

2014 Volunteer Water Quality Monitoring Report

The Chittenden County Stream Team (CCST) is a program to engage citizens across an eight-town area to implement projects to reduce non-point source pollution and stormwater volume at the local level. The participating towns are Burlington, Essex, Essex Junction, Milton, Shelburne, South Burlington, Williston, and Winooski. The project is managed by the Chittenden County Regional Planning Commission, and run by the Winooski Natural Resource Conservation District with assistance from the Friends of the Winooski River. This report describes the results of the third year of a stream water quality monitoring effort by the CCST.

The CCST collected biweekly water quality samples at fourteen sites on eight area streams during the summers of 2012, 2013, and 2014. These mostly urban or suburban streams suffer from sedimentation, excessive nutrient loads, high temperatures, bacteria, and other pollutants. In 2014, samples were collected on a total of five sampling dates during the season and were analyzed for turbidity, total phosphorous, and chloride. These parameters were also sampled at five of these sites during a rain event on 10/21. The specific sampling sites and their locations are listed in Table 1 and a map of the sites is shown in Figure 1.

Table 1. Chittenden County Stream Team 2014 Water Quality Sampling Sites

<u>Location</u>	<u>Waterbody</u>	<u>Site ID</u>	<u>Lat / Long</u>
Grove Street in Burlington	Centennial Brook	Cent 10	44.48453 / -73.18423
Champlain School Comm. Gardens	Englesby Brook	Englesby 10	44.45627 / -73.21394
Essex High School	Indian Brook	Indian 10	44.49668 / -73.11093
Lang Farm in Essex	Indian Brook	Indian 20	44.50442 / -73.09190
McMullen Road	Malletts Creek	Milton 10	44.60779 / -73.20103
Route 7 and Bay Road	Monroe Brook	Monroe 10	44.38987 / -73.21730
Spear & Webster Intersection	Monroe Brook	Monroe 20	44.38984 / -73.20103
Landry Park Winooski	Morehouse Brook	Morehouse 10	44.50037 / -73.19370
River Cove Road in Williston	Muddy Brook	Muddy 10	44.47293 / -73.13505
Marshall Avenue in South Burlington	Muddy Brook	Muddy 20	44.45340 / -73.13833
Van Sicklen Road in Williston	Muddy Brook	Muddy 30	44.42823 / -73.14622
Kindness Court in South Burlington	Potash Brook	Potash 10	44.44572 / -73.21348
Farrell Street in South Burlington	Potash Brook	Potash 20	44.44660 / -73.20415
Dorset Street in South Burlington	Potash Brook	Potash 30	44.45150 / -73.17849

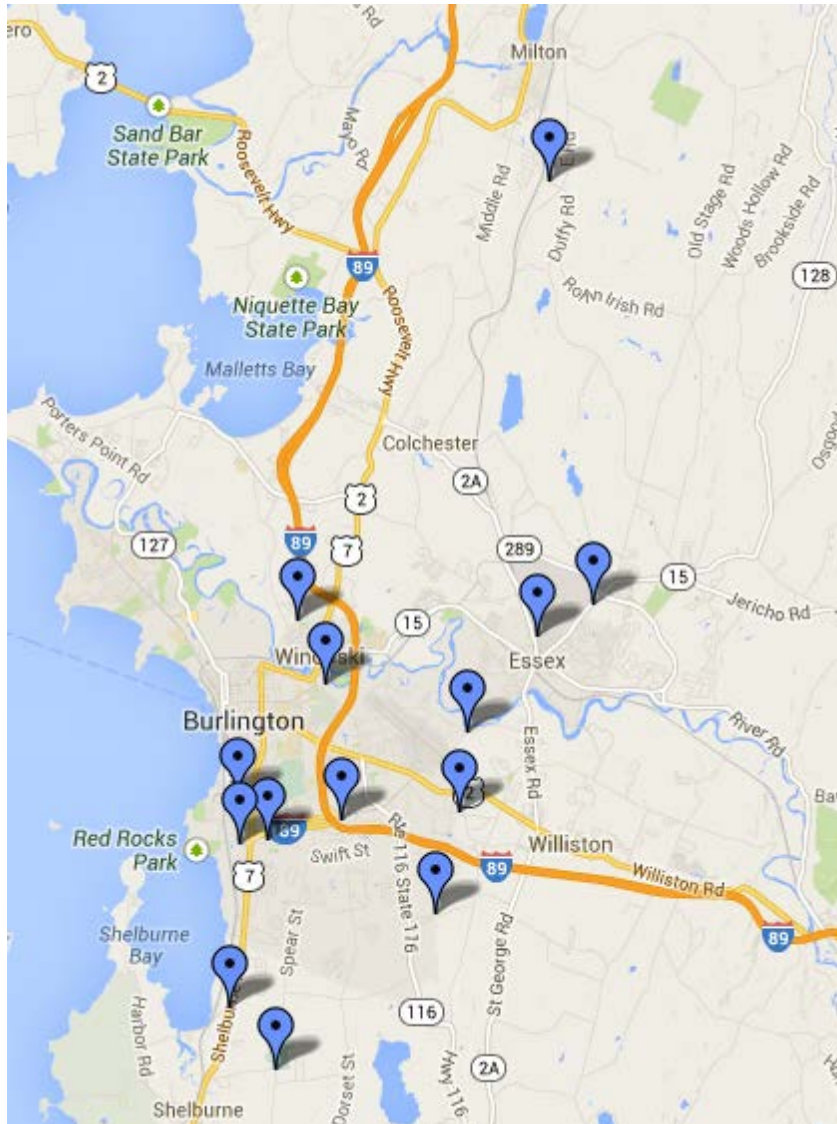


Figure 1. Chittenden County Stream Team 2014 water quality monitoring sites.

