga Lake, 2010.

Chlorophyll-a	Frequency
1.6	1
2.8	9
4.0	5
5.1	6
6.3	10
7.5	5
8.7	9
9.8	6
11.0	4
12.2	1
13.4	2
More	0

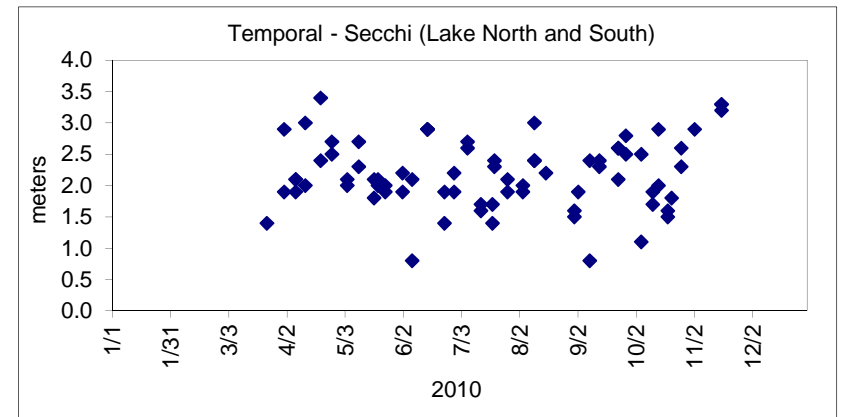
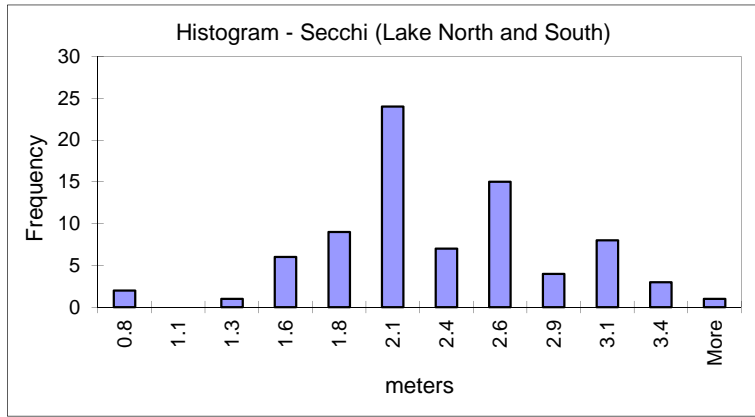


Phaeophytin-a	Frequency
0.20	25
0.42	5
0.64	5
0.9	8
1.1	4
1.3	4
1.5	0
1.7	4
2.0	0
2.2	0
2.4	1
More	1



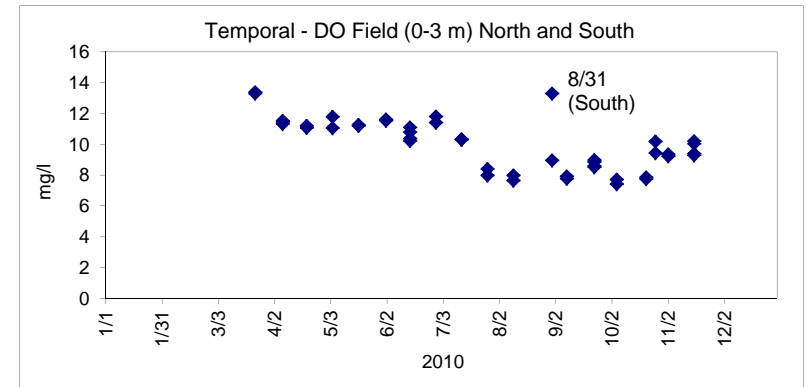
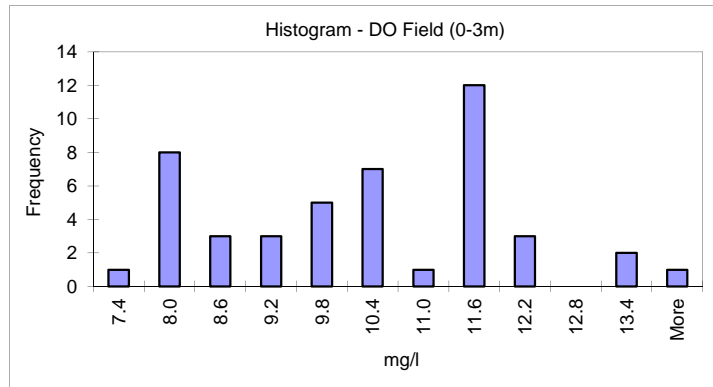
Attachment 7(c). Outlier evaluation for Secchi depth in Onondaga Lake, 2010.

Secchi	Frequency
0.8	2
1.1	0
1.3	1
1.6	6
1.8	9
2.1	24
2.4	7
2.6	15
2.9	4
3.1	8
3.4	3
More	1

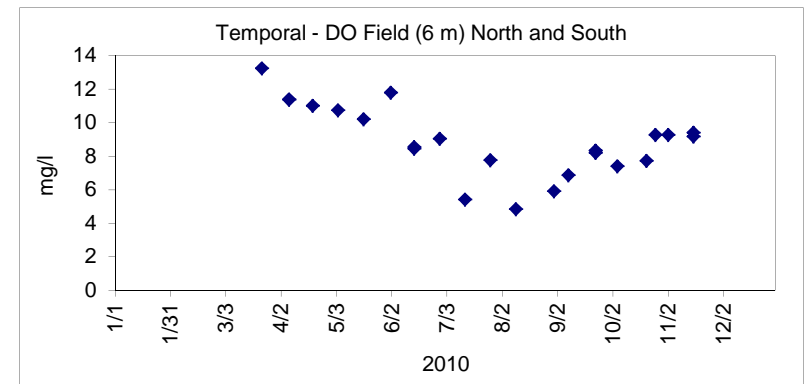
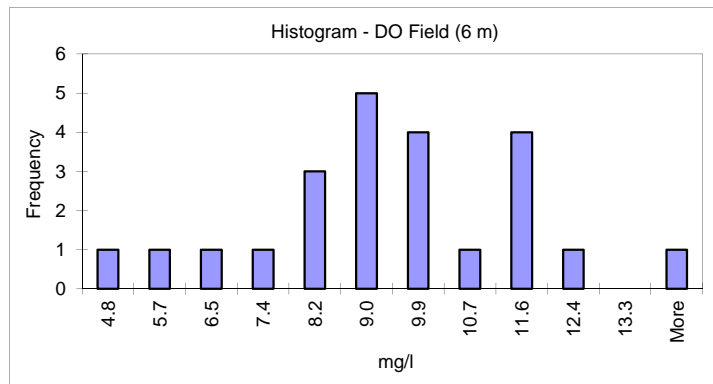


Attachment 7(d). Outlier evaluation for dissolved oxygen in Onondaga Lake, 2010.

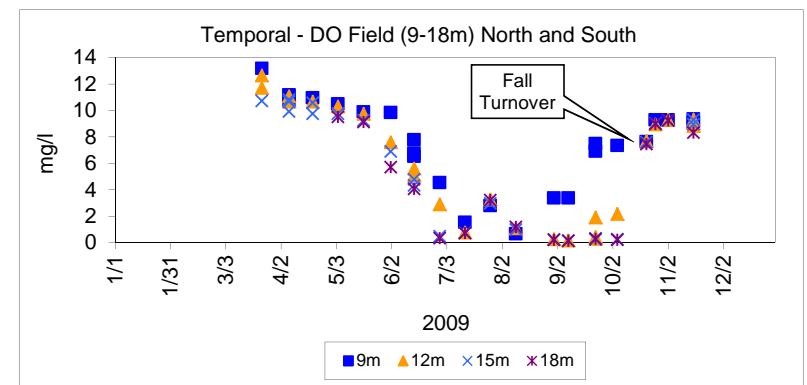
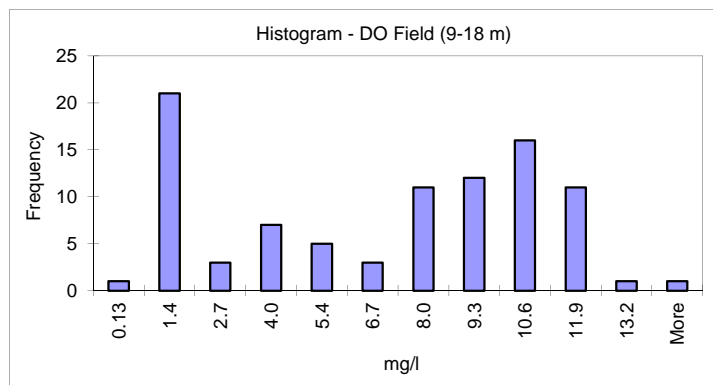
DO-Field	Frequency
7.4	1
8.0	8
8.6	3
9.2	3
9.8	5
10.4	7
11.0	1
11.6	12
12.2	3
12.8	0
13.4	2
More	1

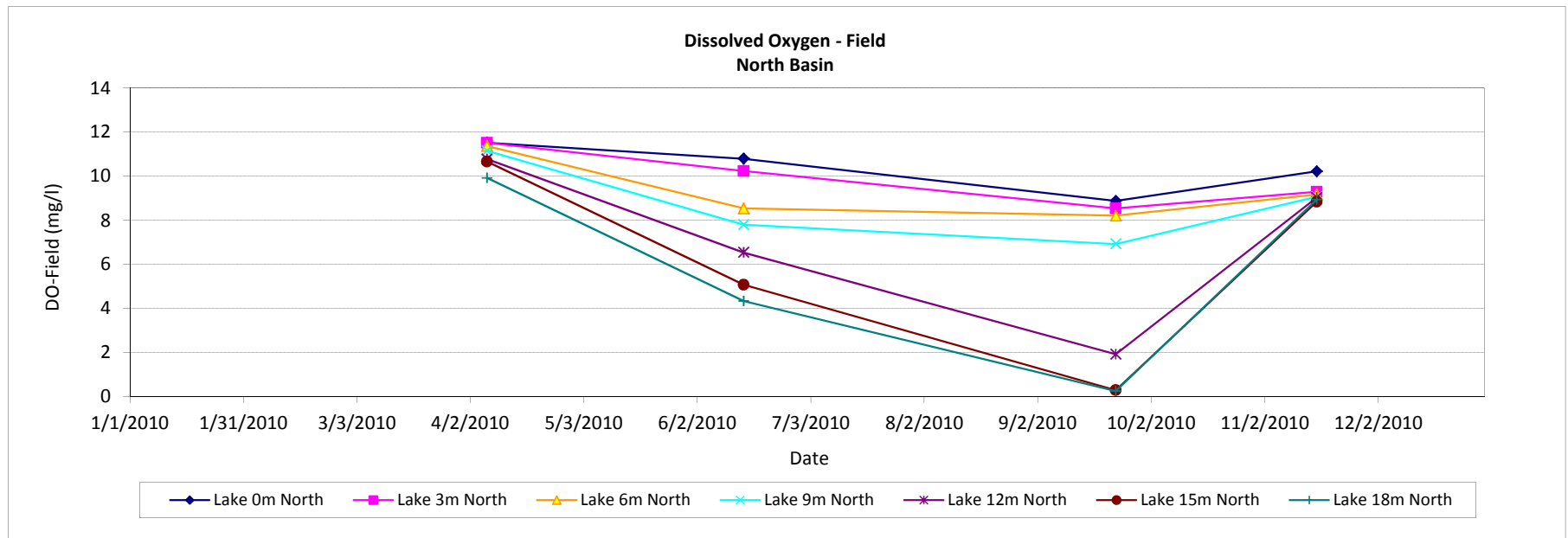
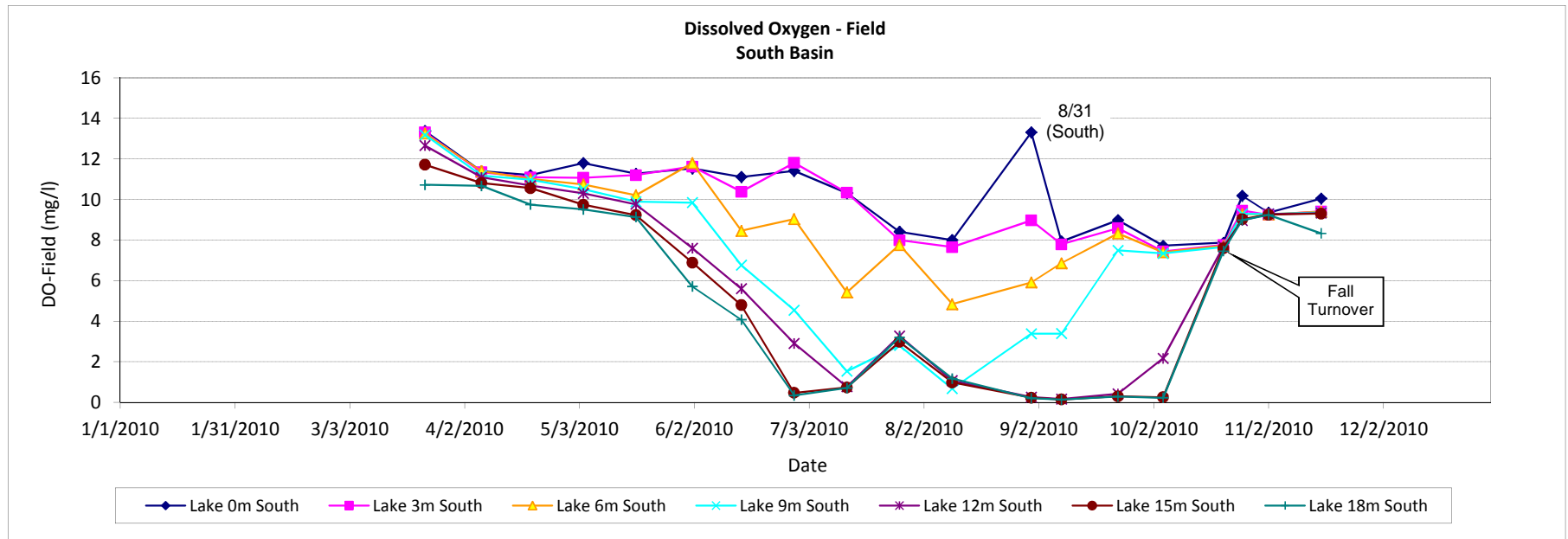