Results summary

The summer of 2014 was relatively dry in terms of precipitation amounts. Rainfall amounts in the 48 hours prior to all sampling were below 0.25 inches at all sites on all dates, and volunteers reported the flow levels as either low or medium and the flow category as baseflow. For the purposes of this report, therefore, all samples are considered to have been collected during dry conditions.

Our sampling results indicate that 2014 mean chloride levels were high in Centennial, Englesby, and Potash Brooks, where they exceeded the proposed state standard of 230 mg/L. Mean phosphorus levels exceeded the proposed Vermont state standard of 27ug/L in all samples at all sites except Malletts Creek (Site ID = Milton 10), and were especially high on Muddy Brook. All streams had total phosphorus levels well above 10ug/L, the target phosphorus concentration for Lake Champlain (Main Lake). Turbidity levels averaged below the state standard of 10 NTU for Class B, cold-water streams. The results for each parameter are discussed in more detail in separate sections below; the mean levels of each parameter are summarized in Table 2. Raw data is presented in Appendix C.

Site ID	Chloride (mg/L)	Phosphorus, Total (ug/L)	Turbidity (NTU)
Centennial 10	499.6	53.4	8.6
Engelsby 10	328.0	46.7	6.3
Indian 10	173.8	35.9	8.0
Indian 20	64.9	42.3	11.7
Milton 10	35.0	26.3	4.7
Monroe 10	113.2	45.8	13.2
Monroe 20	49.4	47.5	11.4
Morehouse 10	109.6	28.2	4.8
Muddy 10	101.4	54.4	5.9
Muddy 20	82.9	88.2	10.5
Muddy 30	26.2	108.1	8.3
Potash 10	380.0	27.0	2.6
Potash 20	375.2	30.1	1.8
Potash 30	330.0	44.5	4.6

Table 2. 2014 Chittenden County Stream Team Results Summary. Mean values for chloride, total phosphorous, and turbidity in eight Burlington area streams, based on five dry-weather, baseflow samples taken biweekly during the summer. Mean levels above proposed or adopted Vermont water quality standards are highlighted.

Chloride levels in Chittenden County Streams 2012-2014

The mean levels of chloride at each of the sampling sites in all sampling years are shown in Figure 2. Centennial and Potash Brooks had mean chloride levels that exceeded the EPA chronic criterion of 230 mg/L in all years. In 2014, mean chloride levels exceeded this standard in Engelsby Brook as well. Chloride levels in these three problem streams were higher in 2014 than in other years. This may be due to an increase in road salt use in surrounding areas or to the fact that the summer of 2014 was relatively dry, and chloride levels tend to be higher in drier conditions. None of the individual samples for any of the CCST monitoring sites in any year had chloride levels that exceeded the EPA’s acute standard, which is 860 mg chloride/L.

The high chronic levels of chloride in Centennial, Potash, and Engelsby Brooks are of a major concern since sustained elevated chloride can interfere with the survival and reproduction of freshwater aquatic organisms. The EPA, when recommending the 230mg/L criterion, stated, “Freshwater aquatic organisms and their uses should not be affected unacceptably if the four-day average concentration of dissolved chloride, when associated with sodium, does not exceed 230 mg/L more than once every three years on the average.” Of the nineteen samples the CCST has collected in Centennial Brook over the past three years, only 3 have had chloride levels below 230mg/L. Only 15 out of 50 samples from Potash Brook had chloride levels below the standard during the three years of sampling. In 2014, all of the samples collected in either Centennial or Potash Brook had chloride levels above the standard; Engelsby Brook had only one of five samples fall below the chloride standard. It therefore seems likely that chloride levels on these three streams have had four-day average concentrations above 230 mg/L more than once in the past three years, and that the aqualtic life in these streams is being negatively impacted by chloride.

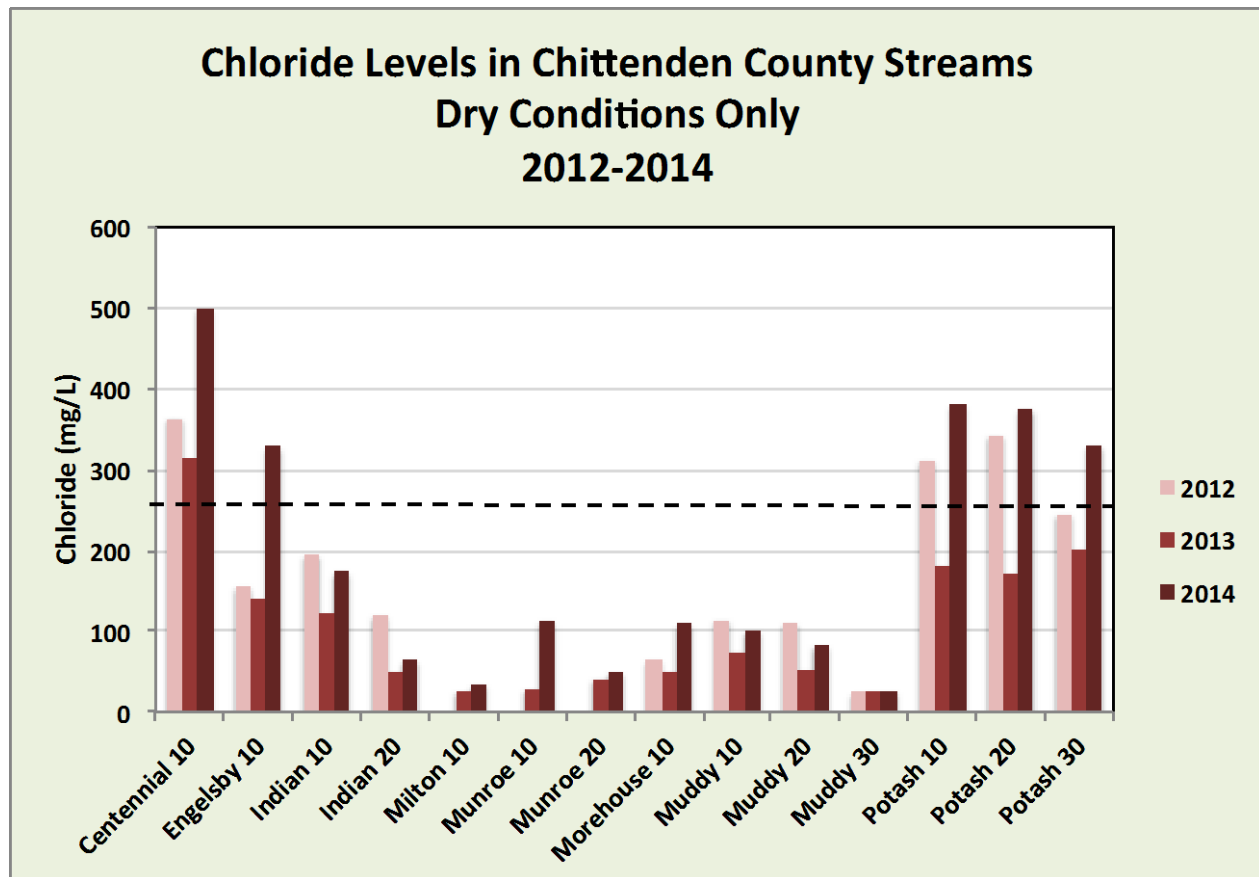


Figure 3. Mean chloride levels in Chittenden County Streams 2012-2014. Only the chloride levels in samples collected in dry weather conditions were used to calculate the mean. The EPA standard (and proposed Vermont standard) for mean chloride levels of 230 mg/L is shown by the dotted line. This is the concentration of chloride above which chronic health effects have been observed in of aquatic species.

Phosphorous

The state of Vermont is considering adoption of a base-flow phosphorous standard of 27 ug/L for class B, “warm water medium-gradient streams” and 15 ug/L for “medium (sized) high-gradient streams.” We are assuming most of the streams monitored by the CCST would fall under the first category, although the streams monitored are not listed as warm-water streams in the 2011 Vermont Water Quality Standards. This concentration is indicated by a dotted line in Figure 3, which shows a comparison of the mean phosphorus levels during dry conditions for all three years of CCST monitoring.

Mean phosphorous levels in dry, base-flow conditions at all the sites in all the streams sampled were above the target 10ug/L concentration for Lake Champlain and, except for Malletts Creek, exceeded the 27 ug/L standard. Muddy Brook, which forms the border between South Burlington and Williston, had particularly high levels of phosphorous, especially at the most upstream site (Muddy 30). 2014 phosphorus levels were generally lower than in 2012 and 2013, probably because 2014 was a relatively dry year and phosphorus enters streams when fertilizers, animal waste, etc. gets washed into them via rainfall and snowmelt.