DO-Field	Frequency
4.8	1
5.7	1
6.5	1
7.4	1
8.2	3
9.0	5
9.9	4
10.7	1
11.6	4
12.4	1
13.3	0
More	1



DO-Field	Frequency
0.13	1
1.4	21
2.7	3
4.0	7
5.4	5
6.7	3
8.0	11
9.3	12
10.6	16
11.9	11
13.2	1
More	1

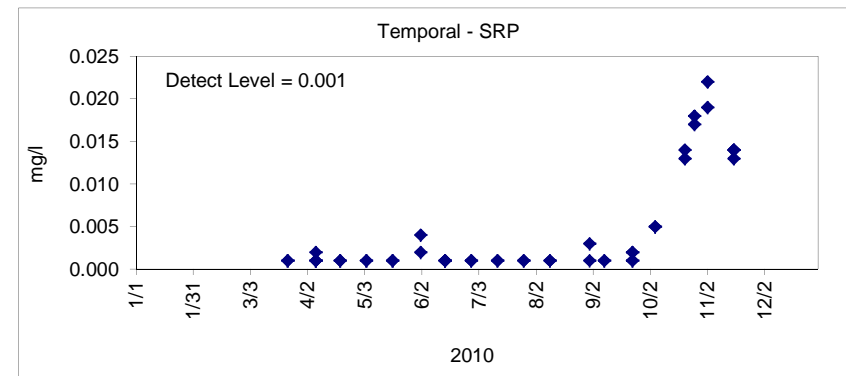
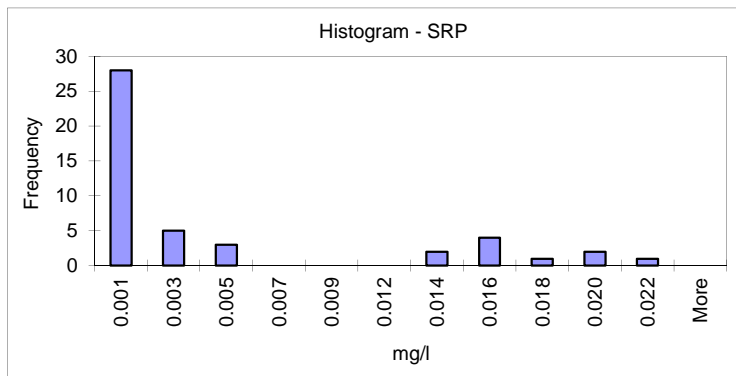




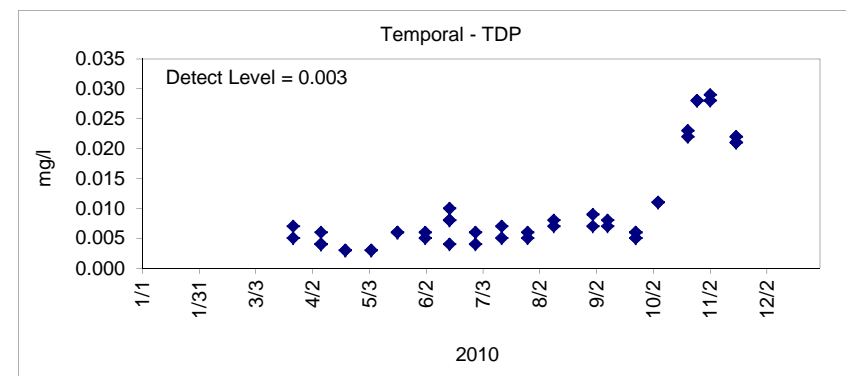
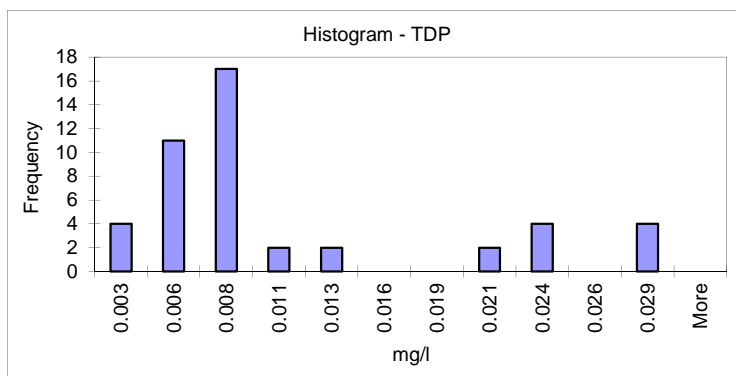
Attachment 7(e). Outlier evaluation for phosphorus in Onondaga Lake, 2010.

Epilimnion (0-3 meters)

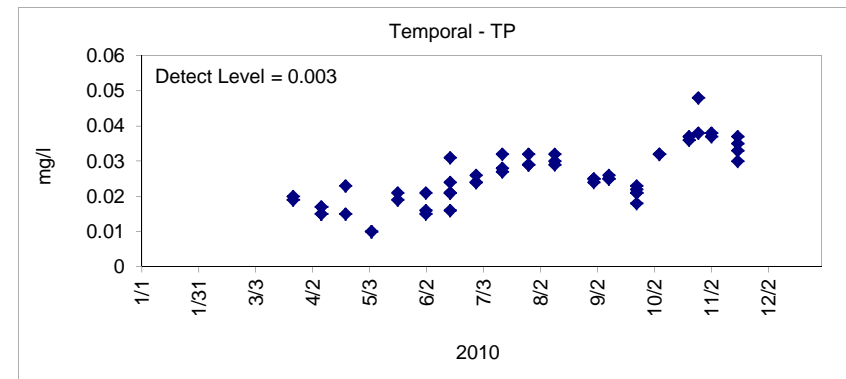
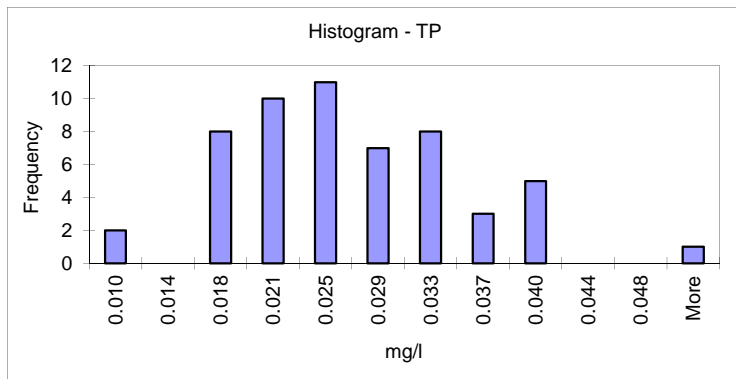
SRP	Frequency
0.001	28
0.003	5
0.005	3
0.007	0
0.009	0
0.012	0
0.014	2
0.016	4
0.018	1
0.020	2
0.022	1
More	0



TDP	Frequency
0.003	4
0.006	11
0.008	17
0.011	2
0.013	2
0.016	0
0.019	0
0.021	2
0.024	4
0.026	0
0.029	4
More	0



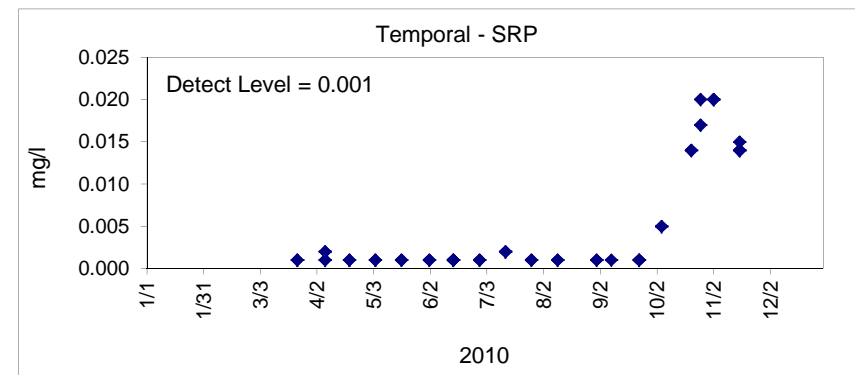
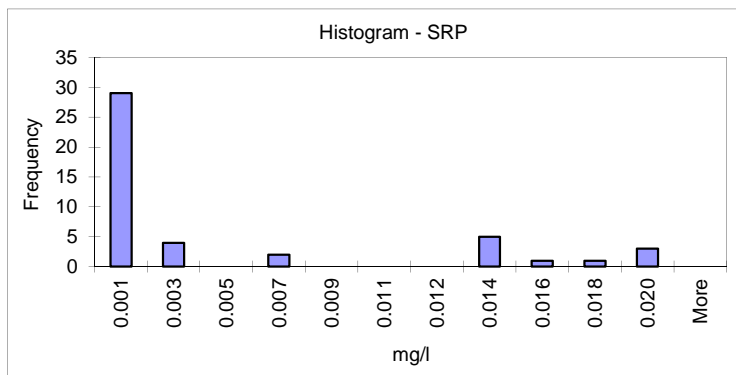
TP	Frequency
0.010	2
0.014	0
0.018	8
0.021	10
0.025	11
0.029	7
0.033	8
0.037	3
0.040	5
0.044	0
0.048	0
More	1



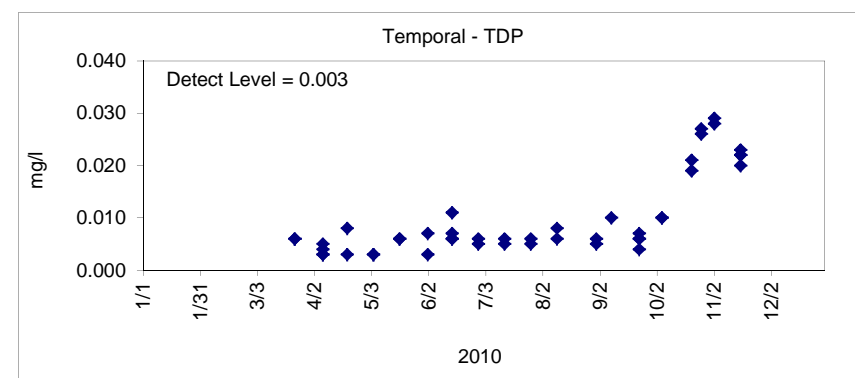
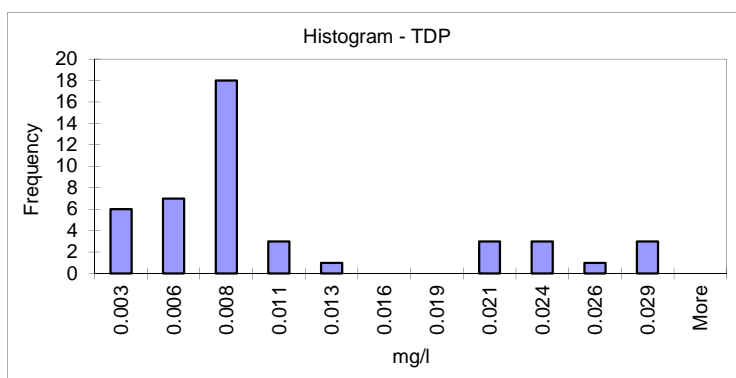
Attachment 7(e). Outlier evaluation for phosphorus in Onondaga Lake, 2010.

Metalimnion (6 meters)

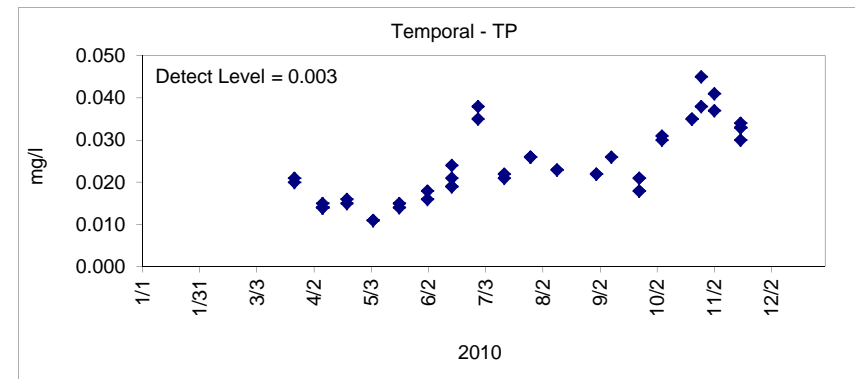
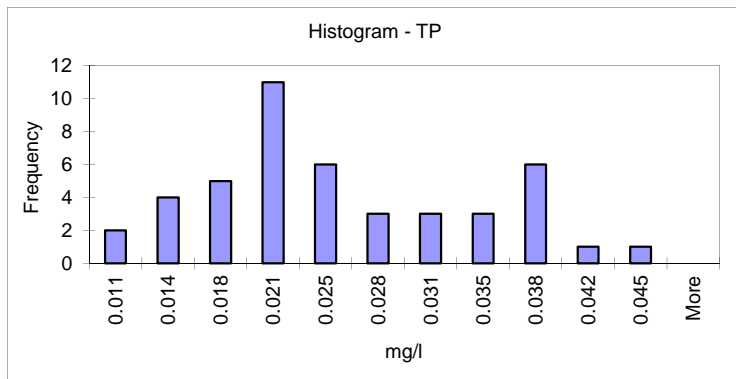
SRP	Frequency
0.001	29
0.003	4
0.005	0
0.007	2
0.009	0
0.011	0
0.012	0
0.014	5
0.016	1
0.018	1
0.020	3
More	0



TDP	Frequency
0.003	6
0.006	7
0.008	18
0.011	3
0.013	1
0.016	0
0.019	0
0.021	3
0.024	3
0.026	1
0.029	3
More	0



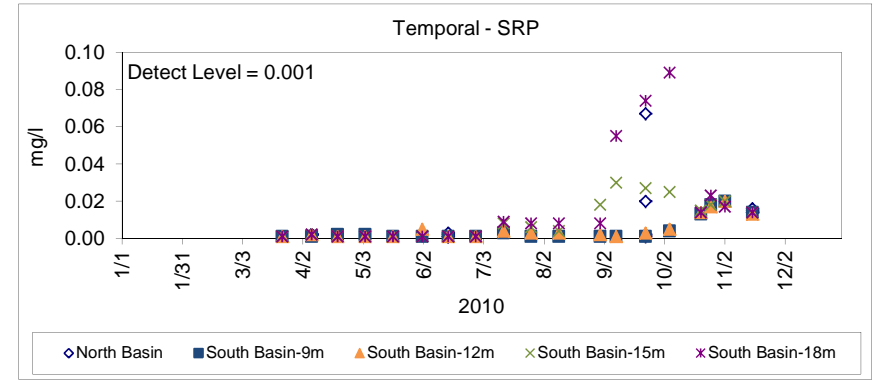
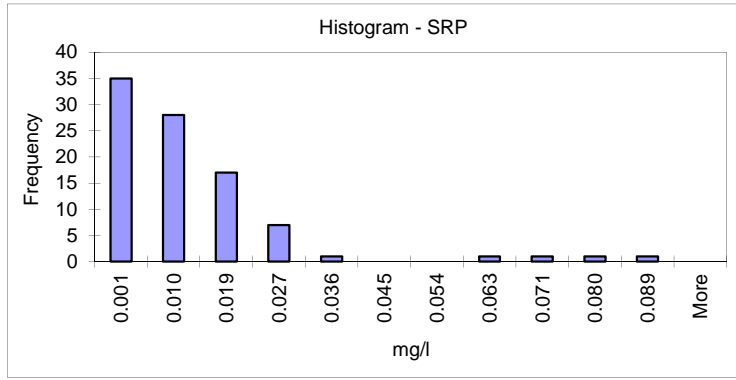
TP	Frequency
0.011	2
0.014	4
0.018	5
0.021	11
0.025	6
0.028	3
0.031	3
0.035	3
0.038	6
0.042	1
0.045	1
More	0



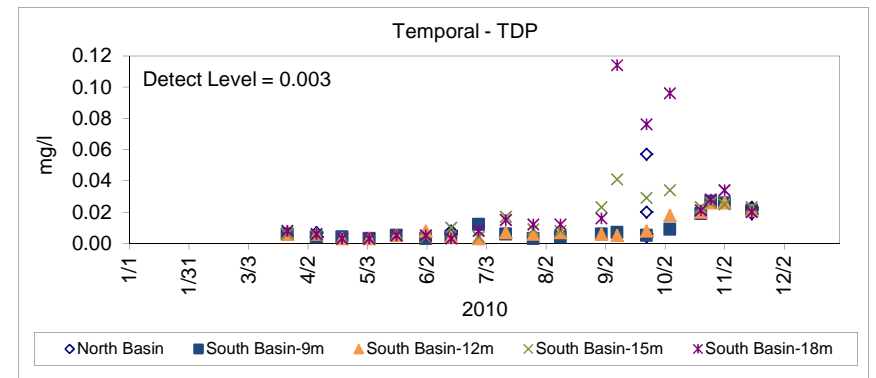
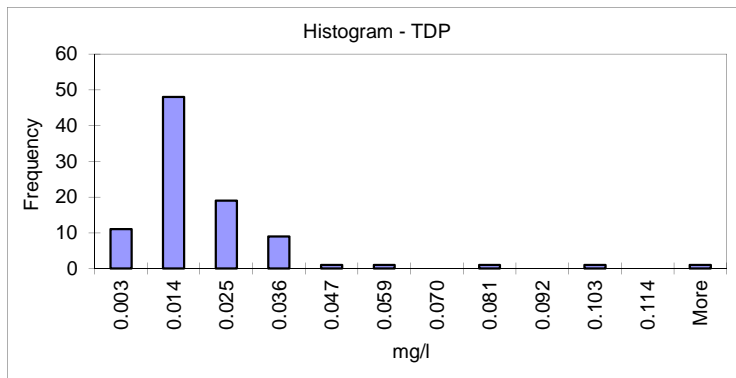
Attachment 7(e). Outlier evaluation for phosphorus in Onondaga Lake, 2010.

Hypolimnion (9-18 meters)

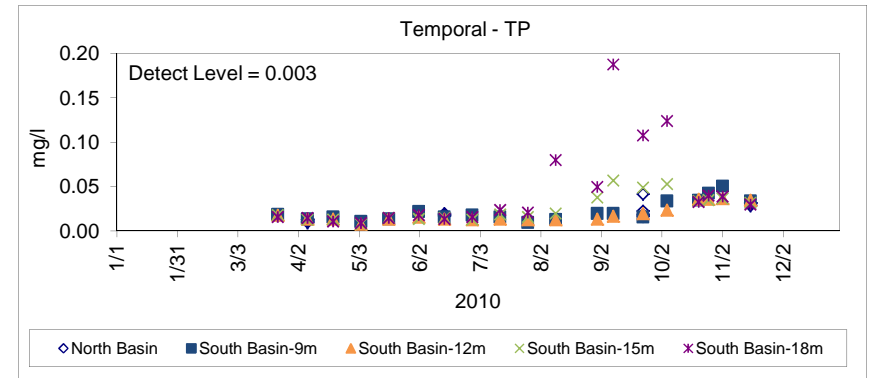
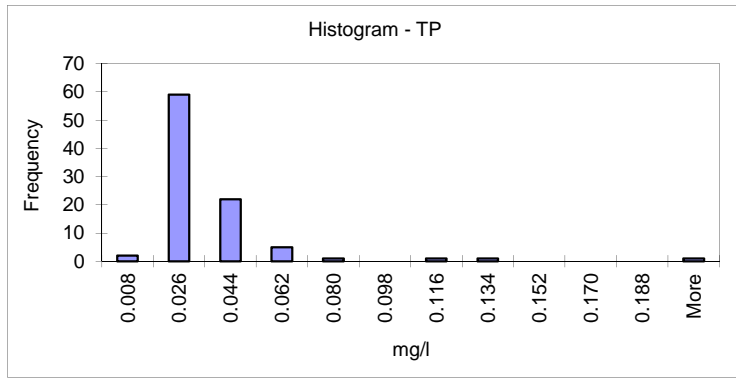
SRP	Frequency
0.001	35
0.010	28
0.019	17
0.027	7
0.036	1
0.045	0
0.054	0
0.063	1
0.071	1
0.080	1
0.089	1
More	0



TDP	Frequency
0.003	11
0.014	48
0.025	19
0.036	9
0.047	1
0.059	1
0.070	0
0.081	1
0.092	0
0.103	1
0.114	0
More	1



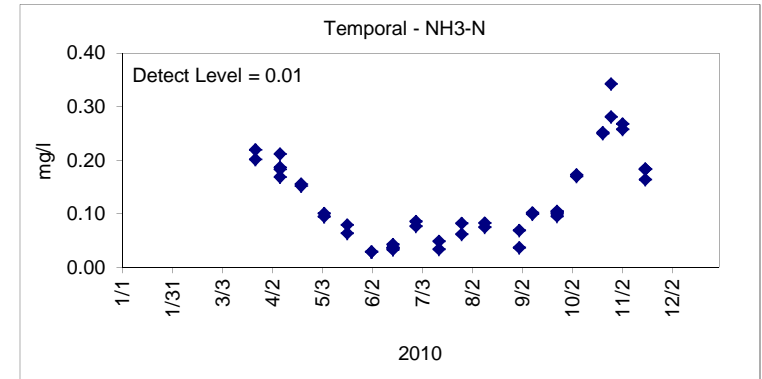
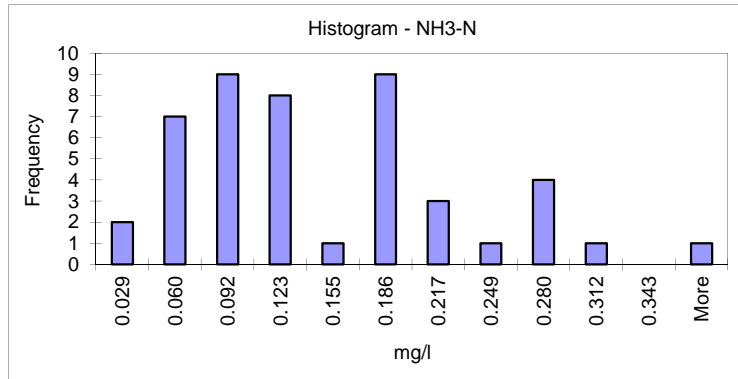
TP	Frequency
0.008	2
0.026	59
0.044	22
0.062	5
0.080	1
0.098	0
0.116	1
0.134	1
0.152	0
0.170	0
0.188	0
More	1



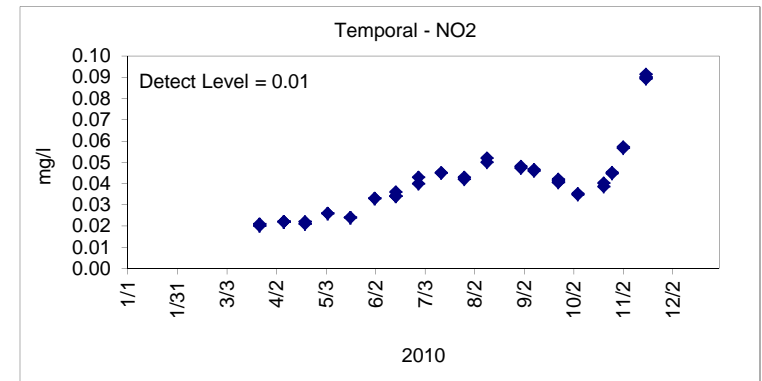
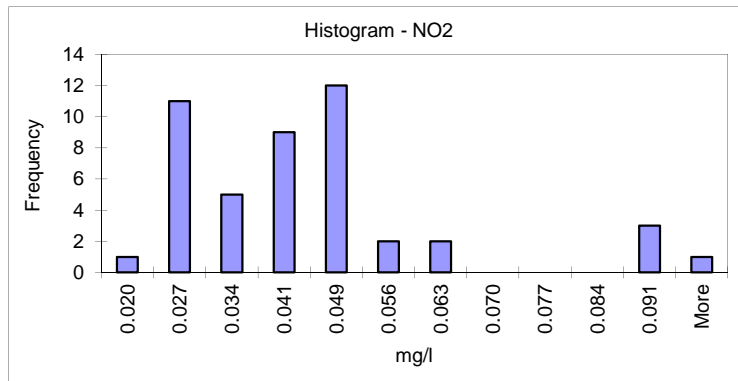
Attachment 7(f). Outlier evaluation for nitrogen species in Onondaga Lake, 2010.