Phosphorus Levels in Chittenden County Streams Dry Conditions Only 2012-2014

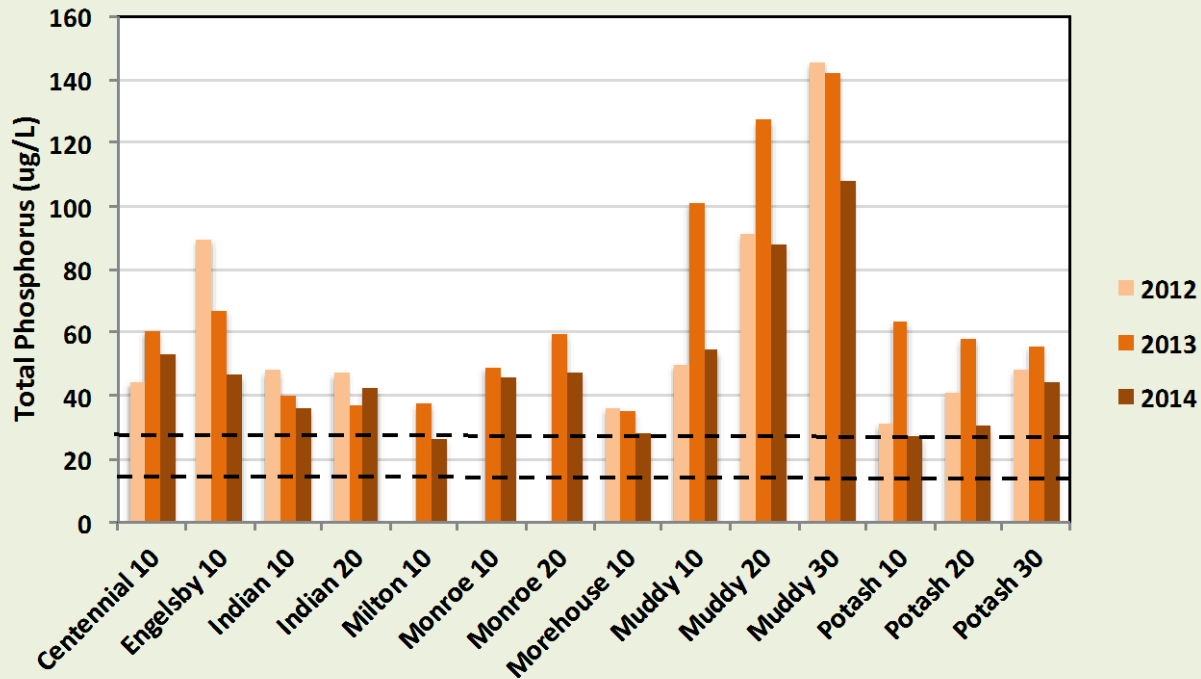


Figure 3. Comparison of mean total phosphorus levels 2012-2014 during dry conditions. The standard proposed by the State of Vermont for mean total phosphorus at base-flow in medium gradient, warm water streams (27 ug/L) is indicated by the dotted black line.

Turbidity

None of the mean turbidity values from any of the sampled streams exceeded the VT Water Quality standard for turbidity of 25 nephelometric units (NTU) for warm-water fish habitat. However, average turbidity levels in Indian, Monroe, and Muddy Brooks were above the 10 NTU standard for cold-water fish habitat.

Rain event sampling

In 2014, a Chittenden County Stream Team volunteer sampled five sites for chloride, phosphorus, and turbidity during a rainstorm on 10/21/14. Samples were collected as soon as possible after the onset of a rainstorm in an attempt to sample the “first flush” of stormwater flow. The results of this sampling are shown in Table 3, where they are compared with the 2014 mean values of these parameters measured during dry conditions.

Site ID	Chloride (mg/L)	Phosphorus, Total (ug P/L)	Turbidity (NTU)
Centennial 10 2014 mean, dry conditions	500	53	9
Centennial 10 rain event	368	58	11
Indian 10 2014 mean, dry conditions	174	36	8
Indian 10 rain event	122	32	3
Morehouse 10 2014 mean, dry conditions	110	28	5
Morehouse 10 rain event	54	33	2
Muddy 20 2014 mean, dry conditions	83	88	11
Muddy 20 rain event	145	66	6
Potash 20 2014 mean, dry conditions	375	30	2
Potash 20 rain event	266	32	2

Table 3. Chittenden County Stream Team 2014 Rain Event Sampling. Chloride levels above 230 mg/L, total phosphorous levels above 27ug/L, and turbidity levels above 10 NTU are highlighted. Means for dry conditions were determined from the biweekly sampling described above.

Since this comparison is based on only one rain event, firm conclusions about the effect of rainfall on these streams cannot be made. However, when combined with CSST rain event monitoring in 2012 and 2013, some patterns begin to emerge. Table 4 shows the results for all three years. In general, chloride levels are highest during dry periods, indicating that rainfall and associated runoff is diluting chloride concentrations. Muddy Brook is the exception: during two of the rain events monitored in the 2012-2014 period chloride levels increased.

Site ID	Chloride (mg/L)	Phosphorus, Total (ug P/L)	Turbidity (NTU)
Cent 10 Dry	412	51	7
Cent 10 Rain	270	173	32
Indian 10 Dry	170	42	9
Indian 10 Rain	109	62	5
Morehouse 10 Dry	77	52	20
Morehouse 10 Rain	53	145	86
Muddy 20 Dry	89	96	10
Muddy 20 Rain	108	94	12
Potash 20 Dry	328	39	2
Potash 20 Rain	213	53	3

Table 4. Mean levels of chloride, total phosphorus, and turbidity in Chittenden Country Stream during dry conditions or rain events in 2012-2014. Concentrations above the VT proposed or adopted water quality standards are highlighted.

Phosphorus levels generally increased during rainstorms, as expected. Runoff from urban, suburban, and rural landscapes carries fertilizers, animal waste, and sometimes overflows from sewer systems – all of which are high in phosphorus. Muddy Brook was again the exception in that its phosphorus levels stayed relatively level during precipitation events. Centennial and Morehouse Brooks, on the other hand, appear to be particularly susceptible to the effects of stormwater runoff and/or erosion.