Epilimnion (0-3 meters)

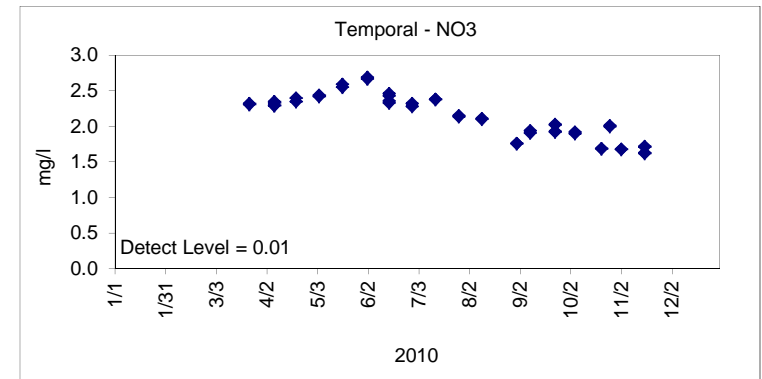
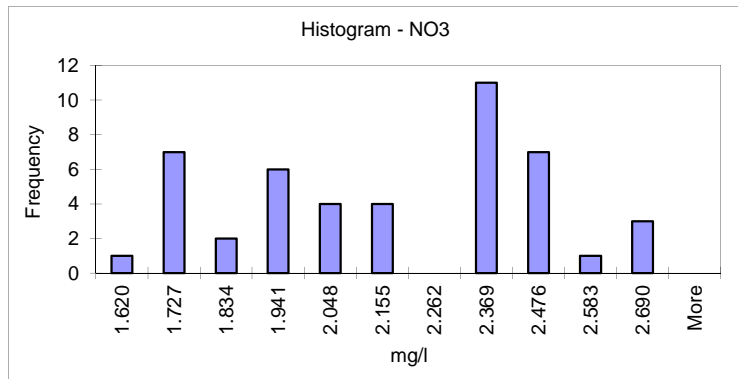
NH3-N	Frequency
0.029	2
0.060	7
0.092	9
0.123	8
0.155	1
0.186	9
0.217	3
0.249	1
0.280	4
0.312	1
0.343	0
More	1



NO2	Frequency
0.020	1
0.027	11
0.034	5
0.041	9
0.049	12
0.056	2
0.063	2
0.070	0
0.077	0
0.084	0
0.091	3
More	1



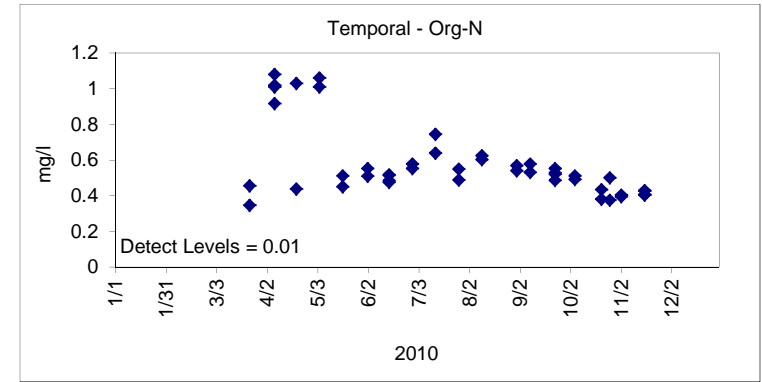
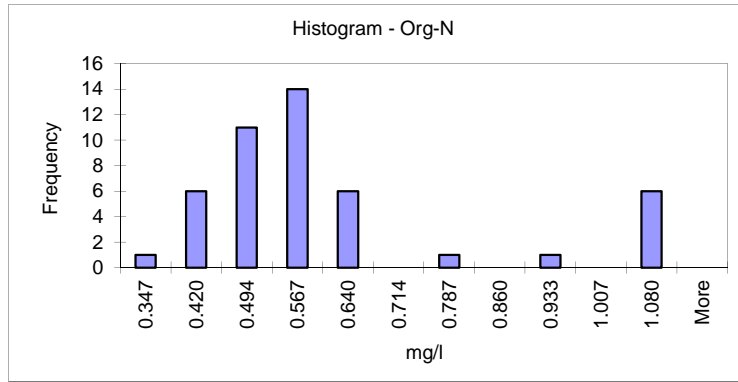
NO3	Frequency
1.620	1
1.727	7
1.834	2
1.941	6
2.048	4
2.155	4
2.262	0
2.369	11
2.476	7
2.583	1
2.690	3
More	0



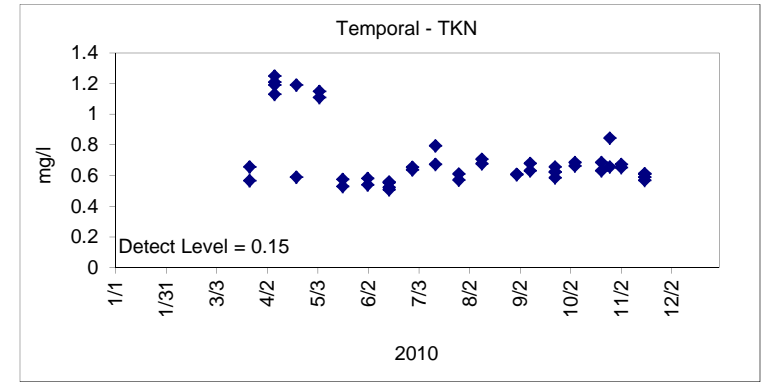
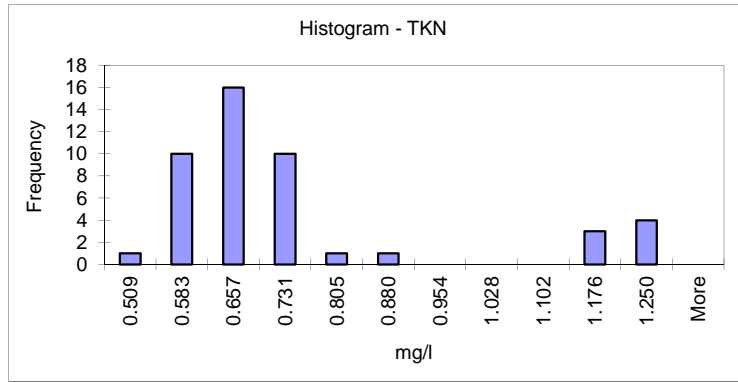
Attachment 7(f). Outlier evaluation for nitrogen species in Onondaga Lake, 2010.

Epilimnion (0-3 meters)

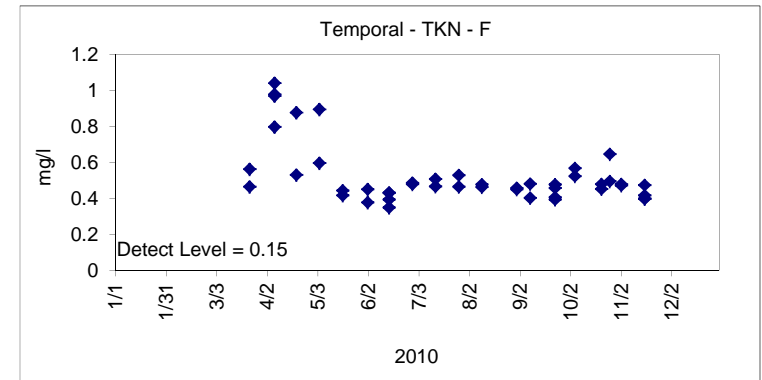
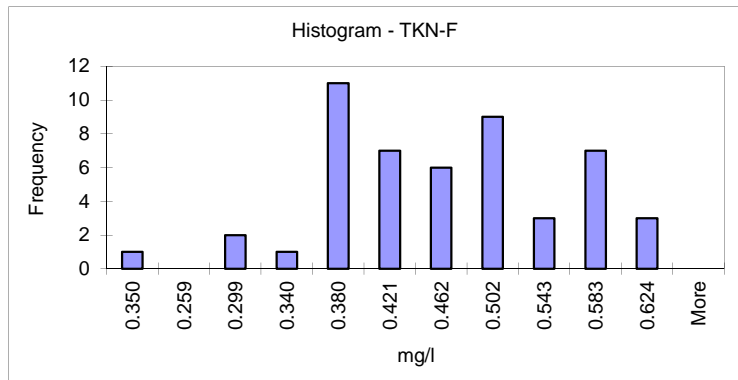
ORG-N	Frequency
0.347	1
0.420	6
0.494	11
0.567	14
0.640	6
0.714	0
0.787	1
0.860	0
0.933	1
1.007	0
1.080	6
More	0



TKN	Frequency
0.509	1
0.583	10
0.657	16
0.731	10
0.805	1
0.880	1
0.954	0
1.028	0
1.102	0
1.176	3
1.250	4
More	0



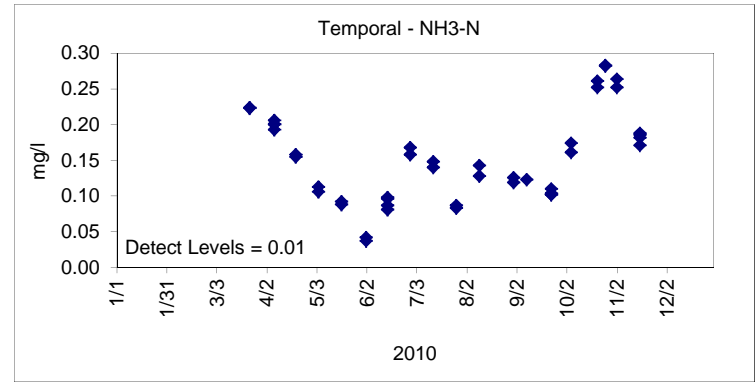
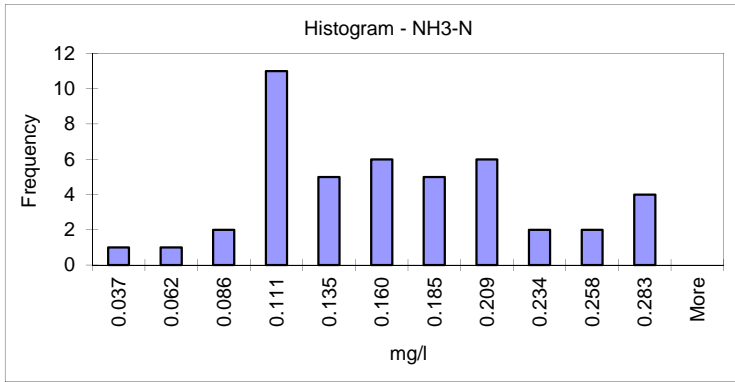
TKN-F	Frequency
0.350	1
0.259	0
0.299	2
0.340	1
0.380	11
0.421	7
0.462	6
0.502	9
0.543	3
0.583	7
0.624	3
More	0



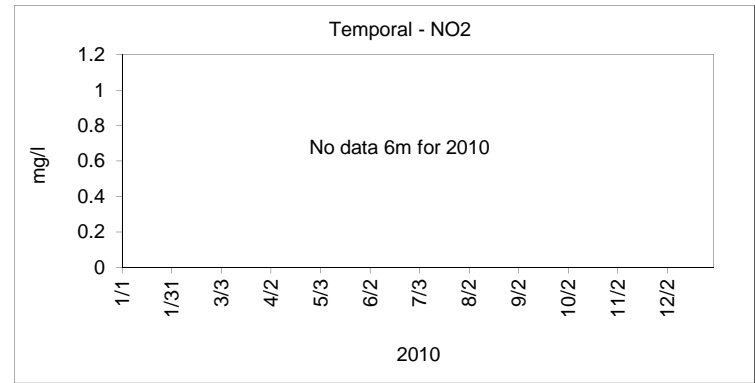
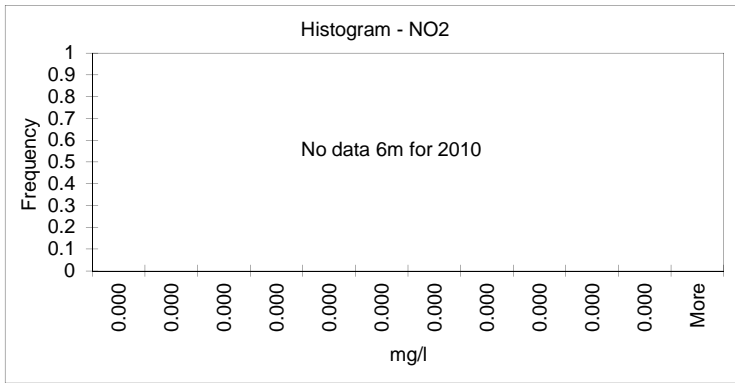
Attachment 7(f). Outlier evaluation for nitrogen species in Onondaga Lake, 2010.

Metalimnion (6 meters)

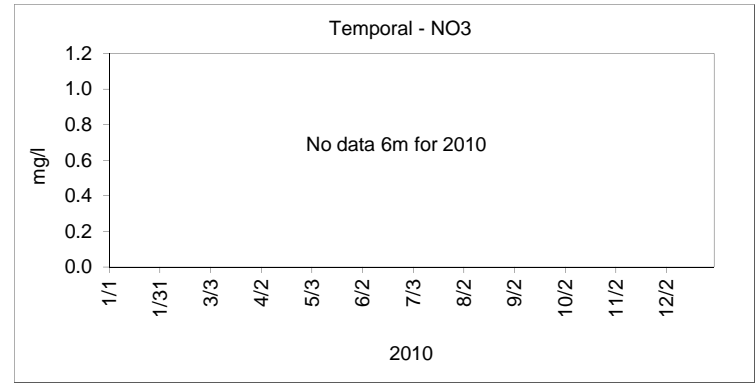
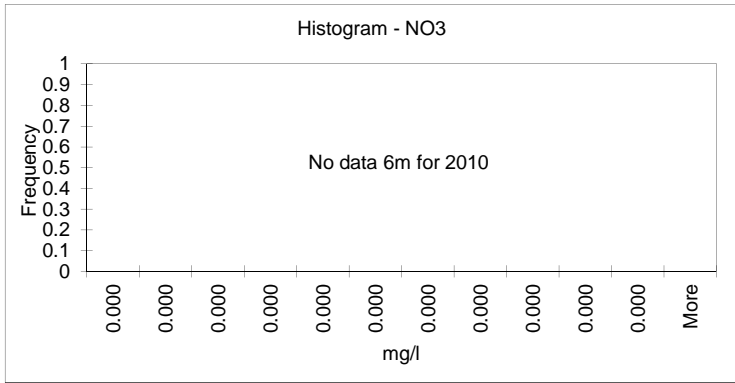
NH ₃ -N	Frequency
0.037	1
0.062	1
0.086	2
0.111	11
0.135	5
0.160	6
0.185	6
0.209	6
0.234	2
0.258	2
0.283	4
More	0



NO ₂	Frequency
0.000	0
0.000	0
0.000	0
0.000	0
0.000	0
0.000	0
0.000	0
0.000	0
0.000	0
0.000	0
0.000	0
0.000	0
0.000	0
0.000	0
0.000	0
0.000	0
More	0



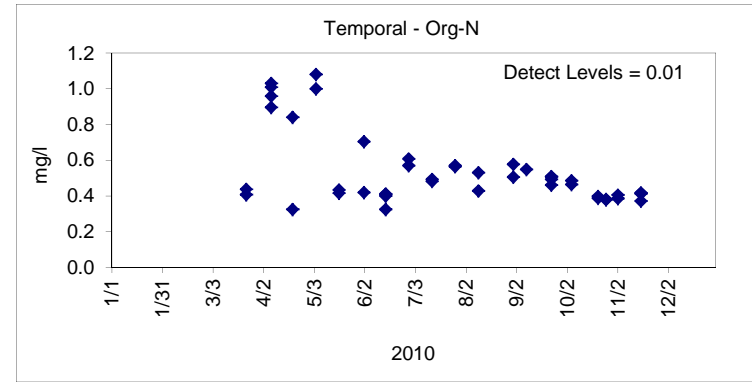
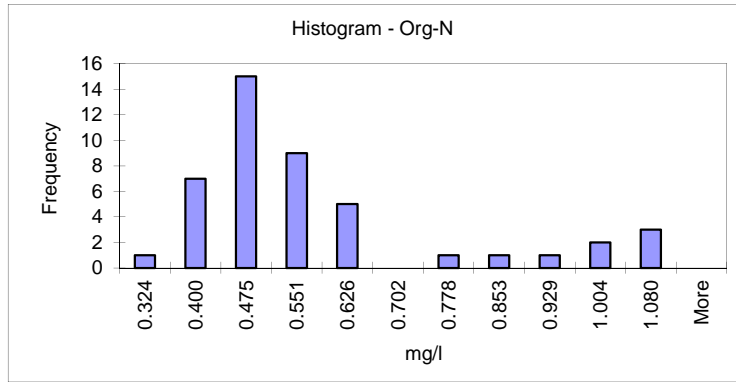
NO ₃	Frequency
0.000	0
0.000	0
0.000	0
0.000	0
0.000	0
0.000	0
0.000	0
0.000	0
0.000	0
0.000	0
0.000	0
0.000	0
0.000	0
0.000	0
0.000	0
0.000	0
0.000	0
More	0



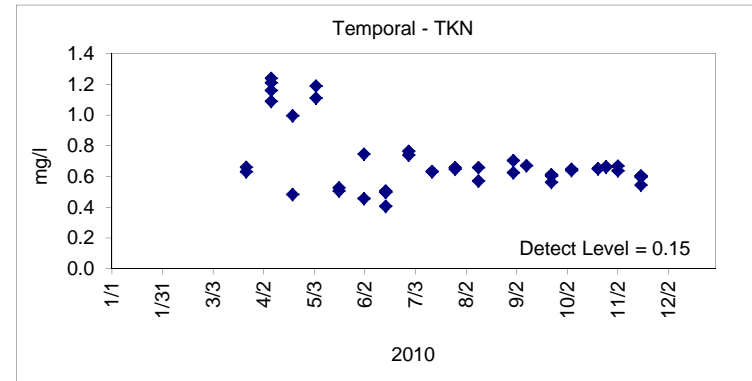
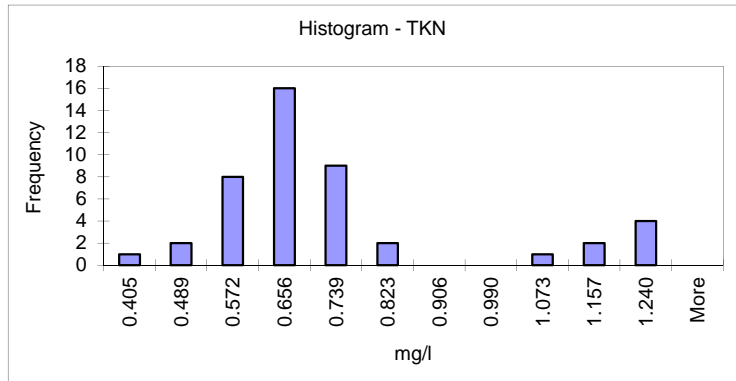
Attachment 7(f). Outlier evaluation for nitrogen species in Onondaga Lake, 2010.

Metalimnion (6 meters)

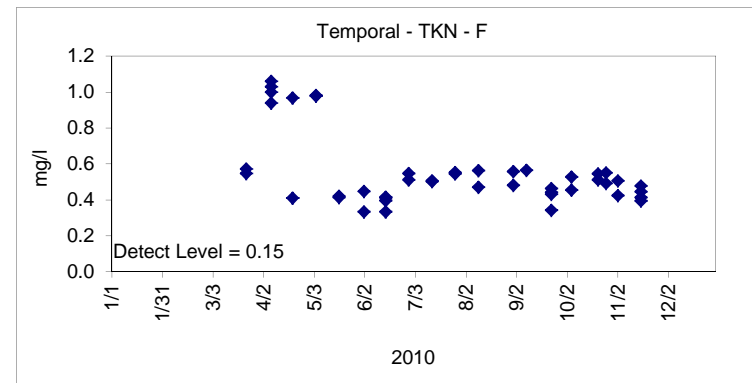
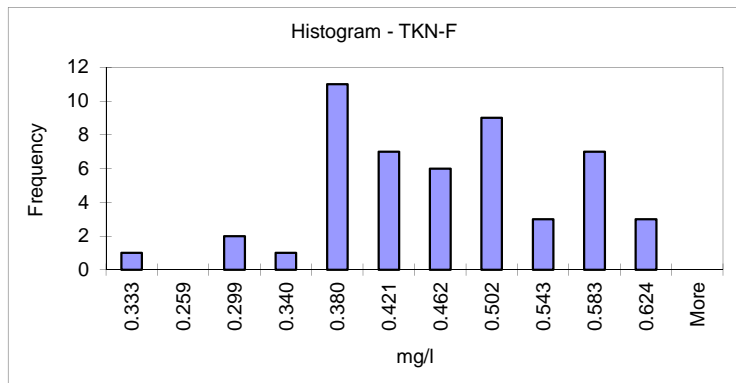
ORG-N	Frequency
0.324	1
0.400	7
0.475	15
0.551	9
0.626	5
0.702	0
0.778	1
0.853	1
0.929	1
1.004	2
1.080	3
More	0



TKN	Frequency
0.405	1
0.489	2
0.572	8
0.656	16
0.739	9
0.823	2
0.906	0
0.990	0
1.073	1
1.157	2
1.240	4
More	0



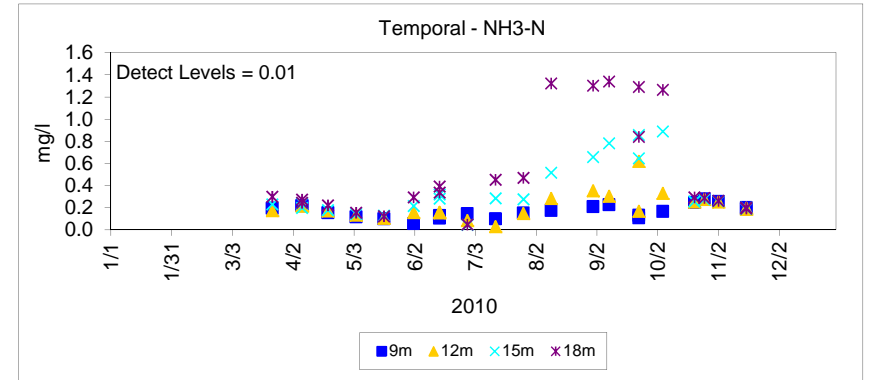
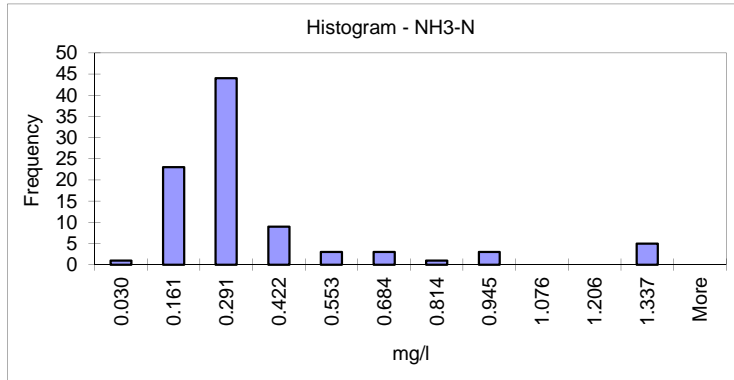
TKN-F	Frequency
0.333	1
0.259	0
0.299	2
0.340	1
0.380	11
0.421	7
0.462	6
0.502	9
0.543	3
0.583	7
0.624	3
More	0



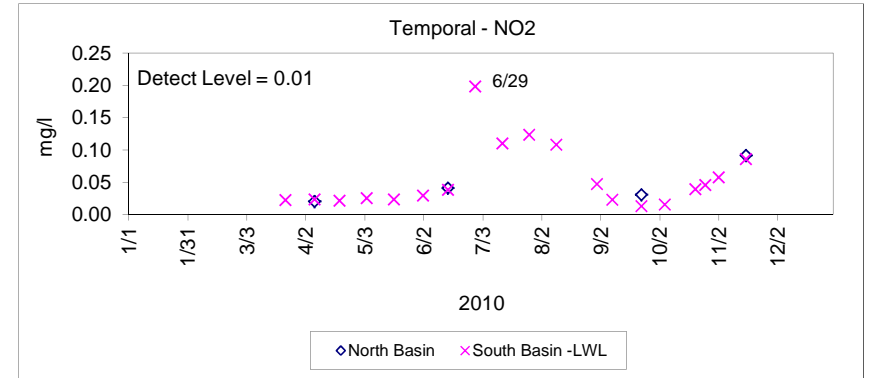
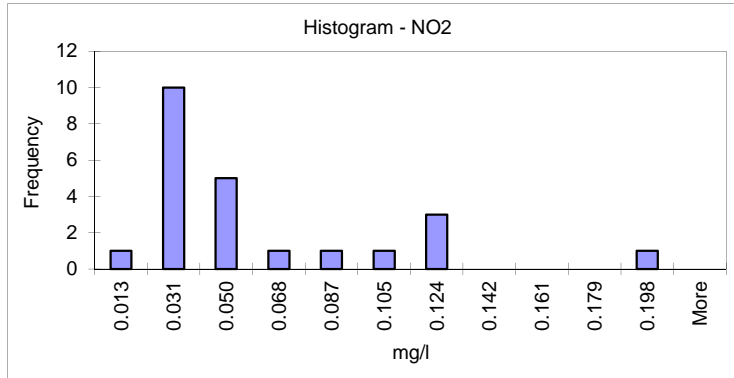
Attachment 7(f). Outlier evaluation for nitrogen species in Onondaga Lake, 2010.