Conclusion

The Chittenden County Stream Team has monitored chloride, phosphorus, and turbidity in Burlington area streams for the past three years (2012-2014). Phosphorus levels in these mainly urban and suburban streams are consistently above the proposed Vermont water quality standard of 27 ug/L, even in dry summers like that of 2014. Muddy Brook had especially high levels, with one site averaging concentrations of over 100 ug/L in 2014. Centennial and Englesby Brooks also had particularly high phosphorus concentrations. All sites on all streams had concentrations above the target level of phosphorus for Lake Champlain. Chloride levels were also a problem in several streams, most notably Centennial, Engelsby, and Potash Brooks. 2014 Chloride levels in these streams were significantly higher than in the past two years of CCST monitoring, and are likely to be causing a negative impact on aquatic organisms in those streams. Turbidity levels, while slightly elevated in Indian, Monroe, and Muddy Brooks, does not seem to be as much of a concern. Limited rain event sampling in 2014 and previous years indicates that Centennial and Morehouse Brooks may be particularly susceptible to the effects of surface runoff.

Appendix A. Quality Assurance Measures for Phosphorous, Chloride, and Turbidity Sampling in 2014

Site ID	Date	Sample Type	Relative Percent Difference Between Duplicate Pairs (RPD)
Morehouse10	6/24/14	Chloride	0.8 %
		Phosphorus	0 %
		Turbidity	3.1 %
Muddy 10	7/8/14	Chloride	0.8 %
		Phosphorus	1.8 %
		Turbidity	10.5 %
Potash 20	7/22/14	Chloride	2.2%
		Phosphorus	28.7 %
		Turbidity	6.2 %
Monroe 20	8/5/14	Chloride	0.8 %
		Phosphorus	2.2 %
		Turbidity	12.5 %
Milton 10	8/19/14	Chloride	0.3 %
		Phosphorus	0.6 %
		Turbidity	1.2 %
Centennial 10	10/21/14	Chloride	0.5 %
		Phosphorus	2.1 %
		Turbidity	6.6 %
Mean Relative Percent Difference (Mean RPD)		Chloride	0.9%
		Phosphorus	5.9%
		Turbidity	6.7%

Target RPD for duplicate field samples:

Chloride ≤5%

Phosphorus ≤30%

Turbidity ≤15%

Appendix B– Project Completeness

Parameter	Number of Samples Anticipated	Number of Valid Samples Collected & Analyzed	Percent Complete
Turbidity	94	87	92%
Total phosphorus	94	87	92%
Chloride	94	86	91%

Appendix C – Individual Sample Results

Sample Number	Location	Date	Test	Symbol	Results
140331-01	Cent 10	6/24/14	Chloride		490
140331-01	Cent 10	6/24/14	Phosphorus - Digested		47.7
140331-01	Cent 10	6/24/14	Turbidity		3.62
140332-01	Cent 10	7/8/14	Chloride		584
140332-01	Cent 10	7/8/14	Phosphorus - Digested		59.4
140332-01	Cent 10	7/8/14	Turbidity		7.14
140416-01	Cent 10	7/22/14	Chloride		570
140416-01	Cent 10	7/22/14	Phosphorus - Digested		63.3
140416-01	Cent 10	7/22/14	Turbidity		14.1
140475-01	Cent 10	8/5/14	Chloride		406
140475-01	Cent 10	8/5/14	Phosphorus - Digested		49.7
140475-01	Cent 10	8/5/14	Turbidity		8.52
140538-01	Cent 10	8/19/14	Chloride		448
140538-01	Cent 10	8/19/14	Phosphorus - Digested		46.9
140538-01	Cent 10	8/19/14	Turbidity		9.58
140333-01	Cent 10	10/21/14	Chloride		368
140333-01	Cent 10	10/21/14	Phosphorus - Digested		57.6
140333-01	Cent 10	10/21/14	Turbidity		10.9
140333-03	Cent 10 - Blank	10/21/14	Chloride	<	2
140333-03	Cent 10 - Blank	10/21/14	Phosphorus - Digested	<	5
140333-03	Cent 10 - Blank	10/21/14	Turbidity	<	0.2
140333-02	Cent 10 - Duplicate	10/21/14	Chloride		370
140333-02	Cent 10 - Duplicate	10/21/14	Phosphorus - Digested		56.4
140333-02	Cent 10 - Duplicate	10/21/14	Turbidity		10.2
140331-02	Engelsby 10	6/24/14	Chloride		404
140331-02	Engelsby 10	6/24/14	Phosphorus - Digested		41.6
140331-02	Engelsby 10	6/24/14	Turbidity		5.24
140332-02	Engelsby 10	7/8/14	Chloride		352
140332-02	Engelsby 10	7/8/14	Phosphorus - Digested		42.7
140332-02	Engelsby 10	7/8/14	Turbidity		4.74
140416-02	Engelsby 10	7/22/14	Chloride		402
140416-02	Engelsby 10	7/22/14	Phosphorus - Digested		40.5
140416-02	Engelsby 10	7/22/14	Turbidity		4.15
140475-02	Engelsby 10	8/5/14	Chloride		254
140475-02	Engelsby 10	8/5/14	Phosphorus - Digested		48.9
140475-02	Engelsby 10	8/5/14	Turbidity		7.29
140538-02	Engelsby 10	8/19/14	Chloride		228
140538-02	Engelsby 10	8/19/14	Phosphorus - Digested		59.9
140538-02	Engelsby 10	8/19/14	Turbidity		9.99
140331-03	Indian 10	6/24/14	Chloride		224