Hypolimnion (9-18 meters)

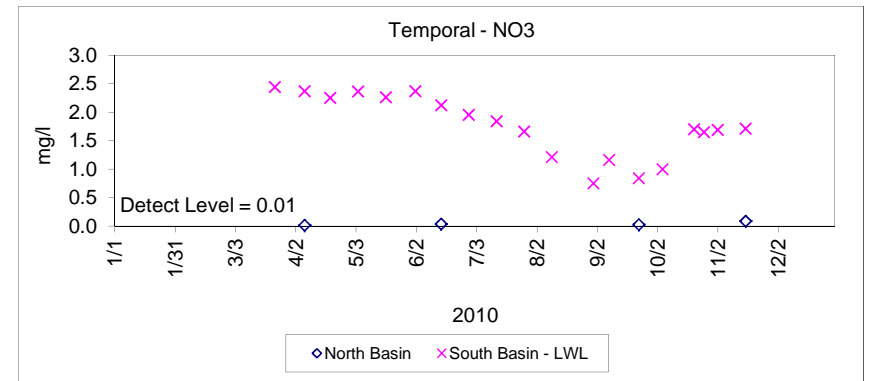
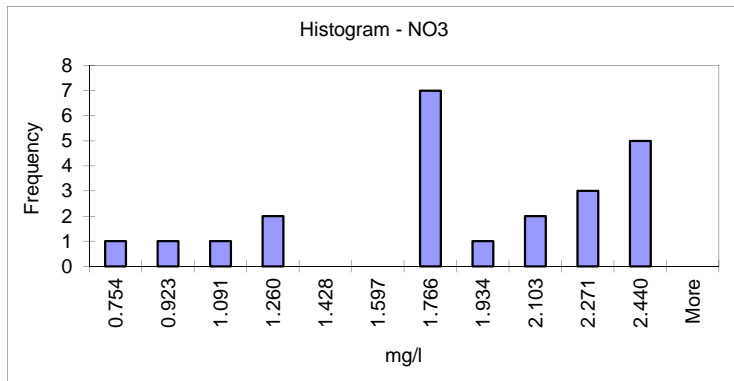
NH3-N	Frequency
0.030	1
0.161	23
0.291	44
0.422	9
0.553	3
0.684	3
0.814	1
0.945	3
1.076	0
1.206	0
1.337	5
More	0



NO2	Frequency
0.013	1
0.031	10
0.050	5
0.068	1
0.087	1
0.105	1
0.124	3
0.142	0
0.161	0
0.179	0
0.198	1
More	0



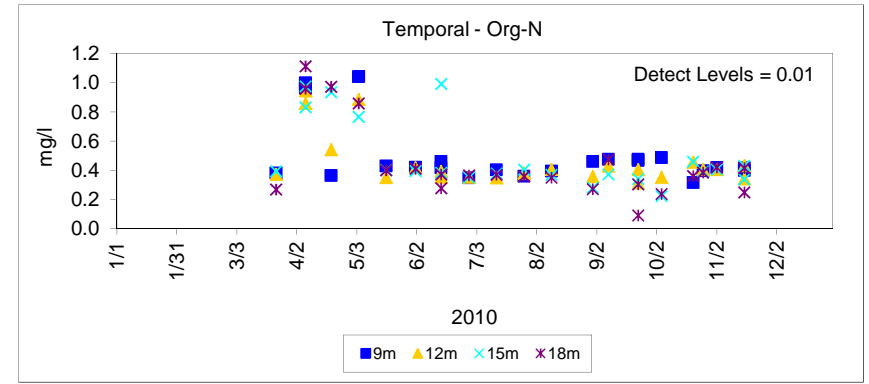
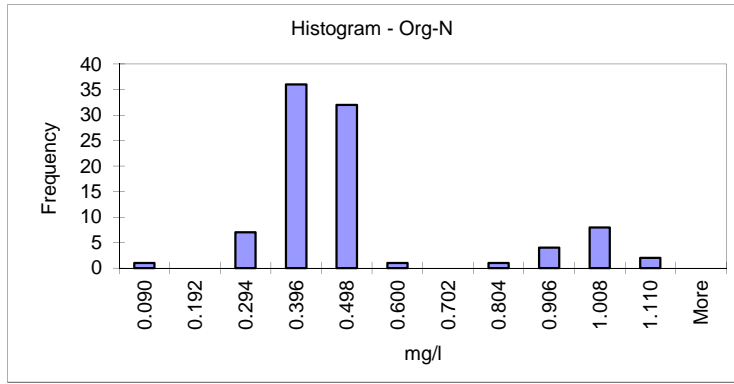
NO3	Frequency
0.754	1
0.923	1
1.091	1
1.260	2
1.428	0
1.597	0
1.766	7
1.934	1
2.103	2
2.271	3
2.440	5
More	0



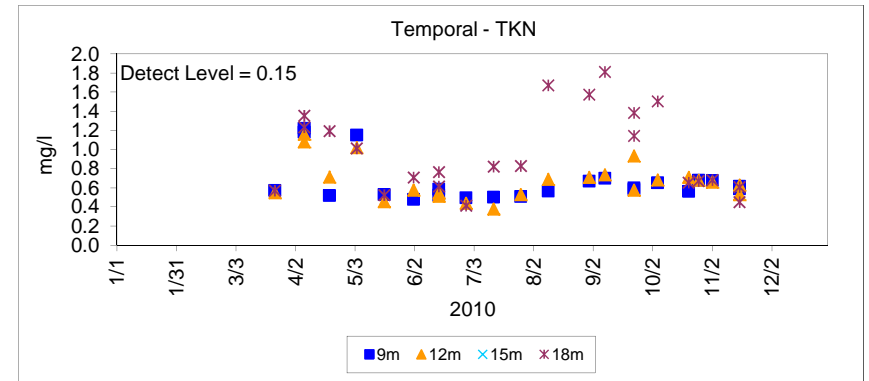
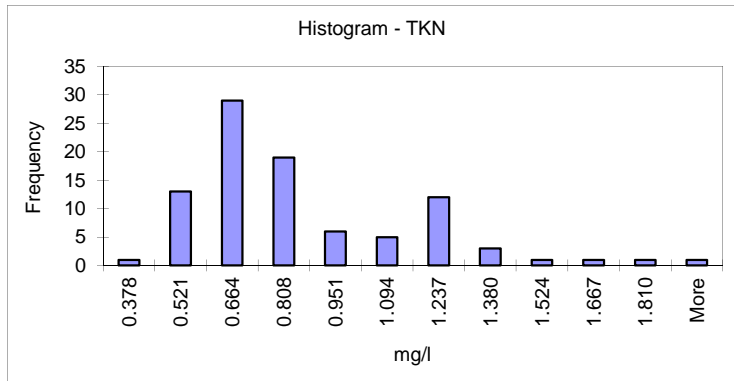
Attachment 7(f). Outlier evaluation for nitrogen species in Onondaga Lake, 2010.

Hypolimnion (9-18 meters)

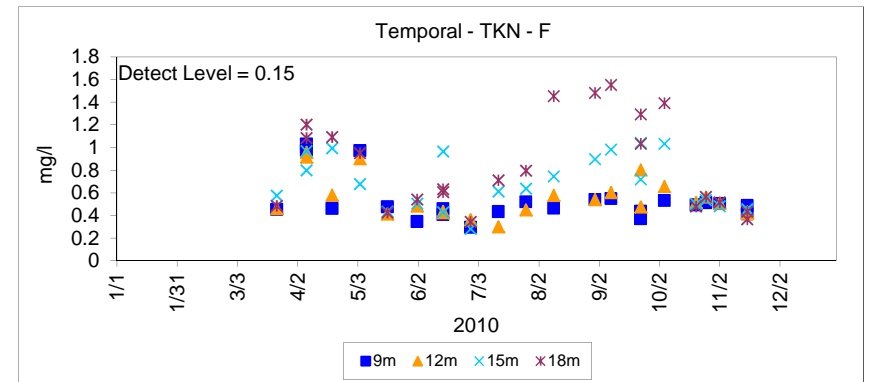
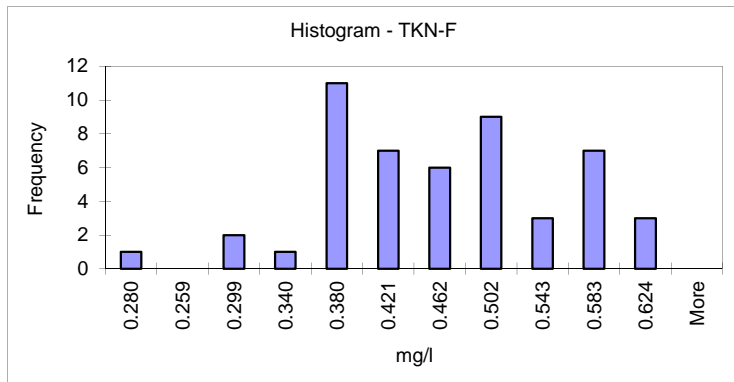
ORG-N	Frequency
0.090	1
0.192	0
0.294	7
0.396	36
0.498	32
0.600	1
0.702	0
0.804	1
0.906	4
1.008	8
1.110	2
More	0



TKN	Frequency
0.378	1
0.521	13
0.664	29
0.808	19
0.951	6
1.094	5
1.237	12
1.380	3
1.524	1
1.667	1
1.810	1
More	1



TKN-F	Frequency
0.280	1
0.259	0
0.299	2
0.340	1
0.380	11
0.421	7
0.462	6
0.502	9
0.543	3
0.583	7
0.624	3
More	0



Attachment 8. Sample results flagged "V" = Reported value is considered estimated due to variance from quality control or assurance criteria**A. Sample Acceptance Criteria Not Met**

DATE	SITE	IND_ SOURCE CODE	PARAMETER	UNITS	SRESULT	REMARK_ CODE	LAB_COMMENTS
9/20/2010	METRO	789 Metro Final Effluent	CN-A	mg/L	<0.003	V	CN bottle: Sample acceptance criteria not met. pH=12.84
			CN-Cl2	mg/L	<0.003	V	CN bottle: Sample acceptance criteria not met. pH=12.84
			CN-T	mg/L	<0.003	V	CN bottle: Sample acceptance criteria not met. pH=12.84
11/1/2010	METRO	789 Metro Final Effluent	CN-A	mg/L	<0.003	V	Sample is a split of sample #20100133669. CN bottle; Sample acceptance criteria not met. pH=12.77
			CN-Cl2	mg/L	<0.003	V	Sample is a split of sample #20100133669. CN bottle; Sample acceptance criteria not met. pH=12.77
			CN-T	mg/L	<0.003	V	Sample is a split of sample #20100133669. CN bottle; Sample acceptance criteria not met. pH=12.77
11/2/2010	SOUTH	920 Lake 6m South - Duplicate	TDP	mg/L	0.029	V	Sample is duplicate of #2010013374. TDP bottle; Sample acceptance criteria not met. pH=1.14. TDP & TP reprep'd 11/3.
	SOUTH	922 Lake 12m South	TDP	mg/L	0.026	V	TDP bottle; Sample acceptance criteria not met. pH=1.26. TDP & TP reprep'd 11/3.
12/2/2010	BYPASS	630 Crk-Metro By-Pass	NH3-N	mg/L	4.51	V	NP bottle Sample acceptance criteria not met pH=1.26.
			TDP	mg/L	0.23	V	NP bottle Sample acceptance criteria not met pH=1.26, TDP Sample acceptance criteria not met pH=1.20 Turbidity second source expired, waiting for new
			TKN	mg/L	7.91	V	NP bottle Sample acceptance criteria not met pH=1.26, TDP Sample acceptance criteria not met pH=1.20 Turbidity second source expired, waiting for new
			TP	mg/L	0.69	V	NP bottle Sample acceptance criteria not met pH=1.26, TDP Sample acceptance criteria not met pH=1.20 Turbidity second source expired, waiting for new
			Turbidity	NTU	39.7	V	NP bottle Sample acceptance criteria not met pH=1.26, TDP Sample acceptance criteria not met pH=1.20 Turbidity second source expired, waiting for new

Attachment 8. Sample results flagged "V" = Reported value is considered estimated due to variance from quality control or assurance criteria**A. Sample Acceptance Criteria Not Met**

DATE	SITE	IND_ SOURCE	PARAMETER	UNITS	SRESULT	REMARK_	LAB_ COMMENTS
		CODE				CODE	
12/2/2010	CKBLANK	901	Crk-Blank SS Pail (Crew A)	TDP	mg/L	<0.003	V TDP Sample acceptance criteria not met pH=1.26
	DORWIN	910	Crk-Onondaga Creek @ Dorwin Ave.	NH3-N	mg/L	0.0526	V NP bottle Sample acceptance criteria not met pH=1.16.
			Crk-Onondaga Creek @ Dorwin Ave. - Duplicate	NH3-N	mg/L	0.0532	V Sample is duplicate of #2010013405. NP bottle Sample acceptance criteria not met pH=1.18, TDP Sample acceptance criteria not met pH=1.11 Turbidity se
			Crk-Onondaga Creek @ Dorwin Ave.	TDP	mg/L	0.047	V NP bottle Sample acceptance criteria not met pH=1.16, TDP Sample acceptance criteria not met pH=1.05 .
			Crk-Onondaga Creek @ Dorwin Ave. - Duplicate	TDP	mg/L	0.048	V Sample is duplicate of #2010013405. NP bottle Sample acceptance criteria not met pH=1.18, TDP Sample acceptance criteria not met pH=1.11 Turbidity se
			Crk-Onondaga Creek @ Dorwin Ave.	TKN	mg/L	0.856	V NP bottle Sample acceptance criteria not met pH=1.16.
			Crk-Onondaga Creek @ Dorwin Ave. - Duplicate	TKN	mg/L	0.83	V Sample is duplicate of #2010013405. NP bottle Sample acceptance criteria not met pH=1.18, TDP Sample acceptance criteria not met pH=1.11 Turbidity se
			Crk-Onondaga Creek @ Dorwin Ave.	TP	mg/L	0.225	V NP bottle Sample acceptance criteria not met pH=1.16. TP filtered in lab.
			Crk-Onondaga Creek @ Dorwin Ave. - Duplicate	TP	mg/L	0.238	V Sample is duplicate of #2010013405. NP bottle Sample acceptance criteria not met pH=1.18, TDP Sample acceptance criteria not met pH=1.11 Turbidity se
			Crk-Onondaga Creek @ Dorwin Ave. - Duplicate	Turbidity	NTU	287	V Sample is duplicate of #2010013405. NP bottle Sample acceptance criteria not met pH=1.18, TDP Sample acceptance criteria not met pH=1.11 Turbidity se
	KIRKPAT	882	Crk-Onondaga Creek @ Kirkpatrick	TDP	mg/L	0.052	V TDP Sample acceptance criteria not met pH=1.18.

Attachment 8. Sample results flagged "V" = Reported value is considered estimated due to variance from quality control or assurance criteria

A. Sample Acceptance Criteria Not Met

DATE	SITE	IND_ SOURCE CODE	PARAMETER	UNITS	SRESULT	REMARK_ LAB_COMMENTS CODE
12/2/2010	METRO	789 Crk-Metro Effluent	NH3-N	mg/L	0.0483	V NP bottle Sample acceptance criteria not met pH=1.21.
			TDP	mg/L	0.017	V NP bottle Sample acceptance criteria not met pH=1.21, TDP Sample acceptance criteria not met pH=1.14 Turbidity second source expired, waiting for new
			TKN	mg/L	0.588	V NP bottle Sample acceptance criteria not met pH=1.21, TDP Sample acceptance criteria not met pH=1.14 Turbidity second source expired, waiting for new
			TP	mg/L	0.043	V NP bottle Sample acceptance criteria not met pH=1.21, TDP Sample acceptance criteria not met pH=1.14 Turbidity second source expired, waiting for new
			Turbidity	NTU	1.55	V NP bottle Sample acceptance criteria not met pH=1.21, TDP Sample acceptance criteria not met pH=1.14 Turbidity second source expired, waiting for new
	OUTLET12	1907 Crk-Onondaga Lake Outlet 12 ft.	TDP	mg/L	0.018	V TDP Sample acceptance criteria not met pH=1.26
	OUTLET2	1906 Crk-Onondaga Lake Outlet 2 ft.	TDP	mg/L	0.018	V TDP Sample acceptance criteria not met pH=1.21
	PARK	908 Crk-Ley Creek @ Park Street	TDP	mg/L	0.026	V TDP Sample acceptance criteria not met pH=1.26
	RT48	905 Crk-Nine Mile Creek @ Lakeland Rt 48	TDP	mg/L	0.046	V TDP Sample acceptance criteria not met pH=1.17.
	TRIB5A	904 Crk-Tributary 5a @ State Fair Blvd	NH3-N	mg/L	0.377	V NP bottle Sample acceptance criteria not met pH=1.28.
			TKN	mg/L	0.656	V NP bottle Sample acceptance criteria not met pH=1.28.
			TP	mg/L	0.053	V NP bottle Sample acceptance criteria not met pH=1.28.
			Turbidity	NTU	13.6	V NP bottle Sample acceptance criteria not met pH=1.28. Turbidity second source expired, waiting for new source to arrive.
	VELASKO	911 Crk-Harbor Brook @ Velasko Road	TDP	mg/L	0.018	V TDP Sample acceptance criteria not met pH=1.26

Attachment 8. Sample results flagged "V" = Reported value is considered estimated due to variance from quality control or assurance criteria

A. Sample Acceptance Criteria Not Met

DATE	SITE	IND_ SOURCE CODE	PARAMETER	UNITS	SRESULT	REMARK_ CODE	LAB_COMMENTS
12/21/2010	DORWIN	910 Crk-Onondaga Creek @ Dorwin Ave.	TDP	mg/L	0.017	V	TDP bottle: Sample acceptance criteria not met. pH=1.24.
	HIAWATHA	902 Crk-Harbor Brook @ Hiawatha	TDP	mg/L	0.034	V	TDP bottle: Sample acceptance criteria not met. pH=1.27
	KIRKPAT	882 Crk-Onondaga Creek @ Kirkpatrick	TDP	mg/L	0.012	V	TDP bottle: Sample acceptance criteria not met. pH=1.26.
	METRO	789 Crk-Metro Effluent	TDP	mg/L	0.023	V	TDP bottle: Sample acceptance criteria not met. pH=1.22
	OUTLET12	1907 Crk-Onondaga Lake Outlet 12 ft.	TDP	mg/L	0.017	V	NP bottle: Sample acceptance criteria not met. pH=1.21. TDP bottle: Sample acceptance criteria not met. pH=1.09.
	OUTLET12	1907 Crk-Onondaga Lake Outlet 12 ft.	TP	mg/L	0.026	V	NP bottle: Sample acceptance criteria not met. pH=1.21.
	OUTLET2	1906 Crk-Onondaga Lake Outlet 2 ft.	TDP	mg/L	0.016	V	TDP bottle: Sample acceptance criteria not met. pH=1.21
	PARK	908 Crk-Ley Creek @ Park Street	TDP	mg/L	0.01	V	TDP bottle: Sample acceptance criteria not met. pH=1.21
	PARK	908 Crk-Ley Creek @ Park Street - Duplicate	TDP	mg/L	0.008	V	Sample is duplicate of #2010015470. TDP bottle: Sample acceptance criteria not met. pH=1.15
	RT48	905 Crk-Nine Mile Creek @ Lakeland Rt 48	TDP	mg/L	0.011	V	TDP bottle: Sample acceptance criteria not met. pH=1.26
	TRIB5A	904 Crk-Tributary 5a @ State Fair Blvd	TDP	mg/L	0.04	V	TDP bottle: Sample acceptance criteria not met. pH=1.17
	VELASKO	911 Crk-Harbor Brook @ Velasko Road	TDP	mg/L	0.02	V	TDP bottle: Sample acceptance criteria not met. pH=1.15

Attachment 8. Sample results flagged "V" = Reported value is considered estimated due to variance from quality control or assurance criteria

B. Other QC Criteria not met

DATE	SITE	IND_ SOURCE CODE	PARAMETER	UNITS	SRESULT	REMARK_ LAB_COMMENTS CODE
<u>Air Bubble Upon Receipt</u>						
11/24/2010	KIRKPAT	882 Crk-Onondaga Creek @ Kirkpatrick	ALK-T	mg/L	250	V Alk-T bottle: air bubble upon receipt.
<u>Duplicate Difference Failure</u>						
1/19/2010	WATER	999 Crk-Blind Duplicate-OC @ Water St	TSS	mg/L	30	V Tributary Blind Duplicate. Sample is a duplicate of sample# 2010000506. Refer to notification form # AMP02102010. Duplicate difference failed the fiel
<u>Holding Time Exceeded</u>						
2/16/2010	EFLUME	903 Crk-Allied East Flume-Over Weir	TIC	mg/L	35	V TIC: past hold time, result is an estimate.
3/31/2010	BYPASS	630 Crk-Metro By-Pass	TIC	mg/L	46.9	V High Flow. TIC: past hold time.
5/25/2010	METRO	789 Crk-Metro Effluent	BOD5	mg/L	3	V BOD5: past hold time setup
6/6/2010	BYPASS	630 Metro By-Pass Event #15	FCOLI-MF	count/100	6	V grab 3. F.Coli sample was past the hold time of 8Hrs.
9/30/2010	BYPASS	630 Metro By-Pass Event #33	BOD5	mg/L	42	V composite consists of 6 grabs. BOD5,CBOD5: past hold time; original results
9/30/2010	BYPASS	630 Metro By-Pass Event #33	CBOD5	mg/L	28	V composite consists of 6 grabs. BOD5,CBOD5: past hold time; original results
10/1/2010	BYPASS	630 Metro By-Pass Event #34	FCOLI-MF	count/100	540	V grab 2. FCOLI-MF read past accepted read time.
<u>Lab Contamination Suspected</u>						
7/12/2010	METRO	789 Metro Final Effluent	Methylene Chloride	µg/L	6	V Methylene Chloride is suspected to have Laboratory contamination. Sample is split of sample 2010007528.
<u>LFS Outside Acceptance Criteria</u>						
4/2/2010	METRO	789 Metro Final Effluent	CBOD5	mg/L	<2	V CBOD5: LFS outside acceptance criteria.
5/4/2010	BYPASS	630 Metro By-Pass Event #7	O&G	mg/L	8	V one grab only. O&G(SPE): LFS outside acceptance criteria.
6/5/2010	BYPASS	630 Metro By-Pass Event #14	O&G	mg/L	16	V grab 1. O&G(SPE):LFS outside acceptance criteria.
8/5/2010	BYPASS	630 Metro By-Pass Event #25	O&G	mg/L	<6	V One grab only. Monthly Parameters added. O&G(SPE):LFS outside acceptance criteria.
8/15/2010	BYPASS	630 Metro By-Pass Event #27	O&G	mg/L	10	V grab 1. O&G(SPE):LFS outside acceptance criteria.