140331-03	Indian 10	6/24/14	Phosphorus - Digested		37.4
140331-03	Indian 10	6/24/14	Turbidity		7.4
140332-03	Indian 10	7/8/14	Chloride		165
140332-03	Indian 10	7/8/14	Phosphorus - Digested		36.1
140332-03	Indian 10	7/8/14	Turbidity		4.88
140416-03	Indian 10	7/22/14	Chloride		238
140416-03	Indian 10	7/22/14	Phosphorus - Digested		33.8
140416-03	Indian 10	7/22/14	Turbidity		7.57
140475-03	Indian 10	8/5/14	Chloride		126
140475-03	Indian 10	8/5/14	Phosphorus - Digested		42.2
140475-03	Indian 10	8/5/14	Turbidity		15.7
140538-03	Indian 10	8/19/14	Chloride		116
140538-03	Indian 10	8/19/14	Phosphorus - Digested		30.2
140538-03	Indian 10	8/19/14	Turbidity		4.62
140333-04	Indian 10	10/21/14	Chloride		122
140333-04	Indian 10	10/21/14	Phosphorus - Digested		32.1
140333-04	Indian 10	10/21/14	Turbidity		2.63
140331-04	Indian 20	6/24/14	Chloride		87.9
140331-04	Indian 20	6/24/14	Phosphorus - Digested		53.6
140331-04	Indian 20	6/24/14	Turbidity		19.6
140332-04	Indian 20	7/8/14	Chloride		44.2
140332-04	Indian 20	7/8/14	Phosphorus - Digested		42.5
140332-04	Indian 20	7/8/14	Turbidity		10.9
140416-04	Indian 20	7/22/14	Chloride		132
140416-04	Indian 20	7/22/14	Phosphorus - Digested		44.9
140416-04	Indian 20	7/22/14	Turbidity		9.72
140475-04	Indian 20	8/5/14	Chloride		31.7
140475-04	Indian 20	8/5/14	Phosphorus - Digested		39.7
140475-04	Indian 20	8/5/14	Turbidity		12.8
140538-04	Indian 20	8/19/14	Chloride		28.6
140538-04	Indian 20	8/19/14	Phosphorus - Digested		30.7
140538-04	Indian 20	8/19/14	Turbidity		5.4
140331-16	Milton 10	6/24/14	Chloride		34.9
140331-16	Milton 10	6/24/14	Phosphorus - Digested		21.3
140331-16	Milton 10	6/24/14	Turbidity		3.2
140332-16	Milton 10	7/8/14	Chloride		36.3
140332-16	Milton 10	7/8/14	Phosphorus - Digested		24.2
140332-16	Milton 10	7/8/14	Turbidity		3.78
140416-16	Milton 10	7/22/14	Phosphorus - Digested		26.7
140416-16	Milton 10	7/22/14	Turbidity		4.57
140475-16	Milton 10	8/5/14	Chloride		31.6
140475-16	Milton 10	8/5/14	Phosphorus - Digested		28.1

140475-16	Milton 10	8/5/14	Turbidity		5.03
140538-14	Milton 10	8/19/14	Chloride		37.2
140538-14	Milton 10	8/19/14	Phosphorus - Digested		31.2
140538-14	Milton 10	8/19/14	Turbidity		6.72
140538-15	Milton 10-Blank	8/19/14	Chloride	<	2
140538-15	Milton 10-Blank	8/19/14	Phosphorus - Digested	<	5
140538-15	Milton 10-Blank	8/19/14	Turbidity	<	0.2
140538-16	Milton 10-Duplicate	8/19/14	Chloride		37.1
140538-16	Milton 10-Duplicate	8/19/14	Phosphorus - Digested		31.4
140538-16	Milton 10-Duplicate	8/19/14	Turbidity		6.8
140331-14	Monroe 10	6/24/14	Chloride		115
140331-14	Monroe 10	6/24/14	Phosphorus - Digested		50.3
140331-14	Monroe 10	6/24/14	Turbidity		16.8
140332-14	Monroe 10	7/8/14	Chloride		88.1
140332-14	Monroe 10	7/8/14	Phosphorus - Digested		56.3
140332-14	Monroe 10	7/8/14	Turbidity		17.6
140416-14	Monroe 10	7/22/14	Chloride		179
140416-14	Monroe 10	7/22/14	Phosphorus - Digested		35.5
140416-14	Monroe 10	7/22/14	Turbidity		4.51
140475-12	Monroe 10	8/5/14	Chloride		93.4
140475-12	Monroe 10	8/5/14	Phosphorus - Digested		45.6
140475-12	Monroe 10	8/5/14	Turbidity		13.8
140538-12	Monroe 10	8/19/14	Chloride		90.3
140538-12	Monroe 10	8/19/14	Phosphorus - Digested		41.1
140538-12	Monroe 10	8/19/14	Turbidity		13.4
140331-15	Monroe 20	6/24/14	Chloride		44.7
140331-15	Monroe 20	6/24/14	Phosphorus - Digested		52.4
140331-15	Monroe 20	6/24/14	Turbidity		14.4
140332-15	Monroe 20	7/8/14	Chloride		36.5
140332-15	Monroe 20	7/8/14	Phosphorus - Digested		51.2
140332-15	Monroe 20	7/8/14	Turbidity		18.2
140416-15	Monroe 20	7/22/14	Chloride		93.6
140416-15	Monroe 20	7/22/14	Phosphorus - Digested		49.6
140416-15	Monroe 20	7/22/14	Turbidity		8.37
140475-13	Monroe 20	8/5/14	Chloride		36.5
140475-13	Monroe 20	8/5/14	Phosphorus - Digested		45
140475-13	Monroe 20	8/5/14	Turbidity		9.75
140538-13	Monroe 20	8/19/14	Chloride		35.7
140538-13	Monroe 20	8/19/14	Phosphorus - Digested		39.5
140538-13	Monroe 20	8/19/14	Turbidity		6.47
140475-14	Monroe 20-Blank	8/5/14	Chloride	<	2
140475-14	Monroe 20-Blank	8/5/14	Phosphorus - Digested	<	5