Attachment 8. Sample results flagged "V" = Reported value is considered estimated due to variance from quality control or assurance criteria

B. Other QC Criteria not met

DATE	SITE	IND_ SOURCE CODE	PARAMETER	UNITS	SRESULT	REMARK_ CODE	LAB_COMMENTS
<u>LFS Outside Acceptance Criteria (continued)</u>							
10/1/2010	BYPASS	630 Metro By-Pass Event #34	O&G	mg/L	<6	V	grab 1; O&G(SPE): LFS outside acceptance criteria.
11/17/2010	BYPASS	630 Metro By-Pass Event #39	O&G	mg/L	9	V	Grab 1; O&G(SPE): LFS outside acceptance criteria.
12/2/2010	BYPASS	630 Metro By-Pass Event #42	O&G	mg/L	<6	V	grab 1. O&G(SPE):LFS outside acceptance criteria.
<u>Low Sample Volume</u>							
8/17/2010	SR_B334	963 River Buoy #334 Top	TDP	mg/L	0.045	V	TDP bottle received with very low sample volume.
<u>Matrix Spike Outside Acceptance Criteria</u>							
4/16/2010	BYPASS	630 Metro By-Pass Event #5	O&G	mg/L	16	V	One grab only. O&G(SPE): Matrix Spike outside acceptance criteria
<u>Issue with Filtering and/or Preservation</u>							
10/12/2010	DORWIN	999 Crk-Onondaga Creek @ Dorwin Ave.	TDP	mg/L	0.006	V	TDP: not filtered or preserved in the field.
10/12/2010	KIRKPAT	999 Crk-Onondaga Creek @ Kirkpatrick	TDP	mg/L	0.01	V	TDP: not filtered or preserved in the field.
10/12/2010	RT48	999 Crk-Nine Mile Creek @ Lakeland Rt 48	TDP	mg/L	0.011	V	TDP: not filtered or preserved in the field.
12/11/2010	METRO	789 Metro Final Effluent	NH3-N	mg/L	0.339	V	TP, TKN & NH3-N: sample was taken from the un-preserved PC bottle due to possible sampling error.
12/11/2010	METRO	789 Metro Final Effluent	TKN	mg/L	1.07	V	TP, TKN & NH3-N: sample was taken from the un-preserved PC bottle due to possible sampling error.
8/5/2010	BYPASS	630 Metro By-Pass Event #25	CN-T	mg/L	<0.003	V	One grab only. Monthly Parameters added. CN sample failed pH preservation, pH=11.56.
12/11/2010	METRO	789 Metro Final Effluent	TP	mg/L	0.037	V	TP, TKN & NH3-N: sample was taken from the un-preserved PC bottle due to possible sampling error.

Attachment 8. Sample results flagged "V" = Reported value is considered estimated due to variance from quality control or assurance criteria**B. Other QC Criteria not met**

DATE	SITE	IND_ SOURCE CODE	PARAMETER	UNITS	SRESULT	REMARK_ CODE	LAB_COMMENTS
<u>Issue with Composite</u>							
4/16/2010	BYPASS	630 Metro By-Pass Event #5	CBOD5	mg/L	92	V	One grab only. CBOD: unable to determine CBOD seed correction.
6/28/2010	BYPASS	630 Metro By-Pass Event #20	BOD5	mg/L	91	V	Composite consists of 2 grabs.
6/28/2010	BYPASS	630 Metro By-Pass Event #20	CBOD5	mg/L	66	V	Composite consists of 2 grabs. The PC grab bottle taken at 0245 had a pH=12.4.
6/28/2010	BYPASS	630 Metro By-Pass Event #20	TSS	mg/L	364	V	Composite consists of 2 grabs. The PC grab bottle taken at 0245 had a pH=12.4.
7/19/2010	METRO	789 Metro Final Effluent	TKN	mg/L	1.3	V	TKN repressed 7/28; repressed and reported result from PC container 8/4.
<u>Probe Not in Water</u>							
9/14/2010	DORWIN	910 Crk-Onondaga Creek @ Dorwin Ave.	COND-field	umHos/cm	14	V	V Flag:SpCond/Salinity probe NOT in water.
9/14/2010	DORWIN	910 Crk-Onondaga Creek @ Dorwin Ave.	Salinity-field	ppt	0.01	V	V Flag:SpCond/Salinity probe NOT in water.
<u>Control Limit Exceeded</u>							
7/12/2010	METRO	789 Metro Final Effluent	Endrin	µg/L	<0.2	V	Endrin result should be considered an estimate because the Endrin breakdown exceeded the control limit. Sample is split of sample 2010007528.
<u>QC Standards Failed Acceptance Criteria</u>							
4/13/2010	METRO	789 Metro Final Effluent	BOD5	mg/L	3	V	BOD5: Two consecutive sets of QC standards failed the acceptance criteria CBOD5: QC standards failed the acceptance criteria
7/21/2010	METRO	789 Metro Final Effluent	CBOD5	mg/L	<2	V	CBOD5: Two consecutive sets of QC standards failed the acceptance criteria
9/25/2010	METRO	789 Metro Final Effluent	BOD5	mg/L	<2	V	BOD5: Two consecutive sets of QC standards failed the acceptance criteria
<u>Turbidity Second Source Expired</u>							
12/2/2010	CKBLANK	888 Crk-Blank Dunker Churn (Crew B)	Turbidity	NTU	<0.1	V	Turbidity second source expired, waiting for new source to arrive.
12/2/2010	CKBLANK	901 Crk-Blank SS Pail (Crew A)	Turbidity	NTU	<0.1	V	Turbidity second source expired, waiting for new source to arrive.
12/2/2010	CKBLANK	990 Crk-Blank Churn (Crew A)	Turbidity	NTU	<0.1	V	Turbidity second source expired, waiting for new source to arrive.

Attachment 8. Sample results flagged "V" = Reported value is considered estimated due to variance from quality control or assurance criteria

B. Other QC Criteria not met

DATE	SITE	IND_ SOURCE CODE	PARAMETER	UNITS	SRESULT	REMARK_ CODE	LAB_COMMENTS
<u>Turbidity Second Source Expired (continued)</u>							
12/2/2010	DORWIN	910 Crk-Onondaga Creek @ Dorwin Ave.	Turbidity	NTU	288	V	Turbidity second source expired, waiting for new source to arrive.
12/2/2010	HIAWATHA	902 Crk-Harbor Brook @ Hiawatha	Turbidity	NTU	14.9	V	Turbidity second source expired, waiting for new source to arrive.
12/2/2010	KIRKPAT	882 Crk-Onondaga Creek @ Kirkpatrick	Turbidity	NTU	209	V	Turbidity second source expired, waiting for new source to arrive.
12/2/2010	OUTLET12	1907 Crk-Onondaga Lake Outlet 12 ft.	Turbidity	NTU	2.23	V	Turbidity second source expired, waiting for new source to arrive.
12/2/2010	OUTLET2	1906 Crk-Onondaga Lake Outlet 2 ft.	Turbidity	NTU	2.38	V	Turbidity second source expired, waiting for new source to arrive.
12/2/2010	PARK	908 Crk-Ley Creek @ Park Street	Turbidity	NTU	24.9	V	Turbidity second source expired, waiting for new source to arrive.
12/2/2010	RT48	905 Crk-Nine Mile Creek @ Lakeland Rt 48	Turbidity	NTU	42.8	V	Turbidity second source expired, waiting for new source to arrive.
12/2/2010	VELASKO	911 Crk-Harbor Brook @ Velasko Road	Turbidity	NTU	5.04	V	Turbidity second source expired, waiting for new source to arrive.
<u>Temperature Out of Compliance</u>							
6/26/2010	METRO	789 Metro Final Effluent	BOD5	mg/L	<2	V	BOD5,CBOD5:temperature out of compliance 07/02/10
6/26/2010	METRO	789 Metro Final Effluent	CBOD5	mg/L	<2	V	BOD5,CBOD5:temperature out of compliance 07/02/10
6/30/2010	METRO	789 Metro Final Effluent	BOD5	mg/L	2	V	BOD5,CBOD5:temperature out of compliance 07/02/10
6/30/2010	METRO	789 Metro Final Effluent - Duplicate	BOD5	mg/L	<2	V	Sample is duplicate of #2010007025. BOD5,CBOD5:temperature out of compliance 07/02/10
6/30/2010	METRO	789 Metro Final Effluent	CBOD5	mg/L	<2	V	BOD5,CBOD5:temperature out of compliance 07/02/10
6/30/2010	METRO	789 Metro Final Effluent - Duplicate	CBOD5	mg/L	<2	V	Sample is duplicate of #2010007025. BOD5,CBOD5:temperature out of compliance 07/02/10

Attachment 8. Sample results flagged "V" = *Reported value is considered estimated due to variance from quality control or assurance criteria*

C. Flagged "V", no Lab_Comment provided.

DATE	SITE	IND_ SOURCE CODE	PARAMETER	UNITS	SRESULT	REMARK_ LAB_COMMENTS CODE
4/17/2010	METRO	789 Metro Final Effluent	CBOD5	mg/L	<2	V
9/14/2010	DORWIN	910 Crk-Onondaga Creek @ Dorwin Ave.	DO-field	mg/L	10.18	V

Attachment 9. Sample results flagged "X" = Reported value fails limnological reasonableness

DATE	SITE	IND_ SOURCE CODE	PARAMETER	UNITS	SRESULT	REMARK_ CODE	LAB_COMMENTS
4/27/2010	KIRKPAT	882 Crk-Onondaga Creek @ Kirkpatrick	SRP	mg/L	0.003	X	TDP & SRP fail limnological reasonableness but within range of uncertainty of the tests.
			TDP	mg/L	<0.003	X	TDP repressed 4/28, results verified. TDP & SRP fail limnological reasonableness but within range of uncertainty of the tests.
6/8/2010	TRIB5A	904 Crk-Tributary 5a @ State Fair Blvd	SRP	mg/L	0.039	X	Sample is duplicate of #2010005984. TDP < SRP, failed limnological reasonableness however results are within range of uncertainty of the tests.
			TDP	mg/L	0.037	X	Sample is duplicate of #2010005984. TDP < SRP, failed limnological reasonableness however results are within range of uncertainty of the tests.
	VELASKO	911 Crk-Harbor Brook @ Velasko Road	TDP	mg/L	0.011	X	Sample is duplicate of #2010005988.
	TP	mg/L	0.01	X	Sample is duplicate of #2010005988.		
7/27/2010	SOUTH	921 Lake 9m South	TKN	mg/L	0.51	X	TKN & TKN-F repressed 8/4. TKN < TKN-F failed limnological reasonableness but within range of uncertainty of the tests.
			TKN-F	mg/L	0.52	X	TKN & TKN-F repressed 8/4. TKN < TKN-F failed limnological reasonableness but within range of uncertainty of the tests.
7/29/2010	SR_B269	951 River Buoy #269 Top	SRP	mg/L	0.045	X	TDP and SRP repeated. TDP < SRP failed limnological reasonableness but within range of uncertainty of the tests.
			TDP	mg/L	0.036	X	TDP and SRP repeated. TDP < SRP failed limnological reasonableness but within range of uncertainty of the tests.
	SR_B269	1070 River Buoy #269 Mid	SRP	mg/L	0.043	X	TDP and SRP repeated. TDP < SRP failed limnological reasonableness.
			TDP	mg/L	0.02	X	TDP and SRP repeated. TDP < SRP failed limnological reasonableness.
9/14/2010	VELASKO	911 Crk-Harbor Brook @ Velasko Road	SRP	mg/L	0.007	X	SRP > TDP and TP, failed limnological reasonableness.
	DORWIN	910 Crk-Onondaga Creek @ Dorwin Ave.	TOC	mg/L	1.98	X	TOC & TOC-F repressed. TOC & F-TOC fail limnological reasonableness but within range of uncertainty of the tests.
			TOC-F	mg/L	2.08	X	TOC & TOC-F repressed. TOC & F-TOC fail limnological reasonableness but within range of uncertainty of the tests.

Attachment 9. Sample results flagged "X" = *Reported value fails limnological reasonableness*

DATE	SITE	IND_ SOURCE CODE	PARAMETER	UNITS	SRESULT	REMARK_ CODE	LAB_COMMENTS
9/23/2010	NORTH	933 Lake 18m North	SRP	mg/L	0.067	X	SRP > TDP and TP, failed limnological reasonableness.
10/26/2010	LS_9MILE	983 Lake Nearshore (Nine Mile Creek)	ECOLI	count/100	148	X	ECOLI > FCOLI fail limnological reasonableness but are within the range of uncertainty of the tests.
			FCOLI-MF	count/100	90	X	ECOLI > FCOLI fail limnological reasonableness but are within the range of uncertainty of the tests.
11/9/2010	HIAWATHA	902 Crk-Harbor Brook @ Hiawatha	SRP	mg/L	0.041	X	TDP & SRP fail limnological reasonableness but within range of uncertainty of the tests.
			TDP	mg/L	0.038	X	TDP & SRP fail limnological reasonableness but within range of uncertainty of the tests.
11/24/2010	DORWIN	910 Crk-Onondaga Creek @ Dorwin Ave.	SRP	mg/L	0.02	X	TDP result verified. TDP & SRP fail limnological reasonableness.
			TDP	mg/L	0.009	X	TDP result verified. TDP & SRP fail limnological reasonableness.