140475-14	Monroe 20-Blank	8/5/14	Turbidity	<	0.2
140475-15	Monroe 20-Duplicate	8/5/14	Chloride		36.8
140475-15	Monroe 20-Duplicate	8/5/14	Phosphorus - Digested		44
140475-15	Monroe 20-Duplicate	8/5/14	Turbidity		8.6
140331-05	Morehouse 10	6/24/14	Chloride		130
140331-05	Morehouse 10	6/24/14	Phosphorus - Digested		23.9
140331-05	Morehouse 10	6/24/14	Turbidity		3.97
140332-05	Morehouse 10	7/8/14	Chloride		102
140332-05	Morehouse 10	7/8/14	Phosphorus - Digested		33.6
140332-05	Morehouse 10	7/8/14	Turbidity		3.61
140416-05	Morehouse 10	7/22/14	Chloride		126
140416-05	Morehouse 10	7/22/14	Phosphorus - Digested		33.5
140416-05	Morehouse 10	7/22/14	Turbidity		8.08
140475-05	Morehouse 10	8/5/14	Chloride		98.6
140475-05	Morehouse 10	8/5/14	Phosphorus - Digested		23.4
140475-05	Morehouse 10	8/5/14	Turbidity		3.77
140538-05	Morehouse 10	8/19/14	Chloride		91.2
140538-05	Morehouse 10	8/19/14	Phosphorus - Digested		26.7
140538-05	Morehouse 10	8/19/14	Turbidity		4.38
140333-05	Morehouse 10	10/21/14	Chloride		54
140333-05	Morehouse 10	10/21/14	Phosphorus - Digested		32.5
140333-05	Morehouse 10	10/21/14	Turbidity		2.18
140331-07	Morehouse 10 - Blank	6/24/14	Chloride	<	2
140331-07	Morehouse 10 - Blank	6/24/14	Phosphorus - Digested	<	5
140331-07	Morehouse 10 - Blank	6/24/14	Turbidity	<	0.2
140331-06	Morehouse 10 - Duplicate	6/24/14	Chloride		131
140331-06	Morehouse 10 - Duplicate	6/24/14	Phosphorus - Digested		23.9
140331-06	Morehouse 10 - Duplicate	6/24/14	Turbidity		3.85
140331-08	Muddy 10	6/24/14	Chloride		86.1
140331-08	Muddy 10	6/24/14	Phosphorus - Digested		51.4
140331-08	Muddy 10	6/24/14	Turbidity		7.39
140332-06	Muddy 10	7/8/14	Chloride		75.9
140332-06	Muddy 10	7/8/14	Phosphorus - Digested		61.6
140332-06	Muddy 10	7/8/14	Turbidity		6.43
140416-06	Muddy 10	7/22/14	Chloride		102
140416-06	Muddy 10	7/22/14	Phosphorus - Digested		49.9
140416-06	Muddy 10	7/22/14	Turbidity		4.21
140475-06	Muddy 10	8/5/14	Chloride		114
140475-06	Muddy 10	8/5/14	Phosphorus - Digested		55.5
140475-06	Muddy 10	8/5/14	Turbidity		5.78
140538-06	Muddy 10	8/19/14	Chloride		129
140538-06	Muddy 10	8/19/14	Phosphorus - Digested		53.6

140538-06	Muddy 10	8/19/14	Turbidity		5.46
140332-07	Muddy 10-Blank	7/8/14	Chloride	<	2
140332-07	Muddy 10-Blank	7/8/14	Phosphorus - Digested	<	5
140332-07	Muddy 10-Blank	7/8/14	Turbidity	<	0.2
140332-08	Muddy 10-Duplicate	7/8/14	Chloride		76.5
140332-08	Muddy 10-Duplicate	7/8/14	Phosphorus - Digested		62.7
140332-08	Muddy 10-Duplicate	7/8/14	Turbidity		7.14
140331-09	Muddy 20	6/24/14	Chloride		71.6
140331-09	Muddy 20	6/24/14	Phosphorus - Digested		75.2
140331-09	Muddy 20	6/24/14	Turbidity		11.7
140332-09	Muddy 20	7/8/14	Chloride		67.3
140332-09	Muddy 20	7/8/14	Phosphorus - Digested		87.3
140332-09	Muddy 20	7/8/14	Turbidity		11.5
140416-07	Muddy 20	7/22/14	Chloride		78
140416-07	Muddy 20	7/22/14	Phosphorus - Digested		102
140416-07	Muddy 20	7/22/14	Turbidity		8.28
140475-07	Muddy 20	8/5/14	Chloride		92.5
140475-07	Muddy 20	8/5/14	Phosphorus - Digested		93.8
140475-07	Muddy 20	8/5/14	Turbidity		11.2
140538-07	Muddy 20	8/19/14	Chloride		105
140538-07	Muddy 20	8/19/14	Phosphorus - Digested		82.9
140538-07	Muddy 20	8/19/14	Turbidity		9.95
140333-06	Muddy 20	10/21/14	Chloride		145
140333-06	Muddy 20	10/21/14	Phosphorus - Digested		65.5
140333-06	Muddy 20	10/21/14	Turbidity		6.24
140331-10	Muddy 30	6/24/14	Chloride		23.4
140331-10	Muddy 30	6/24/14	Phosphorus - Digested		79.9
140331-10	Muddy 30	6/24/14	Turbidity		8.03
140332-10	Muddy 30	7/8/14	Chloride		24.8
140332-10	Muddy 30	7/8/14	Phosphorus - Digested		89.5
140332-10	Muddy 30	7/8/14	Turbidity		6.14
140416-08	Muddy 30	7/22/14	Chloride		24.4
140416-08	Muddy 30	7/22/14	Phosphorus - Digested		140
140416-08	Muddy 30	7/22/14	Turbidity		6.33
140475-08	Muddy 30	8/5/14	Chloride		27.2
140475-08	Muddy 30	8/5/14	Phosphorus - Digested		120
140475-08	Muddy 30	8/5/14	Turbidity		11.5
140538-08	Muddy 30	8/19/14	Chloride		31.2
140538-08	Muddy 30	8/19/14	Phosphorus - Digested		111
140538-08	Muddy 30	8/19/14	Turbidity		9.41
140331-11	Potash 10	6/24/14	Chloride		440
140331-11	Potash 10	6/24/14	Phosphorus - Digested		29.7

140331-11	Potash 10	6/24/14	Turbidity		2.95
140332-11	Potash 10	7/8/14	Chloride		406
140332-11	Potash 10	7/8/14	Phosphorus - Digested		29.9
140332-11	Potash 10	7/8/14	Turbidity		2.82
140416-09	Potash 10	7/22/14	Chloride		384
140416-09	Potash 10	7/22/14	Phosphorus - Digested		22.3
140416-09	Potash 10	7/22/14	Turbidity		2.1
140475-09	Potash 10	8/5/14	Chloride		346
140475-09	Potash 10	8/5/14	Phosphorus - Digested		24.1
140475-09	Potash 10	8/5/14	Turbidity		2.74
140538-09	Potash 10	8/19/14	Chloride		324
140538-09	Potash 10	8/19/14	Phosphorus - Digested		29
140538-09	Potash 10	8/19/14	Turbidity		2.44
140331-12	Potash 20	6/24/14	Chloride		444
140331-12	Potash 20	6/24/14	Phosphorus - Digested		30.8
140331-12	Potash 20	6/24/14	Turbidity		1.6
140332-12	Potash 20	7/8/14	Chloride		424
140332-12	Potash 20	7/8/14	Phosphorus - Digested		31.9
140332-12	Potash 20	7/8/14	Turbidity		2.91
140416-10	Potash 20	7/22/14	Chloride		368
140416-10	Potash 20	7/22/14	Phosphorus - Digested		31.1
140416-10	Potash 20	7/22/14	Turbidity		1.34
140475-10	Potash 20	8/5/14	Chloride		342
140475-10	Potash 20	8/5/14	Phosphorus - Digested		26.3
140475-10	Potash 20	8/5/14	Turbidity		1.61
140538-10	Potash 20	8/19/14	Chloride		298
140538-10	Potash 20	8/19/14	Phosphorus - Digested		30.4
140538-10	Potash 20	8/19/14	Turbidity		1.4
140333-07	Potash 20	10/21/14	Chloride		266
140333-07	Potash 20	10/21/14	Phosphorus - Digested		31.7
140333-07	Potash 20	10/21/14	Turbidity		1.81
140416-11	Potash 20-Blank	7/22/14	Chloride	<	2
140416-11	Potash 20-Blank	7/22/14	Phosphorus - Digested	<	5
140416-11	Potash 20-Blank	7/22/14	Turbidity	<	0.2
140416-12	Potash 20-Duplicate	7/22/14	Chloride		376
140416-12	Potash 20-Duplicate	7/22/14	Phosphorus - Digested		23.3
140416-12	Potash 20-Duplicate	7/22/14	Turbidity		1.26
140331-13	Potash 30	6/24/14	Chloride		354
140331-13	Potash 30	6/24/14	Phosphorus - Digested		36.1
140331-13	Potash 30	6/24/14	Turbidity		3.58
140332-13	Potash 30	7/8/14	Chloride		324
140332-13	Potash 30	7/8/14	Phosphorus - Digested		45.9

140332-13	Potash 30	7/8/14	Turbidity		4.99
140416-13	Potash 30	7/22/14	Chloride		338
140416-13	Potash 30	7/22/14	Phosphorus - Digested		50.6
140416-13	Potash 30	7/22/14	Turbidity		5.56
140475-11	Potash 30	8/5/14	Chloride		294
140475-11	Potash 30	8/5/14	Phosphorus - Digested		55.1
140475-11	Potash 30	8/5/14	Turbidity		5.34
140538-11	Potash 30	8/19/14	Chloride		340
140538-11	Potash 30	8/19/14	Phosphorus - Digested		34.6
140538-11	Potash 30	8/19/14	Turbidity		3.41